A Message from the Dean

As a new academic year begins, I welcome new and returning graduate students to the University of Calgary. You are valued members of our University's community as students, as researchers and as teachers. Your success – whether in the laboratory, the classroom or the community – is also our success, and we are committed to providing the training and support you need to achieve it. As a vibrant and growing research-intensive institution, the University of Calgary is committed to training the next generation of scholars, practitioners and professionals.

Many resources are available to you during the course of your graduate education. The faculty members in your program, notably your supervisor, should provide mentorship both in the substance of your area of study and in your development as a professional and scholar in your field. The Graduate Students' Association, the Student Success Centre, the Centre for International Students and Study Abroad, the Wellness Centre, and the My GradSkills program among others, provide a wide range of services and support for graduate students over the course of their degree programs. I encourage you to familiarize yourself with these resources and make use of the assistance they can provide.

The Faculty of Graduate Studies provides leadership and support for excellence in graduate education. We are the faculty of registration for all graduate students; we also set admission and program standards, administer over $30 million annually in financial awards for graduate study, and promote uniform standards of excellence across programs.

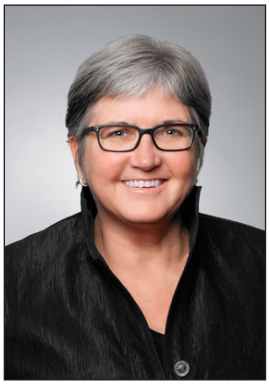
You can contact us with questions about registration, fees, and scholarships, or to clarify the regulations contained in this Calendar. Students enrolled in thesis-based programs will complete their degree program by depositing their thesis with us. Please visit our offices (Earth Sciences 1010) or contact us by telephone (403.220.4938) or e-mail (graduate@ucalgary.ca), and check our website for useful information (grad.ucalgary.ca), including especially the Graduate Awards database.

This Calendar provides important information regarding the regulations of the University and of your program. It is your responsibility to know and comply with the relevant regulations. Being familiar with the material contained in the Calendar will also assist you in setting a timetable for moving successfully through your program. The online Calendar found at ucalgary.ca/pubs/calendar/grad/current is the official version. Any student may choose to remain with the regulations as they were upon her or his entering the program, but we anticipate that changes in subsequent editions will always improve the graduate program, and therefore will be to the student's advantage.

I wish you every success in your studies in the coming year.

Dr. Lisa Young
Vice-Provost and Dean, Faculty of Graduate Studies

Welcome from the Provost



On behalf of the University of Calgary, I offer my congratulations to you as you embark on the next phase of your academic journey. You are joining a thriving campus community of over 6,000 full- and part-time graduate students registered in 63 programs.

Our campus community is – much like Calgary itself – a high-energy destination for people like you with ambitious dreams and the drive essential to fulfill them. Energized by our Eyes High 2017-22 vision, the University of Calgary has earned a reputation for thinking boldly, delivering high-impact outcomes and attracting exceptional talent to our campus. Our students enjoy an educational experience that allows them to pursue their passions in one of Canada's most enterprising and entrepreneurial cities. We are catalysts of change and calculated risk-takers.

We are committed to a student experience characterized by outstanding teaching and research, academic support, and facilities. This includes access to extracurricular activities, leadership and professional development opportunities, exposure to diverse ways of thinking and living, and access to community-based work and volunteer opportunities. It also means students are welcomed into a safe and inclusive environment that allows them to develop the skills, knowledge and personal attributes necessary to become productive citizens and leaders in their chosen fields.

We are happy you have joined us. Whether you are a returning student or someone new to our university, I hope that you will take full advantage of the programs and services available from the Faculty of Graduate Studies, the Graduate Students' Association, and the university to support you with your studies and research.

I wish you great success and look forward to meeting you on campus.

Dru Marshall
Provost and Vice-President (Academic)

Message from the GSA President

As the President of the Graduate Students' Association at the University of Calgary, I would like to welcome all incoming and returning graduate students to the University and to the Graduate Students' Association. As those new to our university will soon discover, there will be a multitude of exciting opportunities for you to engage in it throughout your time on campus.

Graduate school is an opportunity to explore your passion and interests, follow your curiosity, and contribute in a meaningful way to your discipline and your communities. You have arrived at an institution committed to a high quality and impactful student experience. Over the past few years, the Graduate Students' Association, the Faculty of Graduate Studies, and the University have worked hard to improve the quality of graduate education at the University, the size and scope of the opportunities available to graduate students, and overall graduate student life, though programs, services and experiences.

In February, the University of Calgary launched its new Academic and Research Plans to serve as the road maps to the energized Eyes High strategy. These plans have set into motion the vision to be recognized as a top five institution in Canada, and the University is committed to further improving its exceptional teaching and learning, research, and community engagement. Additionally, the University has committed to advancing the student experience for all students on campus and creating a more vibrant campus culture. The implementation of these bold goals will certainly benefit our entire campus community, and especially our graduate students who are at the core of the University's mission.

The GSA is a central component of the University's renewed mission and will be continuing progress on its own strategic plan, Peer Beyond, as we move into the third year of the plan. The GSA's commitment to be a recognized leader in graduate student representation in Canada has spurred the development and revitalization of a number of high-quality services and programs from sustainability to awards and grants, from social events to mentorship and graduate assistantship opportunities. Our leadership in provincial advocacy truly speaks to the innovative and aspirational culture of our University and Calgary communities.

The University of Calgary is a young university; it is one open to change and to exploring new ideas and practices. It is a place where innovation and engagement are welcome and encouraged. It is a place for graduate students to learn, to participate, and to challenge ideas and norms. It is a place where graduate students can find their place and make it their own. I encourage you to explore new ideas and activities, put yourself out there and get involved to make the very most of your time in graduate school. It is the experiences and memories you create that will continue to last beyond your graduation.

Brit Paris
GSA President 2017-2018, 2018-2019

The online Graduate Calendar is the official University Graduate Calendar. The Calendar is available on our website: http://www.ucalgary.ca/pubs/calendar/.

Calendar Production

The University of Calgary extends its gratitude to all those dedicated individuals who contributed time and effort towards this Calendar.

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Editors: Tanya Zdorenko, Faculty of Graduate Studies and Carol Poland, Enrolment Services
Technical Production Specialist: Philip Tsang, Enrolment Services
Co-Chairs of the Graduate Academic Program Subcommittee: Drs. Lisa Young and Antony Ware

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Important Notice and Disclaimer

The material and information in this Calendar is compiled from academic and administrative office submissions and are time-sensitive. Every reasonable effort is made to ensure it is correct and accurate at the time of publication, but inaccuracies and errors may occur. If there is an inconsistency or conflict between the general academic regulations and policies published in the Graduate Calendar, and such regulations and policies as established by resolution of a Faculty or of the University General Faculties Council, the regulations and policies version as approved by the Faculty or the University General Faculties Council will prevail.

By the act of registration with the University of Calgary, each student shall be deemed to have agreed to be bound by the regulations and policies of the University and of the program in which that student is enrolled as well as any relevant Faculty policies and regulations.

Students are responsible for familiarizing themselves with the general information, rules and regulations contained in the Calendar, and with the specific information, rules and regulations of the Faculty or Faculties in which they are registered or enrolled or seek registration or enrolment, as well as the specific requirements of each degree, diploma or certificate sought. It is the student's responsibility to ensure that the courses chosen are appropriate to the program and graduation requirements.

Students should note that not every course listed in the Calendar is offered every year, nor does being admitted into a program guarantee space in any given course.

The University of Calgary has the responsibility and reserves the right to make changes in the information contained in the Calendar and will provide as much notice as administratively possible in effecting such change.

The University of Calgary does not accept, and hereby expressly disclaims, any and or all responsibility or liability to any person, persons or group, either direct or indirect, consequential or otherwise, arising out of any one or more of such changes and, specifically, the University hereby disclaims liability to any person who may suffer loss as a result of reliance upon any information contained in this Calendar.

The University of Calgary disclaims all responsibility and liability for loss or damage suffered or incurred by any student or other party as a result of delays in or termination of its services, courses, or classes by reason of force majeure, pandemics, public health emergencies, fire, flood, riots, war, strikes, lock-outs, damage to University property, financial exigency or other events beyond the reasonable control of the University. The University also disclaims any and all liability for damages arising as a result of errors, interruptions or disruptions to operations or connected with its operations or its campuses, arising out of computer failure or non-compliance of its computing systems.

Faculty of Graduate Studies General Information

Introduction:

The mission of the Faculty of Graduate Studies at the University of Calgary is to promote academic excellence in graduate programs and enhance the graduate student experience by developing and implementing policies that support academic success, building positive partnerships with graduate programs and faculties and providing services to graduate students. The Faculty is also closely involved in the administration of over $30 million annually in financial awards for graduate study.

Contact Information:

Location: Earth Sciences 1010

Faculty number: 403.220.4938

Fax: 403.289.7635

Email address: graduate@ucalgary.ca

Website: grad.ucalgary.ca

Student information: Enquiries concerning graduate programs should be directed to the unit offering the program. The Faculty website contains direct links to units offering graduate programs: ucalgary.ca/future-students/graduate/explore-programs.

Faculty of Graduate Studies

Dean:

Lisa Young

Senior Associate Dean:

Robin Yates

Associate Deans:

Jalel Azaiez (Policy)

Suzanne Curtin (Students)

Cheryl Dueck (Scholarships and Internationalization)

Assistant Dean:

Dave Hansen (Supervisory Development)

Office Staff:

Susan Larsen, Executive Assistant to the Vice-Provost and Dean

Tanya Zdorenko, Graduate Calendar Co-ordinator

Gillian Robinson, Senior Director, Strategic Operations

Jasmine Bosch, Administrative Assistant, Dean's office

Michelle Speta, Graduate Academic and International Specialist

Jaya Dixit, Graduate Academic and International Specialist (on leave)

Tara Christie, Manager, My GradSkills Program

Veronica Vincent, Marketing and Communications Specialist

Cathie Stiven, Manager, Graduate Awards

Jamie Pryde, Team Lead, Graduate Awards

Erin Coburn, Graduate Scholarship Officer

Erin O'Toole, Graduate Scholarship Officer (on leave)

Caylee Stein, Graduate Scholarship Officer

Joan Tetrault, Administrative Assistant, Graduate Awards

Safia Nathoo, Manager, Graduate Enrolment

Calvin Lac, Graduate Recruitment Specialist

Corey Wilkes, Team Lead, Graduate Admissions and Records

Benedicta Antepim, Graduate Program Officer

Robin Hawes, Graduate Program Officer

Carmen Ho, Graduate Program Officer

Catalina Kovacs, Graduate Program Officer

Joanna Wong, Graduate Program Officer

Melissa Peters, Faculty Administrative Officer

Kim Giese, Faculty Administrative Assistant

Graduate Students' Association (GSA)

The Graduate Students' Association (GSA) provides a strong foundation for graduate students at the University of Calgary by advocating on their behalf, and addressing their needs by offering essential services and programs that support and empower them during and after their academic endeavors.

Through services such as professional development workshops, mentorship opportunities, leadership opportunities, social events, a health and dental plan, and awards, grants, and bursaries, the GSA is dedicated to enhancing the well-being and student experience of graduate students.

The GSA also owns and operates the Last Defence Lounge, a full service restaurant located on the third floor of the MacEwan Student Centre (MSC 350).

For a full list of GSA services, visit: gsa.ucalgary.ca.

GSA Membership

All full-time and part-time graduate students registered through the Faculty of Graduate Studies are members of the Graduate Students' Association. Every member pays an annual Association fee. To see a breakdown of fees, visit: gsa.ucalgary.ca/about-the-gsa/gsa-fees.

GSA Executive

The affairs of the GSA are overseen by the Board of Directors. This board is elected each spring for a one-year term. The executive positions are:

President: pres.gsa@ucalgary.ca

Vice-President Academic: vpa.gsa@ucalgary.ca

Vice-President External: vpext.gsa@ucalgary.ca

Vice-President Student Life: vpsl.gsa@ucalgary.ca

Vice-President Finance and Services: vpfs.gsa@ucalgary.ca

The five executives and their team of staff and volunteers support and advocate for the members of the GSA and advance the GSA's goals. According to the Graduate Calendar, GSA Executives are released from course, research, and teaching responsibilities in proportion to the expectations demanded by their role with the GSA. As well, GSA Executives can qualify for an extra year of study without penalty.

Each executive is responsible for specific aspects of the Association. The following is a brief overview of each executive's primary responsibilities:

The President is the official spokesperson and chief advocate of the GSA and is responsible for leading the development and implementation of the GSA's strategic plan and overseeing the governance of the organization. The President is also the graduate students' representative on the University of Calgary Board of Governors and responsible for overseeing the Collective Agreement for graduate assistantships.

The Vice-President Academic is responsible for all academic matters affecting graduate students. This includes advocating for the academic interests and concerns of graduate students, overseeing GSA awards, and joint oversight of the Ombudsperson.

The Vice-President External is the chief government relations officer of the Association and is responsible for the GSA's government and community engagement. This includes overseeing advocacy efforts, social media, and the GSA's employer liaison and mentorship program. The VP External is also the graduate students' representative on the University of Calgary Senate.

The Vice-President Student Life is responsible for non-academic student matters that impact graduate students. This includes all matters relating to Departmental Graduate Associations (DGAs) and Graduate Student Groups, planning and organizing social events, representing the GSA in the University of Calgary's Mental Health Strategy, community engagement initiatives, and issues surrounding Residence and Family Housing and International Students. The Vice-President Student Life also oversees the GSA's weekly News and Views e-newsletter, which is sent out every Tuesday to all graduate students.

The Vice-President Finance and Services is responsible for all GSA services including the oversight of the GSA's Health and Dental plan and bursaries. The Vice-President Finance and Services is also responsible for the oversight of the finances of the GSA and the Last Defence Lounge.

For more information, visit: gsa.ucalgary.ca/elections.

Volunteering Opportunities

The GSA offers a variety of volunteer opportunities for graduate students to get involved with the University community. From one-time events to long-term volunteer positions, there are many ways students can become involved and help shape the graduate student experience. For more information, please visit: gsa.ucalgary.ca/services/volunteer or contact the Volunteer and Services Coordinator at lgirgis@ucalgary.ca.

Departmental Graduate Associations

Through the GSA, each department of the university is able to form a Departmental Graduate Association (DGA). Some of the benefits of joining a DGA include funding opportunities for Association events and functions, as well as a group discount at the Last Defence Lounge. Many departments already have DGAs and the GSA encourages students to join – not only because it provides a networking opportunity within the department, but it also because it fosters a stronger sense of community for graduate students. The process to form a new DGA is described here: gsa.ucalgary.ca/dgasgrns.

Graduate Student Groups

Graduate students are also able to form student groups based on interests outside of academic ones. Further details about registered groups and the process for forming new ones can be found here: gsa.ucalgary.ca/graduatestudentgroups.

Graduate Representative Council

The Graduate Representative Council (GRC) provides direction to the GSA's Board of Directors on political, financial, and operational matters of the GSA. The GRC includes representatives from all active DGAs and is responsible for GSA oversight including budget and fees approval, appointing the auditor, and monitoring GSA policies, practices and activities as reported by the Board of Directors. The GRC meets at least six times per year and is essential in setting the overall direction of the GSA.

Graduate Student Representation

GSA representatives include both the GSA Executives and GRC representatives, and sit as full voting members on most major committees at the University and provide a graduate student voice on issues on and off campus. Graduate students at the University of Calgary are also represented on provincial (the Alberta Graduate Provincial Advocacy Council or ab-GPAC) and national (GU15) student organizations.

The GSA Office and the Last Defence Lounge

The GSA main office is located on the tenth floor of the Earth Sciences building (ES 1030) which houses all of the GSA's operations, including the health and dental plan. The Last Defence Lounge, to which all members of the University community and their guests are welcome, is located on the third floor of the MacEwan Student Centre (MSC 350). For the latest lounge news and daily specials, visit: lastdefencelounge.ca.

GSA Health and Dental Plan

The GSA provides its members with access to a comprehensive extended Health and Dental plan. Through their enrolment in a full-time graduate program at the University, active members are automatically enrolled in the GSA's extended Health and Dental plan (part-time students are also able to opt-in to the plan). The plan encompasses a wide variety of coverage and allows students to access critical services such as prescriptions drugs, dental, vision, and many other health care practitioners. For more information and a breakdown of fees, visit: gsa.ucalgary.ca/health-dental-services.

Awards, Bursaries, and Grants

There are several ways in which the GSA provides funding and recognition for our members. Academic Project Support Grants are available to individual students and groups who are seeking funding to pursue an academic project outside of the purview of their degree requirements. GSA bursaries are given out to students who demonstrate financial need and to students experiencing shortfalls. In the spring of each year, the GSA presents awards of recognition to exceptional teachers, supervisors, administrative assistants, mentors and volunteers, and recognizes exceptional leadership through the Leadership and Emerging Leader Awards. Students also have the opportunity to apply for the Alberta Graduate Citizenship Award in the fall term each year. For more information, contact awards.gsa@ucalgary.ca.

Quality Money

The GSA is committed to enhancing the graduate student experience. Quality Money is one way that the GSA invests in the student community. The GSA helps fund proposals that positively impact

graduate students, promote multidisciplinary interactions, and align with the University's Eyes High strategic plan. For more information, visit: gsa.ucalgary.ca/financial-support/quality-money-program.

GSA Contact Information

The Graduate Students' Association
1030 Earth Sciences
844 Campus Place NW
Calgary AB
T2N 1N4
Tel: 403.220.5997
Fax: 403.282.8992
gsa.ucalgary.ca

GSA Office Hours

Monday to Friday, 10:00 am – 4:30 pm

Academic Schedule

2018-2019 Academic Dates and Deadlines

Courses taught according to non-standard dates have different drop, add and withdrawal deadlines. Please refer to the Student Centre for details regarding those deadlines specific to your course(s). In addition, and in accordance with Faculty regulations, some courses will require Faculty approval to drop, add or withdraw from courses. The academic schedule may be updated online when required and as needed.

The schedules for the Faculties of Law and the Cumming School of Medicine may have different start and end dates.

	Spring/Summer Term 2018	Spring Intersession 2018	Summer Intersession 2018
Academic Dates			
Start of Term	Monday, May 7	Monday, May 7	Tuesday, July 3
End of Term	Sunday, August 26	Saturday, June 30	Sunday, August 26
Start of Classes	Monday, May 14	Monday, May 14	Tuesday, July 3
End of Classes	Wednesday, August 15	Tuesday, June 26	Wednesday, August 15
Start of Exams		Thursday, June 28	Friday, August 17
End of Exams		Saturday, June 30	Monday, August 20
Registration Dates			
Last day to drop a class without financial penalty*	Friday, May 18	Friday, May 18	Monday, July 9
Last day to add a course		Friday, May 18	Monday, July 9
Last day to withdraw from a course**		Tuesday, June 26	Wednesday, August 15
Tuition and Refund Dates			
End of refund period	Friday, May 18	Friday, May 18	Monday, July 9
Tuition and Fee Payment Deadline	Wednesday, May 23	Wednesday, May 23	Wednesday, July 11
Important Dates			
Thesis-based degrees: Last day to submit required forms to the Faculty of Graduate Studies and thesis to The Vault to cancel Spring registration	Wednesday, May 23		
Spring Convocation		Monday-Friday, June 4-8	
Course-based degrees: Last day to complete all degree requirements to cancel Summer registration		Saturday, June 30	
Thesis-based degrees: Last day to submit required forms to the Faculty of Graduate Studies and thesis to The Vault to cancel Summer registration			Wednesday, July 11
Course-based degrees: Last day to complete all degree requirements to be eligible for Fall Convocation	Friday, August 31		
Recognized Holidays (university closed)			
Victoria Day		Monday, May 21	
Canada Day		Sunday, July 1 (university closed Monday, July 2)	
Alberta Heritage Day			Monday, August 6

**There will be no academic record of a course that is dropped by this date and tuition will be refunded.*
***There will be a "W" recorded for the course and tuition will not be refunded.*

	Fall Term 2018	Winter Term 2019
Academic Dates		
Start of Term	Monday, August 27	Wednesday, January 2
End of Term	Monday, December 24	Tuesday, April 30
Block Week	Monday-Friday, August 27-31	Wednesday-Tuesday, January 2-8
Start of Classes	Thursday, September 6	Thursday, January 10
Fall Break, no classes	Sunday-Saturday, November 11-17	Sunday-Sunday, February 17-23
End of Classes	Friday, December 7	Friday, April 12
Start of Exams	Monday, December 10	Monday, April 15
End of Exams	Thursday, December 20	Saturday, April 27
Registration Dates		
Last day to drop a class without financial penalty*	Thursday, September 13	Thursday, January 17
Last day to add a course	Friday, September 14	Friday, January 18
Last day to withdraw from a course**	Friday, December 7	Friday, April 12
Tuition and Refund Dates		
End of refund period	Thursday, September 13	Thursday, January 17
Tuition and Fee Payment Deadline	Friday, September 21	Friday, January 25
Important Dates		
Deadline to Apply for Fall Convocation	Saturday, September 15	
Thesis-based degrees: Last day to submit required forms to the Faculty of Graduate Studies and thesis to The Vault to be eligible for Fall Convocation and cancel Fall registration	Friday, September 21	

First day to apply for Winter Conferral of Degree and first day to apply for Spring Convocation	Friday, November 2	
Fall Convocation	Friday, November 16	
Course-based degrees: Last day to complete all degree requirements to be eligible for Winter Conferral and cancel Winter registration	Monday, December 31	
Deadline to Apply for Winter Conferral of Degree		Tuesday, January 15
Thesis-based degrees: Last day to submit required forms to the Faculty of Graduate Studies and thesis to The Vault to be eligible for Winter Conferral and cancel Winter registration		Friday, January 25
Winter Conferral of Degree		Friday, February 15
Deadline to Apply for Spring Convocation		Sunday, March 31
First day to apply for Fall Convocation		TBD
Thesis-based degrees: Last day to submit required forms to the Faculty of Graduate Studies and thesis to The Vault to be eligible for Spring Convocation and cancel Spring registration		Tuesday, April 30
Course-based degrees: Last day to complete all degree requirements to be eligible for Spring Convocation and cancel Spring registration		Tuesday, April 30
Recognized Holidays (university closed)		
Labour Day	Monday, September 3	
Thanksgiving Day	Monday, October 8	
Remembrance Day	Sunday, November 11 (university closed Nov. 12)	
Holiday Observance	Tuesday-Monday, December 25-31	
New Year's Day		Tuesday, January 1
Alberta Family Day		Monday, February 18
Good Friday		Friday, April 19

**There will be no academic record of a course that is dropped by this date and tuition will be refunded.*

***There will be a "W" recorded for the course and tuition will not be refunded.*

	Spring/Summer Term 2019	**Spring Intersession 2019**	**Summer Intersession 2019**
Academic Dates			
Start of Term	Monday, May 6	Monday, May 6	Tuesday, July 2
End of Term	Friday, August 23	Friday, June 28	Friday, August 23
Start of Classes		Monday, May 6	Tuesday, July 2
End of Classes		Monday, June 17	Tuesday, August 13
Start of Exams		Wednesday, June 19	Thursday, August 15
End of Exams		Friday, June 21	Monday, August 19
Registration Dates			
Last day to drop a class without financial penalty*	Friday, May 10	Friday, May 10	Monday, July 8
Last day to add a course		Friday, May 10	Monday, July 8
Last day to withdraw from a course**		Monday, June 17	Wednesday, August 13
Tuition and Refund Dates			
End of refund period	Friday, May 10	Friday, May 10	Monday, July 8
Tuition and Fee Payment Deadline	Wednesday, May 15	Wednesday May 15	Wednesday, July 10
Important Dates			
Thesis-based degrees: Last day to submit required forms to the Faculty of Graduate Studies and thesis to The Vault to cancel Spring registration	Wednesday, May 15		
Spring Convocation		Monday-Friday, June 3-7	
Course-based degrees: Last day to complete all degree requirements to cancel Summer registration		Saturday, June 30	
Thesis-based degrees: Last day to submit required forms to the Faculty of Graduate Studies and thesis to The Vault to cancel Summer registration			Wednesday, July 10
Course-based degrees: Last day to complete all degree requirements to be eligible for Fall Convocation	Saturday, August 31		
Recognized Holidays (university closed)			
Victoria Day		Monday, May 20	
Canada Day		Monday, July 1	
Alberta Heritage Day			Monday, August 5

**There will be no academic record of a course that is dropped by this date and tuition will be refunded.*

***There will be a "W" recorded for the course and tuition will not be refunded.*

Faculty of Graduate Studies Degrees Information

Summary of Degree Programs

The Faculty of Graduate Studies administers programs leading to the degrees of:

Doctor of Business Administration (DBA)
Doctor of Education (EdD)
Doctor of Philosophy (PhD)
Master of Architecture (MArch)
Master of Arts (MA)
Master of Biomedical Technology (MBT)
Master of Business Administration (MBA)
Master of Counselling (MC)
Master of Disability and Community Studies (MDCS)
Master of Education (MEd)
Master of Engineering (MEng)
Master of Environmental Design (MEDes)
Master of Fine Arts (MFA)
Master of Geographic Information Systems (MGIS)
Master of Landscape Architecture (MLA)
Master of Kinesiology (MKin)
Master of Laws (LLM)
Master of Music (MMus)
Master of Nursing (MN)
Master of Pathologists' Assistant (MPath)
Master of Planning (MPlan)
Master of Public Policy (MPP)
Master of Science (MSc)
Master of Social Work (MSW)
Master of Strategic Studies (MSS)

Combined Degree Programs

The Faculty of Graduate Studies has approved guidelines for Combined Degree Programs. A Combined Degree Program is a formal arrangement between two units offering programs whereby students may be registered simultaneously in two graduate programs (or in one master's program and one professional program such as JD or MD that normally admits students with undergraduate degrees). The University of Calgary presently offers the following combined degree programs: JD/MBA, JD/MPP, MBA/MPP, MBT/MBA, MN/MBA, MPlan/MBA, MSW/MBA, MSc/MBA, PhD/MBA, MD/Master's and MD/PhD.

The University of Calgary also provides opportunities for excellent doctoral students to undertake doctoral studies in collaboration with other universities nationally and internationally through the Doctoral Cotutelle Program. A doctoral cotutelle is a PhD degree designed, supervised and examined by faculty from two universities and jointly awarded by both universities. Visit grad.ucalgary.ca/current-students/managing-my-program/studying-another-university/doctoral-cotutelle.

Information and application packages are available from the relevant graduate programs.

Degrees Offered

ANTH	ARKY	ART	BISI	BMEN	CHEM	CMD
PhD	PhD	MFA	PhD	PhD	PhD	PhD
MA	MA		MSc	MSc	MSc	MSc
				MEng		
CMMS	**CMSS**	**CPSC**	**CPSY**	**DRAM**	**ECON**	**EDER**
PhD	PhD	PhD	PhD	MFA	PhD	PhD
MA	MSS	MSc	MSc		MA	EdD
						MA
						MSc
						MEd
EDPS	**ENCH**	**ENCI**	**ENEL**	**ENGO**	**ENME**	**ENGL**
PhD	PhD	PhD	PhD	PhD	PhD	PhD
MSc	MSc	MSc	MSc	MSc	MSc	MA
MEd	MEng	MEng	MEng	MEng	MEng	
MC						
EVDS	**FISL**	**GEOG**	**GEOS**	**GRST**	**GSEA**	**HIST**
PhD	MA	PhD	PhD	PhD	MA	PhD
MArch		MA	MSc	MA		MA
MEDes		MSc				
MLA		MGIS				
MPlan						
MPlan/MBA						
IGP	**KNES**	**LAW**	**LING**	**LLAC**	**MDBC**	**MDBT**
PhD	PhD	LLM	PhD	PhD	PhD	PhD
MA	MSc	JD/MBA	MA	MA	MSc	MBT/MBA
MSc	MKin	JD/MPP				

(continued on next page...)

MDCH	MDCV	MDGI	MDIM	MDMI	MDNS	MDPA
PhD	PhD	PhD	PhD	PhD	PhD	MPath
MSc	MSc	MSc	MSc	MSc	MSc	
MDCS						
MDSC	**MGMT**	**MTST**	**MUSI**	**NURS**	**PHAS**	**PHIL**
PhD	PhD	PhD	PhD	PhD	PhD	PhD
MSc	DBA	MSc	MA	MN	MSc	MA
	MBA		MMus	MN/NP		
	JD/MBA			PMNP		
	MBT/MBA			MN/MBA		
	MSW/MBA					
	MBA/MPP					
	MN/MBA					
	MPlan/MBA					
POLI	**PPOL**	**PSYC**	**RELS**	**SEDV**	**SOCI**	**SOWK**
PhD	MPP	PhD	PhD	MSc	PhD	PhD
MA	MBA/MPP	Msc	MA		MA	MSW/MBA
	JD/MPP					MSW
VMS						
PhD						
MSc						

Leaders In Medicine

The Leaders in Medicine (LIM) program at the University of Calgary offers students the opportunity to earn simultaneously both a Doctor of Medicine (MD) degree and a graduate degree (PhD, MSc, MA, MBA, etc.). The objective of the Leaders in Medicine program is to train clinicians for a diverse range of careers ranging from academic medical research to the design, management and implementation of health care delivery systems. Individuals trained in the Leaders in Medicine program can expect to develop a unique academic approach to their clinical experiences as well as bring a clinical perspective to their academic domain (research, business, etc.).

Students in the Leaders in Medicine program will be jointly enrolled in the MD program and in any of the graduate programs offered by the Faculty of Graduate Studies at the University of Calgary. Although the most common graduate programs participating in Leaders in Medicine are the eight thesis-based programs offered by the Cumming School of Medicine (Biochemistry and Molecular Biology; Cardiovascular/Respiratory Sciences; Community Health Sciences; Gastrointestinal Sciences; Immunology; Medical Science; Microbiology and Infectious Diseases; Neuroscience), students from other programs, including Philosophy and Engineering, have taken part.

Students wishing to apply to Leaders in Medicine should have an excellent academic record and strong motivation towards a career in academic medicine. Previous research experience is highly desirable. Applicants must apply separately to the Cumming School of Medicine for the MD program and to the selected graduate program in the Faculty of Graduate Studies, and be recommended for admission by each program. Prospective applicants must also complete a supplemental application for the Leaders in Medicine program: forms may be obtained from the Graduate Sciences Education Office (Cumming School of Medicine). Students normally apply for the combined degree program during the first two years of either the MD or the graduate program.

Expected completion time is five years for the MD/Masters programs and seven years for MD/PhD programs. Maximum completion time is six years for the MD/Masters program and eight years for the MD/PhD program.

Each student is required to participate regularly in the LIM journal club and seminar programs.

Continuous registration must be maintained during the combined program.

For more information, contact:

Leaders in Medicine, Health Sciences Centre, Room G321

Telephone: 403.210.9572

Fax: 403.210.8109

Email: mdgrad@ucalgary.ca

or visit the website: cumming.ucalgary.ca/lim

Master of Biomedical Technology/Master of Business Administration (MBT/MBA)

The Master of Biomedical Technology/Master of Business Administration (MBT/MBA) program provides students with managerial skills as well as essential scientific skills and competencies for successful careers in biotechnology business. The combined degree program is targeted at graduate students who are interested in a dual skill set to prepare them for biotechnology jobs in industry, research and government at all levels from the bench to the boardroom. The combined degree allows students to obtain both degrees in a shorter time frame than would be possible taking each degree separately. See the program descriptions for the Master of Biomedical Technology program and the Haskayne School of Business for further information.

Master of Nursing/Master of Business Administration (MN/MBA)

Students admitted to the MN/MBA program will focus on courses for the MBA during the first year and on MN courses in year two. Typically, the remaining courses required will be completed in year three. See the program descriptions for the Haskayne School of Business and the Faculty of Nursing for further information.

Master of Planning/Master of Business Administration (MPlan/MBA)

Students admitted to the MPlan/MBA program will focus on courses for the MBA during the first year and on MPlan courses in years two and three. Typically, the Real Estate Studies specialization will be completed in year four. See the program descriptions for the Haskayne School of Business and the Faculty of Environmental Design for further information.

Master of Social Work/Master of Business Administration (MSW/MBA)

The Master of Social Work/Master of Business Administration (MSW/MBA) program is

designed to prepare students for competent and visionary management of human service organizations. This program is available only to full-time, course-based Master's students in the Leadership in the Human Services specialization in the Faculty of Social Work. The combined program shortens the time for completion of the two degrees from three academic years to two 12-month years. See the program descriptions for the Faculty of Social Work and the Haskayne School of Business for further information.

Juris Doctor/Master of Business Administration (JD/MBA)

The Juris Doctor/Master of Business Administration (JD/MBA) program enables students to complete an undergraduate degree in law while studying for a graduate degree in business. This program is open only to students enrolled in the Haskayne MBA program on a full-time basis. See the program descriptions for the Faculty of Law and the Haskayne School of Business for further information.

Juris Doctor/Master of Public Policy (JD/MPP)

The JD/MPP program is normally restricted to full-time study. It allows students to obtain both degrees in a significantly shorter time frame than if they are taken separately. Please consult the Public Policy program or the Law Program for more information.

Master of Business Administration/ Master of Public Policy (MBA/MPP)

Students admitted to the MBA/MPP will focus on courses for the MBA during the first year and on MPP courses in year two. Typically, the remaining courses required will be completed in the first term of year three. Please consult the MBA Admissions Officer or the Public Policy Program Manager for more information.

Interdisciplinarity at University of Calgary

Interdisciplinary Specializations

Most graduate programs include some interdisciplinary work. The following interdisciplinary specializations have been formalized by the programs involved to facilitate the study and research capability:

Biological Anthropology

Anthropology, Archaeology and Medical Science

Biostatistics

Mathematics and Statistics and Community Health Sciences

Clinical Research

Kinesiology, Medicine, Nursing, Social Work

Energy and Environmental Systems

Engineering, Environmental Design, Management, Law, Sciences, Social Sciences

Engineering, Energy & Environment

Chemical and Petroleum Engineering, Civil Engineering, Electrical and Computer Engineering, Geomatics Engineering, Mechanical and Manufacturing Engineering

Environmental Engineering

Chemical and Petroleum Engineering, Civil Engineering, Electrical and Computer Engineering, Geomatics Engineering, Mechanical and Manufacturing Engineering

Medical Imaging

Biomedical Engineering, Electrical and Computer Engineering, Medical Science, Neuroscience, Psychology, Physics and Astronomy

Reservoir Characterization

Chemical and Petroleum Engineering and Geology and Geophysics

Please see the section on "Interdisciplinary Specializations" for more information.

Credit Certificate and Diploma Programs

The Faculty of Graduate Studies administers programs leading to certificates and diplomas in Data Science, Educational Psychology, Educational Research, Environmental Design, Law, Network and Software Security, Nursing, Radiation Oncology Physics and Social Work. The programs provide those who wish to continue their advanced education with an opportunity to acquire additional academic credentials in specific areas. These credentials may be used for credit toward a future degree when permitted by a degree laddering structure. The graduate certificate and diploma programs will also be valuable to those who have completed a graduate degree but desire or require further credentials or knowledge and skills beyond their degree.

Please see program entries in this Calendar for contact information regarding certificate and diploma programs.

Admissions

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There is no general right of admission to Graduate Programs. Each department determines whether to recommend to the Faculty of Graduate Studies the admission of a particular applicant based not only on the applicant's credentials but also on the availability of resources for supervision and research, departmental research objectives, program balance, and other such considerations. Admissions decisions are not subject to appeal.

General Admission Procedures

Any student who wishes to become a registered student of the University must complete an online Application for Admission, pay the application fee, submit required documentation to demonstrate they meet the admission requirements, receive an offer of admission and pay the Admission Deposit, if required, before they are permitted to register in courses.

A.1 Qualifications

Applicants must hold or obtain the following minimum qualifications before the Faculty will give consideration to admission:

1. A four-year baccalaureate degree or its equivalent from a recognized institution. Degrees and grades from foreign institutions are evaluated for their equivalency to those of the University of Calgary. A grade point average equivalent to 3.00 or better (on the University of Calgary four-point system) is required. This is based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents). Senior-level courses of appropriate content for the graduate program applied for and any graduate work may also be considered. Individual graduate programs may require a higher admission grade point average, which is set out in their calendar entries.

Admission requirements vary depending on the country where previous undergraduate and/or graduate degrees were earned. Visit International Admissions Requirements at ucalgary.ca/future-students/graduate/international for further information on specific degree and grade point average requirements for the country where you earned your degree.

In most cases, a master's degree or equivalent is required for admission to a doctoral program. See program listings for exceptions and details.

Note: In exceptional circumstances, individuals who do not meet formal academic requirements but who have significant life achievements may be considered for admission to some graduate programs. The candidate must provide the relevant graduate program with evidence demonstrating a potential to undertake successfully the proposed program of studies. Such candidates are advised to make early contact with the graduate program. In all such cases, the decision whether or not to admit rests with the Dean of the Faculty of Graduate Studies.

2. Proficiency in the English language is essential for the pursuit and successful completion of graduate programs at the University of Calgary. Prior to admission to the Faculty of Graduate Studies, an applicant whose primary language is not English may fulfill the English language proficiency requirement for academic purposes in one of the following ways:

a) By taking the Test of English as a Foreign Language (TOEFL) and obtaining a score of at least 86* with no section less than 20* (Internet-based test) or 560* (paper-based test). When requesting that official test results are forwarded to the University of Calgary, indicate the institution code **0813** and the code appropriate to the graduate program, as listed on the TOEFL website.

b) By taking the Academic version of the International English Language Testing System (IELTS) and obtaining a minimum score of 6.5* with no section less than 6.0*.

c) By successfully completing the Tier 3 of the University of Calgary International Foundations Program and achieving a minimum grade of "B" in IFPX 290 Academic Writing and Grammar III and a minimum grade of "C" in both IFPX 293 Reading Comprehension & Proficiency III and IFPX 297 Listening Comprehension & Oral Fluency III*.

d) By taking the Michigan English Language Battery (MELAB) test and obtaining a minimum score of 80*. The MELAB test includes a written composition, a listening test, and a test of grammar, vocabulary, and reading comprehension. An optional speaking test is also available.

e) By taking the Academic version of the Pearson Test of English (PTE) and obtaining a score of at least 59*.

**Some programs require scores higher than the Faculty of Graduate Studies minima. See program listings for specific details.*

IELTS, TOEFL, MELAB and PTE test scores are valid for two years from the date of the test.

The department or graduate program may waive the English proficiency-testing requirement in certain circumstances, such as the possession of a baccalaureate degree or its academic equivalent from a recognized institution in which the language of instruction is English. Contact the graduate program to which you plan to apply for further information.

Students who do not meet admission standards and wish to pursue graduate work may be advised to enrol in the equivalent of a full year (a minimum of graded 18 units or 3.0 full-course equivalents) at the senior undergraduate level in order to improve their academic record to acceptable admission standards (a grade of "B" or higher in every course). **Students are advised to discuss this option with the appropriate graduate program before embarking on such a course.** All such courses represent "make-up" work and cannot be used for advanced credit towards a graduate degree program. Successful completion of "make up" work does not guarantee admission to a graduate program.

A.2 Application for Admission

Applications for admission to the Faculty should be submitted through the online application system at grad.ucalgary.ca. No assurance can be given that applications received after the deadlines noted in the "Application Deadline" section of the appropriate program section of this Calendar will be processed in time to permit the applicant to register for the following session. Specific instructions for applicants are included with the application.

All applications to the Faculty of Graduate Studies of the University of Calgary must include the following:

a) A non-refundable application fee (ucalgary.ca/future-students/graduate/apply) for each application to a graduate degree program. $125 for Canadian citizens or Permanent Residents, $145 for international students with a study permit.

b) Official transcripts from **all** post-secondary institutions you have attended. Original documents or certified true copies of each of your official transcripts and degree certificates, in the original sealed envelope, sent directly from the issuing University.

If original documents are not in English:

Original documents or certified true copies of each of your official transcripts and degree certificates in the original language, in the original sealed envelope, sent directly from the issuing University, and an English translation from the issuing University or a notarized word-for-word English translation of a duplicate copy of that original.

c) Official TOEFL, IELTS, PTE, MELAB, GMAT, GRE scores and/or other requirements of the program for which application is being made.

Please see program entries in this Calendar for any additional program requirements, including details on reference letters.

Normally, an appropriate letter of recommendation is one written by an independent individual who can provide an assessment of the applicant's background and capabili-

ties with respect to the prospective program. Letters from friends, family members, colleagues, people currently registered in a graduate degree program, or general reference letters that are not written in support of the person's application to the particular graduate program are not acceptable. An applicant currently registered in a graduate degree program, or who has recently completed a graduate degree program, will normally submit one letter of reference from their program supervisor. Unless the applicant has been out of school for more than four years, at least one letter, and preferably both, should be by an academic. A reference from a non-academic source should come from a person who has had direct supervisory experience of the applicant.

All graduate programs have limited enrolment capacities. Meeting the minimum requirements does not guarantee admission.

If at any time it is discovered that a student was admitted on the basis of falsified documents or information, the admission will immediately be declared null and void and future admission will be denied.

Note: Advanced credit must be requested at the time of application for admission. See A.6 Advanced Credit.

Students will not normally be permitted to register in a University of Calgary certificate, degree or diploma program while simultaneously working toward another certificate, degree or diploma at the University of Calgary or at another institution. Joint degree programs and cotutelle admissions are an exception to this regulation.

A.3 Admission Categories

Graduate students are admitted to the Faculty in one of the following categories:

Regular

Students may be admitted to a program leading to the master's or doctoral degree, provided admission qualifications are met.

Interdisciplinary Degree

(ucalgary.ca/future-students/graduate/apply)

The Interdisciplinary Degree allows a qualified graduate student to pursue thesis-based research (Master's, PhD) in an area that does not fit the traditional disciplinary requirements of only one graduate program. The requirements for the student's program are individually tailored to meet their research interests. Research is carried out under the direction and guidance of a Supervisor, Co-Supervisor and Supervisory Committee whose research expertise is relevant to the disciplinary areas. The student should submit an application form and fee, along with official transcripts and letters of reference to the intended home graduate program. The application must meet the minimum Faculty of Graduate Studies requirements for admission. The prospective home program will work with the conjoint program to establish coursework and candidacy examination requirements. Parchments for the Interdisciplinary Degree will identify both the home and conjoint programs. Contact the prospective home graduate program for further details.

Cotutelle

(ucalgary.ca/future-students/graduate/apply)

A doctoral cotutelle is a single PhD degree jointly awarded by two universities with a transcript and parchment from each. It is designed, supervised and examined by faculty from both universities. Applicants must normally meet the PhD requirements of both universities. An agreed plan of study and support must be established at the outset.

The primary institution may be University of Calgary or another partner institution. Cotutelle admission may be approved at the beginning of the degree or by transfer in the first two years of an existing PhD program.

Qualifying

A student who meets the qualifications for admission but lacks the necessary background for a graduate program in a chosen area of specialization may be admitted as a qualifying graduate student. A qualifying student is required to take more courses in a degree program than a regular graduate student. Upon satisfactory completion of a qualifying term or year, the student may be transferred to regular student status. Qualifying graduate students must be full-time registrants in either a master's or a doctoral degree program. Qualifying status will not be granted for a period exceeding one year.

A qualifying student in a thesis-based degree program will be assessed program fees during their qualifying term or year. Upon transfer to regular student status, program fees are assessed again. Note that time spent as a qualifying student does not count as time in the degree program and does not make the student eligible for assessment of continuing fees (see C.1 Tuition Fees). A qualifying student in a course-based program will pay tuition fees for the extra required courses on a per-course basis.

Conditional Admission for Language Upgrading

An international student may be offered admission into a graduate program conditional on successful completion of the International Foundations Program (IFP). In order to be admitted, the student must successfully complete Tier 3 of the IFP by achieving a minimum grade of "B" in IFPX 290 Academic Writing and Grammar III, and minimum a grade of "C" in both IFPX 293 Reading Comprehension and Proficiency III and IFPX 297 Listening Comprehension and Oral Fluency III. Programs may require a higher level of achievement, which will be set out in the letter of conditional admission. Eligible students who are offered conditional admission must complete the IFP program within one year; after this time the conditional offer of admission is revoked.

Visiting

A student who is registered in a graduate degree program at another university that does not have an exchange agreement with the University of Calgary, and who wishes to engage in course work and/or research at the graduate level at the University of Calgary for credit at their home university, may be admitted as a visiting graduate student. A visiting student must submit a completed Visiting Student Application form, available at ucalgary.ca/future-students/graduate/apply, and the application fee, by one of the deadlines posted on the website. Visiting students pay all applicable general and tuition fees. Visiting students are normally permitted to spend a maximum of one year at the University of Calgary. It should be noted that admission as a visiting student does not guarantee later admission to a graduate program at the University of Calgary.

Exchange

General

The University of Calgary has reciprocal exchange agreements with other institutions. Graduate students from these institutions may engage in course or research work at the University of Calgary for credit at the home institution. Note that students with practicum requirements may not be eligible to apply for an exchange.

An exchange student must submit the appropriate application form, available at ucalgary.ca/future-students/graduate/apply, by one of the deadlines posted on the website.

An exchange student pays tuition fees at the home institution when this is written into the specific exchange agreement, and applicable general fees at the University of Calgary.

If there is no reciprocal fee agreement, the exchange student pays applicable tuition and general fees at the University of Calgary.

Exchange student status does not guarantee admission to graduate programs at the University of Calgary. An exchange student who wishes to apply to a graduate program at the University of Calgary must do so in the usual manner.

Western Deans' Agreement

A graduate student registered in the Faculty of Graduate Studies at one university may apply for student status at a university covered under the Western Deans' Agreement by completing the appropriate application which requires approval of the Graduate Program Director, and the Faculty of Graduate Studies at both the student's home and host universities. See the Faculty of Graduate Studies website for a list of universities covered by The Western Deans' Agreement.

Deadlines in effect at both the home and host institutions must be observed. For University of Calgary deadlines, see ucalgary.ca/future-students/graduate/apply - *Exchange/Visiting Students.*

The student pays tuition and general fees at the home university and applicable general fees at the host institution.

The student is responsible for arranging for an official transcript to be sent from the host institution to the home institution when the course(s) has been completed.

Each home institution has regulations regarding the maximum number of transfer credits permitted. Further information is available at grad.ucal-

gary.ca/current/managing-my-program/studying-at-another-university/western-deans.

Canadian Graduate Student Research Mobility Agreement

The Canadian Graduate Student Mobility Agreement, initiated by the Canadian Association of Graduate Schools (CAGS), encourages graduate student mobility within Canada in order to foster the exchange of ideas, specialized training, research collaboration, and interdisciplinarity. Graduate students, who must be registered full-time and paying fees at a participating home university, may register as "visiting graduate research students" at another participating university. No tuition fees will be charged to visiting graduate research students under this agreement provided they are not taking courses at the host institution. Incidental fees may be charged. A faculty member at the host institution must agree to supervise and take responsibility for the visiting graduate research student during their stay. It is recognized that it is the responsibility of the visiting student to find a supervisor at the host institution.

For further information, see the Faculty of Graduate Studies website at grad.ucalgary.ca/current/managing-my-program/studying-at-another-university/cags.

A.4 Retention of Student Records

Graduate student files are kept electronically in the Faculty of Graduate Studies. All application documents submitted to the Faculty of Graduate Studies become the property of the University of Calgary and cannot be returned to the student.

When applying for admission to another program, an applicant who completed a graduate degree from the University of Calgary must submit original transcripts of post-secondary education institutions attended as required by the program or the Faculty of Graduate Studies, and appropriate letters of reference as required by the program.

A.5 Offer of Admission

An offer of admission to a graduate program shall specify the program to which the student is admitted in terms of available programs as specified in this Calendar. Any more detailed terms of admission applying to a particular offer shall be specified in the offer. Graduate programs will supply a program specification including the terms of admission to the Faculty of Graduate Studies when recommending that a student be admitted or admitting on behalf of the Faculty of Graduate Studies, and will ensure that copies of any documents cited in the specification are lodged with the Faculty of Graduate Studies.

The program specification shall include any full-time requirements, and other relevant program components. It shall also include any offer of funding and any conditions related to that funding, from the program.

An offer of admission to a prospective student who will attend for a qualifying year must include the courses the prospective student is expected to take to upgrade their background to enter the program proper. The offer must include the information that these courses, and the tuition paid during the qualifying year, will not count toward the degree program. No fee credit is given for courses that are taken as a qualifying student.

A student may request that the graduate program defer admission for up to one full year. Deferral is not automatic, and terms of the offer of admission may change. The request must be endorsed by the Graduate Program Director, and the prospective supervisor, where applicable.

If, during a student's program, a change in the program is mutually agreed upon by the student and the graduate program, the program may be changed from that specified as part of the offer of admission, but such variation will not come into effect until it is approved by the Faculty of Graduate Studies. The Change of Program or Status form must be completed and submitted to the Faculty of Graduate Studies for approval (grad.ucalgary.ca/current/managing-my-program/registration).

Admission Deposit

Students who are offered admission to a course-based program will be required to pay a one-time $500 admission deposit by the deadline indicated in their offer of admission to confirm their seat in their admitted program. The deposit is non-refundable and will be applied against tuition and program fees. Re-admits are required to pay the admissions deposit. Note that some programs require a higher deposit.

A.6 Advanced Credit

Courses for which advanced credit is being sought must be from a recognized institution and not have been used for any degree or diploma accreditation. They must be graded, graduate-level courses, and the graded level of performance must be equivalent to a "B" grade or higher standing at the University of Calgary.

Advanced credit is not normally given for courses taken more than five years before admission to the current graduate degree program or for courses taken for the purposes of qualifying for admission.

Course-based programs: The student must request advanced credit in writing at the time of application for admission. This request must be endorsed by the Graduate Program Director and submitted to the Faculty of Graduate Studies with the admission recommendation.

The total of advanced credit and transfer credit may not exceed either one-third of the program or 12 units (2.0 full-course equivalents), whichever is less.

Thesis-based programs: Application for credit should be made to the graduate program at the time of admission, so that the graduate program can take previous work into account when specifying a student's program.

A.7 Readmission

A student who withdrew or was withdrawn from program and wishes to be readmitted to the program must apply for readmission to the graduate program, with submission of official transcripts for any academic work done since departure and a fee of $180.

If readmission is granted, program requirements and completion time will be stipulated in the offer of readmission. Assessment of requirements for degree completion will take into consideration the relevance of work completed during the initial registration and current program requirements.

A fee assessment, taking into account the completed and remaining requirements and time in the student's program, will be made as part of the offer of readmission. Unless a student's registration is active, the student may not participate in University activities towards a degree such as attendance in a course, conducting research in a laboratory, teaching and receiving paid support. Readmits are required to pay any applicable admissions deposit.

A.8 Reactivation

A student who has been withdrawn for failure to register and who wishes to reactivate their registration, must submit a Faculty of Graduate Studies Application for Reactivation of Registration (grad.ucalgary.ca/current/managing-my-program/registration) and a $180 fee. The student's supervisor and Graduate Program Director must sign the registration form, indicating their willingness to reinstate the student. Reactivation may only take place within four months of the student's annual registration month, and the student will be responsible for fees for the entire term. If the student wishes to return to program after the four-month period has passed, the student must apply for readmission for the next session to which the program will admit students (see A.7 Readmission). Unless a student's registration is active, the student may not participate in University activities towards a degree such as attendance in a course, conducting research in a laboratory, teaching and receiving paid support.

Awards and Financial Assistance for Graduate Students

The University of Calgary is very proud of its graduate student awards program. In addition to recognizing academic achievement, scholarships are important in helping to bridge the gap between the rising cost of attending university and limited student income. Attracting top national and international students to the University of Calgary continues to be a very high priority.

We are extremely pleased that our donors share our commitment to graduate student awards, and we appreciate the financial support offered by all of our valued donors.

Full-time students registered in a graduate degree program at the University of Calgary are eligible for awards and financial assistance.

Scholarship information, application forms and instructions are found on the graduate award website and through the searchable awards database at grad.ucalgary.ca/awards.

Additional information is available from your program. Because the award list is published a considerable time before the opening of the session, the university reserves the right to make whatever changes circumstances may require, including cancellation or addition of particular awards.

B.1 University Assistantships

University graduate assistantships are governed by the Collective Agreement between the Governors of the University of Calgary and the Graduate Students' Association. Each year teaching units have varying numbers of graduate assistantships available to be awarded on the basis of merit. Students interested in such appointments should contact their graduate program administrator for information about eligibility, application deadlines and procedures. The stipends indicated are subject to change without notice. Appointments are available from most units in which graduate programs are offered. Categories of appointment include Graduate Assistantships (Teaching and Non-Teaching).

Graduate Assistantships (GA, Teaching/ Non-teaching)

A Graduate Assistantship (Teaching) is an appointment made to assist with the instructional responsibilities of departments or faculties. GA(T)s are appointed to provide teaching or instructional service, which might encompass lecturing assistance, laboratory supervision, office hours, grading assignments, tutorial direction, assistance in preparation of demonstration and instructional aids, and other related academic duties.

A Graduate Assistantship (Non-Teaching) is an appointment made to assist departments and/or professors with non-teaching responsibilities. The duties of a GA(NT) may include, for example, collecting research data, interviewing research subjects, bibliographic work or general research services.

Remuneration paid to graduate assistants must comply with the Collective Agreement or the regulations of the agency providing the funds. The stipend is listed in the Collective Agreement.

Research Assistantships (Scholarship)

A graduate student employed as a research assistant builds academic experience by assisting with a research project, with duties similar to those described above for a Graduate Assistantship (Non-Teaching). Research assistant appointments are funded from the research support accounts for university faculty who select and recommend graduate students for such appointments. The stipends vary. This type of support is arranged directly between graduate students and their prospective supervisors.

B.2 Project Employment

This is funded from a research account to provide a direct service in connection with a faculty member's research. This research is normally not related to the student's program or area of research. The service provided is normally supervised by someone other than the student's supervisor and is treated as regular employment.

B.3 Sessional Instructorships

A department or faculty may appoint a graduate student as a sessional instructor to teach a course as Instructor of Record. Sessional instructor appointments are Term Certain Appointments covered under the Collective Agreement between the Governors of the University of Calgary and the University of Calgary Faculty Association (ucalgary.ca/hr). Normally, a student may not be a sessional instructor for more than one 3-unit or 6-unit course (one half course or one full course) at any one time.

B.4 Faculty of Graduate Studies Scholarships (FGSS)

To be eligible for a Faculty of Graduate Studies scholarship, students must be registered full-time in the Faculty of Graduate Studies in a thesis program at the University of Calgary. Graduate programs allocate these awards, and students should check with the program administrator for application procedures.

B.5 Graduate Students' Association Bursaries

The Graduate Students' Association makes available bursaries of up to $1,000 per year to students who at the time of tenure will be registered in a graduate program at the University of Calgary and can demonstrate financial need. Application forms are available from the Graduate Students' Association, 1030 Earth Sciences, 844 Campus Place NW, telephone 403.220.5997. Contact the GSA office for further information.

B.6 Government Financial Assistance

The provincial and federal governments make assistance available to students in the form of loans. Students must be Canadian citizens or permanent residents of Canada and provide sufficient evidence that financial assistance is essential to enable the student to continue their education. The amount of assistance varies. Students should contact their provincial funding office directly to obtain detailed information about the student loans, grants and bursaries offered through their province. Links to the out of province government loan websites are available from the Student Awards and Financial Aid website: ucalgary.ca/awards.

B.7 International Students

International students planning to do graduate work at the University of Calgary are eligible to apply for graduate assistantships and FGS scholarships. International students are also eligible to apply for a number of Canadian scholarships. Detailed information is found on the graduate award website at grad.ucalgary.ca/awards.

B.8 Awards Offered by Government, Industry and Others

Many foundations, companies, professional organizations and other agencies offer financial support to graduate students. A number

of international, national and provincial organizations award scholarships and fellowships, tenable at this and other universities. Details about many of these awards are available from the graduate award website at grad.ucalgary.ca/awards.

B.9 Office of the Vice President (Research) Thesis/Dissertation Research Grants

The Office of the Vice President (Research) recognizes that there are instances where standard funding for thesis research available through a program or faculty may not be adequate to meet certain special needs that are essential to the completion of a particular thesis research project.

The primary purpose of the Thesis/Dissertation Research Grant program is to assist graduate students with exceptional or unanticipated costs that are essential to the completion of their thesis/dissertation projects, but that could not reasonably be anticipated when their project was approved. The expenses must be beyond the means of the student, laboratory or department. These awards are not intended to provide basic project funding. These awards are competitive. To be eligible, applicants must be registered full-time in a research (thesis) based program leading to a master's or doctoral degree from the University of Calgary. Graduate students applying for Thesis/Dissertation Research Grants must have their thesis/dissertation project approved by the department.

An application guide and the application form may be found at ucalgary.ca/research/files/research/171116_vpr_thesis_grants.pdf.

Contact vprawards@ucalgary.ca for further information.

B.10 Conference Travel Grant

Graduate Student Travel awards are made to assist graduate students in presenting the results of their thesis research at significant scientific or scholarly meetings, and equally, to provide students with an opportunity to gain experience in conference presentation and to meet colleagues in universities and industries who will be of importance to their future career.

Students will apply through the Faculty of Graduate Studies. Information and the application form may be found at grad.ucalgary.ca/awards.

B.11 Faculty of Graduate Studies Scholarships and Awards

Details of all awards administered by the Faculty of Graduate Studies can be found on the graduate awards website and in the searchable graduate award database at grad.ucalgary.ca/awards.

Scholarships are awarded on the basis of academic standing and demonstrated potential for advanced study and research. Normally, master's students in the first two years of program and doctoral students in the first four years of program are eligible to hold scholarships. If, in the opinion of the Graduate Scholarship Committee, a suitable candidate cannot be found, it reserves the right not to award any one or any number of scholarships in any year. Unless otherwise stated, awards are for one year only. The value and terms of the awards are subject to change without notice.

Graduate Scholarship and Award Regulation

The purpose of this regulation is to provide for fair distribution of university-wide competitive academic awards among eligible graduate students, while maintaining graduate programs' autonomy in the allocation of Program Recommended awards.

This regulation does not apply to:

- Doctoral Recruitment scholarships adjudicated through the Entrance Competition
- Izaak Walton Killam Pre Doctoral Scholarship - Honorary
- Funds awarded by graduate programs through their Graduate Support Allocation
- Supervisor funding
- Graduate Assistantships (Teaching and Non-Teaching)
- Differential tuition awards
- Indigenous government funding
- Non-academic awards (e.g. Travel awards, Graduate Students' Association (GSA) awards)

This regulation governs graduate students receiving awards from any source. Graduate students are expected to apply for all awards from external funding agencies for which they are eligible, especially the awards available through the Tri-Council, which includes the Natural Sciences and Engineering Research Council (NSERC), the Social Sciences and Humanities Research Council (SSHRC), and the Canadian Institutes of Health Research (CIHR).

To provide for fair distribution of University of Calgary academic competitive awards, the maximum amount a student can hold in 'other awards' and/or 'university-wide awards', as defined below, at any given time is:

- Master's: $20,500
- Doctoral: $26,000

Students may hold one single award that exceeds the limit.

Students holding the maximum amount or less may also receive one additional Program Recommended award, unless otherwise specified by the award terms of reference.

Students holding a University of Calgary competitive academic award and who are subsequently awarded an external award must take up the external award at the earliest possible date and notify the Graduate Scholarship Office. Holding an external award does not necessarily prevent holding another award. In cases where the regulation is not clear, contact the Graduate Scholarship Office for advice.

A program with an approved tuition differential may combine Program Recommended awards for an individual student up to the value stated above plus the difference between the tuition charged and the regular base tuition.

Definitions:

- **Award** refers to scholarships, awards, fellowships, internships, research and training grants
- **Competitive awards** are awarded for academic merit and research potential through peer reviewed competition
- **Other awards** refers to external funding agency awards; major research and training grants; and department, program or institute level awards not administered by the Faculty of Graduate Studies
- **Program Recommended awards** are nominated by individual graduate programs and administered through the Faculty of Graduate Studies
- **University-wide awards** are administered through the Faculty of Graduate Studies
- **Master's $20,500:** this cap is set as Tri-Council master's scholarship value, currently $17,500, plus $3,000
- **Doctoral $26,000:** this cap is set as Tri-Council doctoral scholarship value, currently $20,000 plus $6,000

Additional information on the conditions for holding University of Calgary administered awards can be found in the Graduate Scholarship and Award Guide at grad.ucalgary.ca/awards/regulations-policies-and-guides.

Notification and Payment

Notification of award is sent electronically to successful candidates as soon as possible after the adjudication. All award winners are asked to accept or decline the offer through the Student Centre as soon as possible and no later than the deadline stated in the notification of award. All award payments begin in September unless otherwise stated in the terms of reference and/or in the award offer.

Should it become known that a student is unqualified for any reason, the university reserves the right to terminate the award(s) and funds already paid out must be returned.

Scholarship payments cannot be made if the student has not registered for the academic year. Students who have been awarded scholarships and other awards should register as soon as possible to ensure timely payment.

The following payment schedule applies to all awards in the Faculty of Graduate Studies, unless the terms of reference of the award specify otherwise.

Amount of Award	Payment
Up to $2,500	One lump sum payment

$2,501 to $6,000	Paid in equal monthly installments over four months
$6,001 to $10,000	Paid in equal monthly installments over eight months
Awards over $10,000	Paid in equal monthly installments over twelve months

If a student has a successful final oral examination during the tenure of a scholarship, the award will be terminated at the end of the month in which the thesis is submitted to the Faculty of Graduate Studies, unless otherwise specified in the terms of reference of the award, or at the date of the termination of the award, whichever comes first.

Before accepting other forms of awards or remuneration, especially those involving service, students must check with the Graduate Scholarship Office, to ensure that acceptance of the award does not affect the holder's full-time registration status.

Students holding multiple year funding must submit a Scholarship Progress Report to the Faculty of Graduate Studies Scholarship Office not later than our weeks prior to the renewal date, or submit an electronic Annual Progress Report through the My UofC Student Centre not later than six months prior to the renewal date.

Adjudication Process	Method of Application
Doctoral Recruitment Scholarships	Online application: grad.ucalgary.ca/awards. Supporting documents sent to the graduate program in which the student will be registered. Contact the Graduate Program Administrator for more information.
Izaak Walton Killam Pre-Doctoral Scholarships	Online application: grad.ucalgary.ca/awards. Supporting documents sent to the graduate program in which the student will be registered. Contact the Graduate Program Administrator for more information.
Open Doctoral Scholarship	Online application: grad.ucalgary.ca/awards. Supporting documents sent to the graduate program in which the student will be registered. Contact the Graduate Program Administrator for more information.
Recommended by Program	Variable, check the terms of reference grad.ucalgary.ca/awards with the Graduate Program Administrator for details.
Special Awards	Online application: grad.ucalgary.ca/awards. Supporting documents sent to the graduate program in which the student will be registered. Contact the Graduate Program Administrator for more information.
Bursary	Online application: grad.ucalgary.ca/awards. Supporting documents sent to the graduate program in which the student will be registered. Contact the Graduate Program Administrator for more information. NOTE: Applicants must show financial need equal to or greater than the value of the award.

Full terms of reference for each award are available through the Graduate Award Database, found at grad.ucalgary.ca/awards.

Graduate Scholarship Office

University of Calgary
Earth Sciences 1010
2500 University Drive NW
Calgary AB T2N 1N4

Fees and Expenses

2018 - 2019 Rates

(effective September 1, 2018)

The following are the approved graduate tuition and general fees for the University of Calgary. The University reserves the right to change fees without notice. Changes to fees will be reflected in this Calendar. This is considered the official fee listing and will be used for all fee assessments and appeal considerations.

C.1 Tuition Fees

Graduate students are assessed tuition and general fees as listed below. Refer to the Academic Schedule for payment deadlines or consult with the Faculty of Graduate Studies regarding payment plans.

C.1.1 Thesis-Based Students

Students in a thesis-based degree (master's or doctoral) program are assessed annual tuition fees. All tuition fees are pro-rated over four terms: one-third in Fall, one-third in Winter, one-sixth in Spring and one-sixth in Summer.

Students in thesis-based master's programs (excluding MBA) are assessed tuition fees for the first year. After the first year, annual continuing fees will apply. Students in the thesis-based MBA program are assessed full tuition fees in both the first and second years. After the second year, continuing fees will apply (see section C.2 Program-Specific Fees).

Students in Doctor of Philosophy programs are assessed tuition fees until the term immediately following admission to candidacy (Spring/Summer are counted as one term). For information on admission to candidacy, see section K. Candidacy. In all subsequent years, students will be assessed annual continuing fees.

The tuition fees below are annual and apply to all thesis-based programs except for those specified in section C.2 Program-Specific Fees.

	Canadian and Permanent Residents	International Students
Tuition fees (except MBA)	$5,593.50	$12,695.88
Tuition fees (thesis-based MBA)	$11,463.12	$25,293.24
Continuing Fees	$1,627.38	$3,693.48

C.1.2 Course-Based Students

Students in most course-based master's programs pay tuition fees on a per course basis. Students in course-based programs are assessed tuition fees by course, based on the level of the course; therefore, undergraduate students taking a graduate-level course (600 or above) will pay the Graduate Studies course fee. Graduate students taking an undergraduate-level course will pay the undergraduate course fee.

Some programs may charge additional program fees, refer to C.2 Program-Specific Fees.

Please note that differential fees may be assessed for courses offered by certain faculties or programs. All students who take these courses are required to pay the differential fee. Students in thesis programs who take courses with differential fee assessments will be required to pay the differential fee assessment in addition to their regular full or continuing fees.

The fees below apply to all course-based programs except for those specified in C.2 Program-Specific Fees.

	Canadian/ Permanent Residents	International Students
Graduate 3 units (half-course) fee	$714.78	$1,622.64
Graduate 6 units (full course) fee	$1,429.56	$3,245.28
Graduate Internship 1.5 units (quarter course) fee	$357.39	$811.32

C.1.3 Audit Fees

Audit fee rates per 3 units:

Canadian/Permanent Residents	International Students
$357.39	$811.32

In addition to the tuition fees, students auditing courses must pay appropriate general fees as indicated in the General Fees chart. For courses with a differential fee assessment (e.g., MBA courses) a student who audits a course will be assessed half the current course fee and half the current differential fee.

C.2 Program-Specific Fees

In addition to the program-specific fees listed below, courses offered off-campus or through distance delivery methods may have tuition charges that differ from the regular tuition rates.

All fees below are annual (per 12-month registration year) unless stated otherwise. For additional information on fees and payment plans, please see: grad.ucalgary.ca/current/tuition.

C.2.1 Cumming School of Medicine

	Canadian/ Permanent Resident	International
Master of Disability and Community Studies		
Community Rehabilitation per 3-unit course	$1,212.00	N/A
Continuing fees from Year 4 onwards at registration anniversary	$1,212.00	N/A
Master of Pathologists' Assistant		
Annual fee	$8,500.00	$17,000.00
Per 3 units	$714.78	$1,622.64

C.2.2 Data Science and Analytics

	Canadian/ Permanent Resident	International
Post-baccalaureate Certificate in Fundamental Data Science and Analytics		
Per 3 units	$3,000.00	$4,000.00
Post-baccalaureate Diploma in Data Science and Analytics		
Per 3 units	$3,000.00	$4,000.00

C.2.3 Faculty of Environmental Design*

	Canadian/ Permanent Resident	International
Master of Architecture		
Foundation Year (Fall and Winter Term)	$5,386.00	$12,225.60
Annual fee	$7,218.00	$16,386.96
Master of Landscape Architecture		
Foundation Year (Fall and Winter Term)	$5,504.10	$12,494.40
Annual fee	$7,218.00	$16,747.48
Post-Baccalaureate Certificate in Built and Landscape Heritage		
Per 3 units	$1,750.00	$3,975.00
Post-Baccalaureate Certificate in Designing Smart and Secure Communities		
Per 3 units	$2,175.00	$4,950.00
Post-Baccalaureate Certificate in Sustainable Urban Design		
Per 3 units	$2,175.00	$4,950.00

**Students admitted to the MEDes program prior to 2009 pay an annual continuing fee of $814.00 (Canadian/ Permanent Resident) or $1,846.64 (international).*

C.2.4 Faculty of Law

	Canadian/ Permanent Resident	International
Undergraduate (600 level, 3 units)	$1,026.24	$3,410.82
Graduate (700+ level, 3 units)	$714.78	$1,622.64

C.2.5 Faculty of Social Work

	Canadian/ Permanent Resident	International
Post-baccalaureate Certificate in Clinical Social Work Practice		
Per 3 units	$1,000.00	$2,000.00
Program Fee	$1,000.00	$2,000.00

C.2.6 Haskayne School of Business

	Canadian/ Permanent Resident	International
Doctor of Business Administration		
Per year for Years 1-3	$30,000.00	$30,000.00
Continuing fee (Year 4 at registration anniversary)	$10,000.00	$10,000.00
Continuing fee (Year 5 and onwards at registration anniversary)	$5,000.00	$5,000.00
Executive MBA (per 8 months)	$34,500.00	$34,500.00
Executive MBA (Global Energy) Program Fee	$108,383.00	$108,383.00
Thesis-based MBA		
Annual fee (Years 1 and 2)	$11,463.12	$25,293.24
Continuing fee	$1,627.38	$3,693.48
Course-based MBA*		
Per 3 units	$1,623.12	$2,880.78

**The Government-approved market modifier for the MBA program was implemented in Fall of 2011. Students admitted prior to Fall 2011 pay $1,302.33 (Canadian/ Permanent Resident) or $2,880.78 (international) per 3 unit course (0.5 full-course equivalent).*

C.2.7 Network and Software Security

	Canadian/ Permanent Resident	International
Post-baccalaureate Certificate in Network Security		
Per 3 units	$3,000.00	$4,000.00
Post-baccalaureate Certificate in Software Security		
Per 3 units	$3,000.00	$4,000.00

C.2.8 School of Public Policy

Master of Public Policy	Canadian/ Permanent Resident	International
Annual Full-Time fee	$20,492.88	$30,739.35
Annual Part-Time fee	$10,246.44	$15,369.68
MPP course fee (per 3 unit course) (For students not in MPP program)	$1,615.98	$2,424.02

C.2.9 Sustainable Energy Development

MSc in Sustainable Energy Development	Canadian/ Permanent Resident	International
SEDV (per 3 unit course)	$1,785.00	$2,785.00

C.2.10 Werklund School of Education

	Canadian/ Permanent Resident	International
EdD (Distance Delivery)		
Annual fee (years 1 - 4)	$11,221.00	$14,540.55
Continuing fee (from Year 5 onwards at registration anniversary)	$4,041.00	$5,233.81
Education Certificate (Distance Delivery)		
Continuing fee from Year 2 onwards at registration anniversary	$1,212.00	$1,212.00
Education Diploma (Distance Delivery)		
Continuing fee from Year 3 onwards at registration anniversary	$1,212.00	$1,212.00
Master of Education (Distance Delivery)		
Continuing fee from Year 4 onwards at registration anniversary	$1,212.00	$1,212.00
Distance 3 units	$1,212.00	$1,212.00
Bridge to Teaching Certificate		
3 units	$1,212.00	N/A
Master of Education – Educational Psychology		
Distance 3 units	$1,212.00	N/A
Continuing fee from Year 4 onwards at registration anniversary	$1,164.00	N/A
Master of Counselling (Distance Delivery)		
Annual fee	$1,578.00	N/A
3 units	$1,212.00	N/A
Post-Bachelor's Diploma - Educational Psychology		
One-time fee on admit term	$488.00	

C.3 General Fees

All graduate students are assessed general fees, which are subject to change without notice, each year.

General fees are assessed yearly and on a per-term basis.

General Fees Assessed Annually

	Full-Time	Part-Time
Graduate Students' Association (GSA)	$170.65	$141.20
Group Insurance	$11.00	-
Extended Health Insurance/ Dental Insurance	$330.58/$270.09	-
Graduate Bursary Donation	$10.00	$10.00
TOTAL	$792.32	$151.20

General Fees Assessed on a Per Term Basis

See the General Fees Assessed on a Per Term Basis Table.

C.3.1 Health and Dental Insurance

Each student is responsible for their own basic health care coverage and must be enrolled in a provincial health plan or its equivalent. The Graduate Student Association arranges an extended health and dental benefit plan which is compulsory for full-time students unless proof of alternative coverage (e.g., Blue Cross, Clarica), with their name and UCID on it, is submitted to the GSA online (studentcare.ca/CalgaryGSA) or in person (Earth Sciences, Room 1030) before the fee payment deadline. Deadlines can be found at gsa.ucalgary.ca/health-dental-services.

Family Coverage must be applied for before the fee deadline. Part-time students are automatically excluded from the Health and Dental Plan, but may apply to the GSA to

General Fees Assessed on a Per Term Basis Table

	Full-Time			Part-Time			
	Spring/Summer* 2018	Fall 2018	Winter 2019	Spring/Summer* 2018	Fall 2018	Winter 2019	
UPASS	$140.00	$145.00	$145.00				Full-time students only
Athletics		$24.65	$24.64		$24.65	$24.64	
Campus Recreation	$35.90	$35.91	$35.90	$35.90	$35.91	$35.90	
Student Services Fee	$150.00	$150.00	$150.00	$50.00	$50.00	$50.00	
TOTAL	$325.90	$355.56	$355.54	$85.90	$110.56	$110.54	

**All Spring/Summer services are available on May 1 and expire on August 31. Summer registrants will be charged the Spring/Summer amount in July; all other registrants will be charged the Spring/Summer amount in May. For additional information on fees and payment plans please see: grad.ucalgary.ca/current/tuition.*

purchase this coverage. Application must be made before the fee payment deadline.

C.3.2 Donations

The Graduate Bursary Donation is an optional $10.00 per year for full- and part-time graduate students.

Students who wish to opt-out must do so in writing through the Faculty of Graduate Studies before the fee payment deadline of your Annual Registration by emailing graduate@ucalgary.ca.

C.3.3 UPass (Universal Transit Pass)

In a 2002 referendum, the Students' Union and Graduate Students' Association members supported the introduction of the compulsory UPass program for all full-time students. The UPass program requires each full-time student attending the University of Calgary to pay a compulsory fee, per term, in return for a reduced rate transit pass. More information can be found at: ucalgary.ca/unicard/upass.

Eligibility for the UPass

To be eligible you must be a full-time undergraduate student registered in three courses for the Fall or Winter Terms or two courses for the Summer Term (including Spring Intersession), or a graduate student with full-time status.

Students who are issued the UPass when their status is full-time and subsequently change their status to part-time are no longer considered eligible to use the UPass program. Students are required to return this sticker to the Parking and Transportation services counter within 7 days of their status change. Failure to return this sticker will result in a hold placed on the student account. Students that change their status from part-time to full-time must wait 48 hours for the change to appear in the system before they can obtain a UPass.

C.3.4 Campus Recreation and Athletic Fees

Descriptions of the Campus Recreation and Athletic programs are to be found in the Student and Campus Services section of this Calendar.

Payment of the athletic fee entitles part-time students to free admission to interuniversity athletic games.

Students completing all University of Calgary courses off-campus are not required to pay campus recreation or athletic fees.

Campus recreation and athletic fees are non-refundable if a student withdraws from a term.

C.3.5 Student Services Fee

The Student Services Fee is mandatory for all undergraduate, medicine and graduate students. Students are assessed on a per term basis for the fall and winter terms and per intersession during the summer term based on full-time or part-time status.

The Student Services Fee is a comprehensive fee that covers a number of services provided to University of Calgary Students.

C.4 Fee Regulations

C.4.1 Transfers between Course-based and Thesis-based Master's Programs

A student transferring from a thesis-based route to a course-based route within a program will be assessed according to the tuition policy for course-based programs from the first term of registration in the course-based program.

A student who has completed 15 units (2.5 full-course equivalents) or fewer in a course-based route will be assessed full fees for one year from the date of transfer to a thesis route within the program. Annual continuing fees will be assessed for subsequent years. A student who has completed 18 units (3.0 full-course equivalents) or more in a course-based route will be assessed annual continuing fees from the date of transfer into a thesis-based route within the program.

C.4.2 Courses Taken Extra-to-Program

Students in a thesis-based or a course-based program who wish to take a course that is extra to their degree program will be assessed a regular course fee in addition to the regular graduate tuition assessment. For more information, see D.1 Registration.

C.4.3 Late Charges

Students who do not register by the posted deadline will be assessed a late registration fee of $60.00.

Students who make course changes (i.e., additions or substitutions) after the posted deadline will be assessed a fee of $60.00 for each Change of Registration form.

C.4.4 Leaders in Medicine

Leaders in Medicine students are permitted to register in both the MD and the graduate program simultaneously for one term for the purpose of taking the final examination without graduate fees being assessed.

C.4.5 Academic Staff, Postdoctoral Fellows and Visiting Scholars

Academic Staff, Postdoctoral Fellows and Visiting Scholars (not to be interpreted as visiting students) are eligible to audit courses without payment of fees, and are not required to seek admission to the University, but must obtain written permission from the instructor of the course on a "Permission to Audit" form obtainable online from the Office of the Registrar (ucalgary.ca/registrar/student-forms). Such audits will not be recorded on an official transcript. Academic staff and visiting scholars who wish to have an audit course recorded on an official transcript must pay the regular audit course fees.

C.4.6 Distance Education Off-Campus Credit Fees

Fees for off-campus credit courses will be assessed at the time of registration in the course(s). Refer to the Academic Schedule for payment deadlines.

C.4.7 Exchange Students

The amount of tuition fees assessed and the institution to which fees are to be paid are determined by the Exchange agreement that is in effect at the time of the commencement of the program.

C.4.8 Visiting Students

Visiting students who take courses are assessed general fees and tuition fees on a per course basis.

Visiting student researchers are assessed campus recreation, student services fee and Group Insurance (graduate students only) each term. See A.3 Admission Categories for further information on the admission process.

C.4.9 International Students

Students who are not Canadian citizens or permanent residents of Canada are required

to pay a differential fee in addition to the international tuition fee.

Canadian student status includes: a) Canadian Citizens; b) Permanent Residents; c) conventional refugees.

International students who are dependents of foreign Consular officials will be assessed fees at the Canadian student rates.

International students whose immigration status changes will be required to provide proof of the new status before a change in fee assessment will be made. Students must provide a signed copy of their permanent residence papers or citizenship papers to enrolment services or the Faculty of Graduate Studies prior to the fee payment deadline for term. Requests received after the fee payment deadline will take effect during the next academic term in which the student is registered.

For 2018/19, the base international tuition fee for a 3 unit course is $611.28 at the undergraduate level and $811.32 at the graduate level.

Note: Applicants who are in Canada on a Work Permit or dependents of persons on a Work Permit are required to pay international fees, unless the dependents are Canadians or Permanent Residents.

C.4.10 Senior Citizens

The University of Calgary waives tuition fees related only to undergraduate, direct-entry bachelor's level courses for senior citizens. The senior citizen must be 65 years of age or older by the fee deadline for the term they are registered in. Students are still responsible for the appropriate application fee and any mandatory supplementary course fees (if applicable).

Senior Citizens are exempt from paying Students' Union, Campus Recreation, Athletic and Student Services fees are waived; however, if senior citizens wish to use any of these services, they must pay the required fees. Any senior citizens who register as full-time students will be assessed the Students' Union Donation, as well as the Health and Dental Plan fees and must opt out using forms available at https://www.mystudentplan.ca/uofcalgary/en/home.

C.4.11 Mandatory Supplementary Fees for Courses

Course supplementary fees may be charged to students for materials or services associated with particular courses or sections of courses. Students will be notified of the additional fees in one of two ways: (1) fees are viewable under Class Notes in the Student Centre; (2) once registered in a class with a supplementary fee, the fee will be indicated in the Finances section of the Student Centre. Departments/instructors are not permitted to charge mandatory supplementary course fees which are not assessed by the Registrar's Office. Departments may charge students a laboratory breakage fee when appropriate. The laboratory breakage fee should be approved by the Dean (or designate) and listed in the course outline.

Mandatory supplementary fees for courses are due by tuition fees payment deadline. In most cases, they are non-refundable after the last day to drop a course for the term(s); however, some courses may have earlier deadlines for refunds. When an earlier date is used it will be listed in the Class Notes section of the course schedule and on the faculty/department website.

The following general principles apply to course supplementary fees:

1. Tuition fees should provide for credit instruction, which includes the following:

   a. Evaluation of work/performance which includes practicums, marking of papers, examinations and other assignments.

   b. Laboratories which include laboratory assistance or supervision, laboratory materials or supplies.

   c. Resources to support instruction. This includes, but is not limited to materials or services required as a result of the method of teaching used by the instructor, classroom audio visual equipment, models for art classes, practice rooms, films and videotapes used for instructional purposes, course outlines, etc.

   d. Library facilities and related basic services.
2. Mandatory supplementary fees may be considered for special materials or services not included under general principle #1, if deemed necessary for the successful completion of the course as approved by the Provost and Vice-President (Academic).
3. Optional supplementary costs are those the student has the option of obtaining from a variety of sources. Examples include but are not limited to art supplies, laboratory coats, goggles, project materials, medical scrubs.

Off-campus courses may be exempt from these principles as needed to accommodate different course structures. Questions regarding mandatory supplementary fees can be directed to the department initiating the fee.

C.4.12 Postgraduate Medical Education

A tuition fee of $485.23 per term, to a maximum of $970.46 over a 12-month period, will be charged to all residents/fellows enrolled in postgraduate medical education based on the number of months active in the program.

The above fees will be assessed at the time of registration. Fees will be waived on the basis of a reciprocity for Canadian medical school residents taking electives through the Cumming School of Medicine.

Residents/fellows will be sent a confirmation of their fee assessment with the fee payment deadline noted on the assessment. All fees are payable to the University of Calgary. See ucalgary.ca/registrar/finances for payment options.

C.4.13 Donations to Bursary Funds

All students (including Open Studies and Visiting students) are being asked to make a tax deductible donation to the Student Peer Assistance Bursaries (undergraduate students) and the Graduate Students' Association Bursary Fund (graduate students). Full-time undergraduate students are automatically levied $10.00 per Fall and Winter Term; part-time undergraduate students and Summer Term (including Spring Intersession) students are levied $7.00 per term. Full- and part-time graduate students are levied $10.00 per year. The monies raised will be used to provide bursaries for undergraduate and graduate students in financial need.

Graduate students who wish to opt-out must do so in writing through the Faculty of Graduate Studies before the fee payment deadline of your Annual Registration by emailing graduate@ucalgary.ca. The donation is not refundable after the deadline for payment of fees.

C.5 Payment of Fees

Balance of fees must be paid or notice of financial assistance provided, before the fee payment deadline for any term. Consult the Academic Schedule for fee payment deadline information.

All annual tuition and continuing fees are pro-rated over four terms as follows:

1/3 in Fall

1/3 in Winter

1/6 in Spring

1/6 in Summer

C.5.1 Method of Payment

Students may pay their fees by online banking, international fund transfer, cheque, money order and bank draft. Cheque, debit and bank drafts payments may be made in-person by visiting Enrolment Services.

For detailed information on how to pay fees, visit ucalgary.ca/registrar/finances/tuition-fees/pay-your-fees.

If fees are to be paid from government student loans, proof of government funding must be confirmed by the University of Calgary prior to the fee payment deadline. Student loans will be confirmed electronically with a pre-approved remittance amount. A remittance amount is paid directly to the University toward the student account. No interest accrues if payment is received within 30 days after the term fee deadline. Payments received after the 30 day deferral are subject to late interest from the term fee deadline date forward. Any amount outstanding in excess of the remittance amount must be paid by the term fee deadline.

If financial assistance is refused by the loan provider, students are responsible to pay outstanding fees by the term fee deadline, including any late interest.

Note that students will not have their registration cancelled if financial assistance is refused and remain fully liable for all tuition and general fees owed to the University of Calgary and affiliates.

C.5.2 Graduate Student Payment Plan

Graduate students receiving funding through the University of Calgary may apply for a Payment Plan, which arranges the fee payment to be spread monthly over a period of time. For more information and eligibility, visit grad.ucalgary.ca/current/tuition.

C.5.3 Late Payment of Fees

Students whose fees are not paid by the term fee deadlines and who have not confirmed financial assistance will be charged interest on the outstanding balance at the rate of 1 per cent per month. Interest is calculated on the daily outstanding balance of $75.00 or more and is not compounded.

Students with an outstanding balance will have a hold placed on their record and services will be restricted. Students will receive email messages to their ucalgary.ca email address on a monthly basis if there is an outstanding balance. Interest rates are subject to change without prior notice. For more information visit ucalgary.ca/registrar/finances/tuition-fees/late-fees-and-payment-issues.

C.5.4 Delinquent Student Accounts

Any current or former student with an overdue debt to the University of Calgary, including any administrative department, the Students' Union or the Graduate Students' Association, will not be allowed to register, will not receive transcripts of grades or parchments at graduation and may also be denied access to other University services until the outstanding account is settled in full, or in exceptional circumstances an acceptable payment arrangement is made. Delinquent student accounts will be referred to a collection agency.

Students are encouraged to consult with the Faculty of Graduate Studies and the Wellness Centre if they are having difficulty meeting their financial obligations.

Note: This regulation pertains to students enrolled in all courses and programs offered by the University of Calgary.

C.5.5 Fee Refunds

Students are responsible and accountable for all assessed tuition and fees that appear on their student account. Tuition or general fee refunds will be made for courses dropped up to and including the course drop deadline as outlined in the Academic Schedule. If a credit balance for the term remains on your account, you can request a refund through the Student Centre.

If you've received a student loan or a scholarship, your refund will be reviewed prior to funds being issued to ensure the refund is in alignment with student loan or scholarship regulations.

After the course drop deadline, a student may withdraw from a course up to the withdraw deadline; however, no refund of any tuition or general fees will be made.

Thesis-based students who withdraw from individual courses will not have any changes made to their fee assessment for the year.

Thesis-based students who withdraw from program will have tuition fees assessed to the end of the term in which they withdraw. If the student withdraws from program before the fee payment deadline, the tuition fees for that term will be refunded.

Note: Some courses may have earlier fee payment deadlines or drop restrictions. These courses will have notes in the Class Notes section of the Schedule of Classes.

Academic Regulations

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The general regulations apply to all graduate students. Regulations specific to particular degree programs are outlined in the individual program, found in the Program Descriptions section.

Notices of any changes in regulations are available from the program office. It is the student's responsibility to be familiar with the regulations and deadlines of the Faculty of Graduate Studies as stated in this Calendar, in their graduate program's Handbook and, for thesis-based students, in the Thesis Guidelines (grad.ucalgary.ca/current/thesis).

Notes:

1. Students are advised to consult with their Graduate Program Director and Graduate Program Administrator regarding all aspects of their graduate programs.
2. All graduate students registering or re-registering must contact their supervisors and programs to discuss their programs of study within the first two weeks of their annual registration month.
3. This Calendar provides a listing of all graduate courses. Course offerings will be determined annually and are subject to the availability of instructors and student interest and in some instances are only offered in alternate years. Students should consult a current timetable before registering.

D.1 Registration

Each year of the program, each graduate student must register using the Student Centre at my.ucalgary.ca. Students must register annually, at the time of the anniversary of their first registration, and before the deadline for that term. All graduate students register for a twelve month period and general fees are assessed in each term. Students enrolled in thesis-based master's or doctoral programs will be considered full-time unless the program Calendar entry allows for part-time registration and specific approval is given to an individual student. Unless a student's registration is active, the student may not participate in University activities towards a degree such as attendance in a course, conducting research in a laboratory, teaching and receiving paid support.

D.1.1 Course Selection and Registration

A complete guide to registration is available online at grad.ucalgary.ca/current/managing-my-program/registration.

Students should always consult with their graduate program and supervisor, if applicable, concerning course selection. Refer to the deadlines in the Academic Schedule.

Following registration, it is the student's responsibility to verify course registration and fee assessment using the Student Centre my.ucalgary.ca.

For information on Block Week courses, see Block Week Courses in the University Calendar.

D.1.2 Auditing Courses

Students wishing to audit courses must consult with their graduate program and complete a Change of Course Registration form, available at grad.ucalgary.ca/current/managing-my-program/registration.

D.1.3 Continuous Registration

Students must maintain continuous registration (with the exception of daytime course-based MBA students - see Haskayne School of Business) and pay the appropriate fees until all degree requirements have been completed. A student who does not register by the appropriate deadline date will be withdrawn for failure to register. Information about readmission or reactivation appears in sections A.7 and A.8 of this Calendar.

It is expected that students in course-based programs will complete at least half of the required courses in the first two years of the program.

D.1.4 Course Withdrawal

A graduate student may withdraw from a course in which they are registered via the Student Centre at my.ucalgary.ca, any time up to and including the last days to drop courses given in the Academic Schedule section of this Calendar. Students are not permitted to withdraw online more than once from the same course. Tuition fees will be refunded only if the student drops a course on or before the last day to drop courses for that term according to the academic schedule.

For regulations on withdrawing from Block Week courses, see Block Week Courses in the University Calendar.

Note: All withdrawals after the posted last day to drop courses will be recorded on the student transcript.

D.1.5 Courses Taken Extra-to-Program

A student in a thesis-based or a course-based program may request to take a course that is extra to their degree program. Extra-to-program courses will not count toward the current graduate degree, but students should be aware that they will be included in all grade point average calculations on the transcript.

Registration in any course is subject to departmental approval. For information on fees, see Fees and Expenses.

D.2 Transfer Credit

Students currently registered in a graduate degree program at the University of Calgary may receive credit for one or more courses taken at other recognized institutions, if approved by the graduate program and the Faculty of Graduate Studies.

Program and Faculty of Graduate Studies' approval of these arrangements must be obtained before the courses begins.

Course-based programs: Transfer credit and any advanced credit received upon entrance to the program may not exceed one third of the program or 12 units (2.0 full-course equivalents), whichever is less.

In order to receive transfer credit, students must arrange for official transcripts showing the courses taken and grades achieved to be sent from the other institution to the Faculty of Graduate Studies. Courses for which transfer credit is being sought must be from a recognized institution and not have been used for any degree or diploma accreditation. They must be graded, graduate-level courses, and the graded level of performance must be equivalent to a "B" grade or higher standing at the University of Calgary.

Transfer credit is not granted for courses for which the graded level of performance is equivalent to "B-" or lower.

D.3 Student Status

D.3.a) Research-Based Programs

Research-based programs include thesis-based programs and research master's programs. Research master's include a significant research component, and would normally be considered acceptable preparation for a PhD program. Some course-based MA and MSc programs are considered research master's programs. These are designated as such in the program's calendar entry.

Students registered in research master's and doctoral programs will be considered full-time unless their program formally offers a part-time option, by listing the option under their respective program entry in this calendar, and approves the student for a part-time registration status on an annual basis.

It is understood that full-time students will normally work an average of 40 hours per week on program-related activities. Program-related activities include course work, systematic reading, laboratory or other research work related to the production of thesis proposals and/or defence of thesis and thesis proposals, field work, and study for candidacy examinations.

D.3.b) Course-Based Programs

D.3.b) i. Course Work Minima

Course-based graduate programs normally consist of at least 36 units (6.0 full-course equivalents) taken at the graduate level. Audited courses do not count towards the fulfillment of program requirements.

D.3.b) ii. Full-time Students

Students will be considered full-time if they enrol in 18 units (3.0 full-course equivalents) or more per annual registration.

D.3.b) iii. Part-time Students

In order to remain eligible for part-time status, students may enrol in no more than 15 units (2.5 full-course equivalents) per annual registration.

Enrolment in additional courses will require a change in status to full-time enrolment.

Part-time enrolment status must be approved by the graduate program.

D.3.c) Change of Registration or Status

A change from part-time to full-time status will require program approval indicating satisfactory progress for full-time registration. It will also require that students pay the full-time general fees for the full year retroactive to their annual registration term.

Changes to full-time/part-time status subsequent to the posted deadline must be submitted to the Faculty of Graduate Studies on a Change of Program or Status form. Forms are available on the Faculty of Graduate Studies website at: grad.ucalgary.ca/current/managing-my-program/registration. Course changes must be done through the Student Centre at my.ucalgary.ca and will be considered until the deadlines listed in the Academic Schedule of this Calendar.

Course changes after the posted deadline must be done on a Faculty of Graduate Studies Change of Course Registration form and a $60 late registration fee will be charged. Forms are available on the Faculty of Graduate Studies website at: grad.ucalgary.ca/current/managing-my-program/registration.

Registration to audit a course must be done on a Faculty of Graduate Studies Change of Course Registration form.

D.3.d) Fees and Registration Status for GSA Executives

Students volunteering in an executive role with the Graduate Students' Association (GSA) shall be registered as a full-time student and noted as having GSA responsibilities for the length of their term with the GSA.

During their term with the GSA, executives are released from course, research, and teaching responsibilities in proportion to the expectations of their role with the GSA. Related funding may be deferred.

While holding an executive role with the GSA, students shall pay continuing fees regardless of time in the program.

D.4 Program Transfers

Program transfers must take place before a student's third annual registration. Students should consult the supervisor and Graduate Program Director. Current time in program will be credited; course credit is given at the discretion of the program.

It is the student's responsibility to check the fee implications of the transfer.

Doctoral students who have transferred from another institution must complete their program's candidacy requirements. Exceptions may be made if the graduate program gives credit for an equivalent requirement successfully completed at another university.

D.5 Withdrawals

A student wishing to withdraw from the Faculty of Graduate Studies should complete a Graduate Withdrawal form, available at grad.ucalgary.ca/current/managing-my-program/withdrawal.

Fees for subsequent terms will be cancelled upon withdrawal notification.

When a student withdraws from the Faculty of Graduate Studies, it is the student's responsibility to ensure that all outstanding fees are paid.

After a required withdrawal from a graduate program at the University of Calgary, a student may not apply to another graduate program at the University of Calgary until a year after the final decision to require withdrawal has been made.

Students under academic review (e.g., for academic misconduct) will not be permitted to withdraw during the review process.

D.6 Time Limits

D.6.1 Faculty of Graduate Studies' Time Limits

Students in research- and thesis-based master's programs must complete all degree requirements within four registration years; students in course-based master's programs must complete all degree requirements within six registration years. It is expected that students completing a master's degree on a full-time basis will complete the degree within half the time allowed.

Students in doctoral programs must complete all degree requirements within six registration years. It is expected that most candidates will complete requirements within four years.

D.6.2 Program-Specific Time Limits

Individual programs may require shorter completion times than the Faculty of Graduate Studies maximum. Check the program's entry for specific details about time limits (see Program Descriptions).

D.6.3 Program Extensions

If a student needs longer than the regulation time set out in D.6.1, an extension to program may be granted by the Faculty of Graduate Studies on the basis of a recommendation from the Graduate Program Director that specifies the grounds for the extension and provides a detailed schedule for the completion of the program. Forms can be found on the Faculty of Graduate Studies website at: grad.ucalgary.ca/current/managing-my-program/registration.

For programs that require shorter completion time than the Faculty of Graduate Studies maximum, requests for extension may be granted by the program.

D.6.4 Program Extensions for GSA Executive Members

Graduate programs must take the service by GSA Executive members into consideration in assessing the student's progress in the annual progress report. On request, the Faculty of Graduate Studies will grant GSA Executive members extensions to time in program of up to one year per year in office.

D.7 Leave of Absence

If a student is unable to maintain continuous registration, they should apply for a leave of absence. Leaves of Absence are granted for reasons including, but not limited to:

- Bereavement
- Care-giving responsibilities
- Maternity
- Medical requirements
- Military service
- Parental responsibilities
- Political service

Leaves of absence may be granted for a minimum of one term and up to one year. Such requested leaves must be approved by the student's home graduate program.

Proper documentation must be supplied when applicable (e.g., medical leaves).

Any requests for renewal beyond a year must be approved by the Faculty of Graduate Studies. The total length of leave time with renewal must not exceed two (2) years for master's, graduate certificates and graduate diploma's students and three (3) years for doctoral students. During a leave of absence, a student is not expected to work on their graduate program. The time on leave will not count as time in program, i.e., a doctoral student who completes two years and then takes a one year leave of absence, will still have four years to complete degree requirements.

Application for a leave of absence should be made in advance of the anticipated leave, or as soon as possible after the event necessitating the leave occurs. While it is often difficult to anticipate the need for a leave, it is helpful if the beginning and end of the leave coincide with the beginning and end dates of a term. All supporting documents need to be submitted along with the request form.

During an approved leave of absence of up to one year, all Faculty of Graduate Studies (FGS) administered scholarship funding is deferred until the student returns to full-time registration. Students should be aware that supervisory and/or funding arrangements other than FGS-administered scholarships cannot in general be guaranteed on return from a leave. It is the student's responsibility to ensure that the proposed leave is compatible with the regulations of any granting agency from which funding would normally be received during the leave period, and that such agencies are informed of the proposed leave. Students on student loan programs should clarify the consequences that a leave will have on their repayment status; information about education financing in Alberta can be found at alis.alberta.ca/ec/fo/pay/loansgrants.html. International students should consult the International Student Centre and immigration authorities regarding their immigration status during the proposed leave.

Information on fee assessments during an approved leave can be found at grad.ucalgary.ca/current/managing-my-program/leave.

D.7 a) Leave of Absence Procedure

The student should discuss the leave and its implications with the supervisor and any other appropriate people, e.g., members of the supervisory committee.

4. If it is a first-time request, and the total length of the leave is less than one year, submit the completed and signed *Application for Leave of Absence* form to the student's home graduate program for approval. See grad.ucalgary.ca/current/managing-my-program/leave.
5. If the total length of the leave on the student's record is beyond a year, or if this is not a first-time request, the application must be approved by the Faculty of Graduate Studies. The completed and signed *Application for Leave of Absence* form must be forwarded to the Faculty of Graduate Studies for approval.

D.7 b) Maternity Leave

In the case of a maternity leave which interrupts funding, the Faculty of Graduate Studies will provide funding for up to 4 months at the rate of $1,000 per month for those months in which no other funding is being received. Thus, if a student is receiving 1 month of maternity leave pay under the GSA Collective Agreement, the Faculty of Graduate Studies will pay for 3 months. Submission of a Leave of Absence form with maternity leave submitted as the reason for the leave, will trigger a review by the Faculty of Graduate Studies of the student's eligibility for these funds.

E. Combined Degrees

A Combined Degree Program is a formal arrangement between two units offering programs whereby approved students may be registered simultaneously in two programs. The requirements for both degrees must be completed before the student can graduate. The University of Calgary presently offers the following combined degree programs: JD/MBA, JD/MPP, MBA/MPP, MSW/MBA, MBT/MBA, MSc/MBA, PhD/MBA, MD/Master's degree, and MD/PhD. Information and application packages are available from the relevant graduate programs.

F. Interdisciplinary Degrees

The Interdisciplinary Degree allows a qualified graduate student to pursue thesis-based research (Master's, PhD) in an area that does not fit the traditional disciplinary requirements of only one graduate program. The requirements for the student's program are individually tailored to meet their research interests. Research is carried out under the direction and guidance of a Supervisor, Co-Supervisor and Supervisory Committee whose research expertise is relevant to the disciplinary areas. The student should submit an application form and fee, along with official transcripts and letters of reference to the intended home graduate program. The application must meet the minimum Faculty of Graduate Studies requirements for admission. The prospective home program will work with the conjoint program to establish coursework and candidacy examination requirements. Parchments for the Interdisciplinary Degree will identify both the home and conjoint programs. Contact the prospective home graduate program for further details.

See ucalgary.ca/future-students/graduate/apply for further information about the admission process.

G. Internships

Students undertaking an internship should register in Internship 601, 602, 603 or 604 throughout the internship in order to have the internship reflected on their transcript.

Internships must be related to the student's program of study. Approval to participate in a graduate internship is at the discretion of the student's supervisor (if applicable) and graduate program, which recommend enrolment to the Faculty of Graduate Studies.

Graduate students undertaking an internship program of 30 hours per week or more are not eligible for scholarship or other non-internship funding from university sources, including supervisor's research grants, during the period of their internship. Graduate students undertaking a part-time internship must ensure the internship is compatible with any scholarship or other funding.

Students are responsible for arranging the details of their remuneration during the period of the internship. Unpaid internships will require special approval from the Faculty of Graduate Studies.

International students must comply with relevant Canada Immigration requirements governing eligibility to work off campus.

G.1 Internships in Research Programs

Full-time students registered in a research-based graduate program as set out in section D.3 Student Status may undertake either:

a) an internship for up to eight months, full-time (21 hours or more per week). This may be completed as a single internship or in blocks of time up to 8 months total, or

b) a part-time internship, up to one year (20 hours or less per week).

Normally, internships are undertaken after a doctoral student has completed all candidacy requirements, or after a student in a thesis-based master's program has completed all course requirements.

Students enrolled in a thesis-based program may undertake an internship after a successful thesis defence, but before approval to graduate. The maximum duration of a post-defence internship will be four months, which must be completed within six months of the date of the thesis defence.

Full-time registration must be maintained until the end of the internship. Continuing fees will be assessed.

G.2 Internships in Course-Based Programs

Full-time students registered in a course-based graduate program may undertake a full-time internship for up to eight months, or a part-time internship for up to one year, at a time that is approved by the graduate program. The student will pay regular domestic or international fees for a 1.5 unit course for each term enrolled in Internship 603 or 604.

H. Academic Standing

H.1 Distribution of Grades

Graduate Grading System for Course Final Grades

Grade	Grade Point Value	Graduate Description
A+	4.00	Outstanding

A	4.00	Excellent - superior performance showing comprehensive understanding of the subject matter.
A-	3.70	Very good performance
B+	3.30	Good performance
B	3.00	Satisfactory performance
B-	2.70	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	All grades of "C+" or lower are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements. Individual programs may require a higher passing grade.
C	2.00	
C-	1.70	
D+	1.30	
D	1.00	
F	0.00	
I	0.00	Incomplete. Sufficient work has not been submitted for evaluation or cannot be adequately assessed; or the final exam has not been submitted.
CR		Completed Requirements. Carries no weight in calculating the grade point average. This will be noted as "Not Included in GPA" in the calendar descriptions of applicable courses.

H.2 Student Standing

Poor academic standing is defined by any one, or combination, of the following conditions:

1. A student receives a "C+" or lower in any one course.
2. A student does not maintain an annual GPA of at least 3.00 calculated each year at the time of their registration anniversary.

H.2.a) Thesis-Based Programs

When any instance of poor academic standing arises, the program must submit a notice informing the Dean of Graduate Studies of its recommendation. The Faculty of Graduate Studies, after consultation with the graduate program and/or supervisory committee concerned, may initiate the withdrawal of a student.

If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

A student must have a cumulative GPA of at least 3.00 in order to graduate.

Final grades may be accessed through the online Student Centre at my.ucalgary.ca.

H.2.b) Course-Based Programs

When any instance of poor academic standing arises, the student's program must make a recommendation to Faculty of Graduate Studies. Programs can recommend that the student withdraw from the program or that the student stay in program. If the Dean of the Faculty of Graduate Studies determines that a student can remain in program, the student will be placed on academic probation. If a student who is on academic probation receives a grade of "C+" or below, they will normally be required to withdraw from their program. To be removed from academic probation, the student must meet any requirements set by the Dean of Graduate Studies when the probation began, and must complete one full semester in good academic standing.

If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

A student must have a cumulative GPA of at least 3.00 in order to graduate.

Final grades may be accessed through the online Student Centre at my.ucalgary.ca.

H.3 Student Progress

H.3.a) Thesis-Based Programs

Graduate students are expected to maintain adequate progress. This includes timely completion of required course work, progress to candidacy according to the program's candidacy timeline, and steady and meaningful work on the thesis. Supervisors and graduate program directors should ensure, through annual progress reports and otherwise, that the student is informed in writing about concerns regarding progress.

The Faculty of Graduate Studies, after consultation with the graduate program director and/or supervisory committee concerned, may initiate the withdrawal of a student for failure to maintain progress.

Annual Student Progress Report

Each thesis-based graduate student must file an annual progress report with their graduate program, typically during the month of May every year (the time may vary by program). Delinquent students may be denied registration.

The annual progress report is accessed from the online Student Centre at my.ucalgary.ca.

H.3.b) Course-Based Programs

A graduate program may recommend to the Faculty of Graduate Studies that a student be required to withdraw for lack of satisfactory progress in either course work or research.

The Faculty of Graduate Studies, after consultation with the graduate program director and/or supervisory committee concerned, may initiate the withdrawal of a student.

I. Language

Except in certain courses in the language departments, the language of instruction at the University of Calgary is English. Delivery of any University of Calgary program in a language other than English requires approval from the Academic Planning and Priorities Committee.

Theses must be submitted in English, except when explicitly permitted in the program's thesis guidelines and related to the student's program of study.

J. Supervision

J.1 Appointment of Supervisor

J.1.1

Graduate students in thesis-based programs are required to have a supervisor throughout the duration of their program. All members' eligibility to supervise is set out in the University of Calgary Graduate Student Supervision Policy.

J.1.2

Postdoctoral scholars are not eligible to serve as supervisors.

J.1.3

At time of admission, a supervisor or an interim supervisor must be appointed.

J.1.4

The Graduate Program Director must appoint a permanent supervisor no later than twelve months after first registration.

J.1.5

Within two months of the appointment of a permanent supervisor, the graduate student and Supervisor must complete the Student-Supervisor Checklist and file their signed copies with their program office. The relationship between supervisor and the graduate student is an academic one, conducted in a professional manner and in accordance with the Faculty of Graduate Studies Conflict of Interest Policy and the University of Calgary Integrity in Scholarly Activity Policy.

J.2 Appointment of Co-Supervisor

J.2.1

If a student's supervisor does not hold full supervisory privileges (see the University of Calgary Graduate Student Supervision Policy) the Graduate Program Director must appoint a co-supervisor, in consultation with the supervisor and the student.

J.2.2

If not required under J.2.1, the Graduate Program Director may appoint a co-super-

visor if recommended by the supervisor and with the agreement of the student.

J.2.3

Postdoctoral scholars are not eligible to serve as co-supervisors.

J.2.4

When a co-supervisor is appointed, all relevant documentation must be signed by both the supervisor and the co-supervisor.

J.3 Continuity of Supervision

J.3.1

Graduate students should expect continuity of supervision through their graduate program (see University of Calgary Graduate Student Supervision Policy).

J.3.2

Graduate students have a responsibility to maintain strong working relationships with their supervisors as set out in Best Practices for Graduate Students.

J.3.3

In cases where graduate students are unwilling to accept the supervision provided or have chosen to pursue research topics other than those indicated at the time of admission, the graduate program and the Faculty of Graduate Studies have no responsibility to agree to alternate supervisory arrangements if they cannot be reasonably accommodated.

J.3.4

Only under exceptional circumstances, students may request permission from the Faculty of Graduate Studies to change supervisors (see Guidelines for Requesting to Change Supervisor).

J.3.5

It is the role of the Graduate Program Director (or delegate) and the Faculty of Graduate Studies to try to mediate conflicts between students and supervisors in order to maintain the continuity of the supervisory relationship (see Guidelines for Resolving Conflicts Between Graduate Students and Supervisors).

J.4 Financial Commitments to Students at Time of Admission

J.4.1

Financial support promised in writing by supervisor is contingent upon a student's continued registration and progress in a graduate program. Expectations should be clearly stated in the offer of funding that comes from the Graduate Program.

J.4.2

It is the collective responsibility of the supervisor(s), the Graduate Program(s) and the Faculty of Graduate Studies to ensure that financial commitments are met (see University of Calgary Graduate Student Supervision Policy Sections 4.20-22).

J.5 Composition of the Supervisory Committee: Master's and Doctoral

J.5.1

The supervisory committee should be constituted by the supervisor in consultation with the student. It will normally consist of the supervisor and co-supervisor, if applicable, and two members. The composition must be approved by the Graduate Program Director (or delegate) and sent to the Faculty of Graduate Studies for information.

- Master's students do not require a supervisory committee unless required by the program or requested by the Graduate Program Director (or delegate).
- Doctoral students require a supervisory committee, which should be appointed as soon as possible, but no later than three months after the appointment of the permanent supervisor or fifteen months after the initial registration.

J.5.2

For both master's and doctoral supervisory committees:

- Members may be external to the Graduate Student's program.
- At least one of the members of the supervisory committee should have had supervisory experience at the doctoral level.
- Postdoctoral scholars are eligible to serve as committee members. A postdoctoral scholar whose supervisor is on the student's supervisory committee is not eligible to serve as a member of the examination committee. In this case, an additional member who is eligible to serve as an examiner must be included in the supervisory committee.
- Persons who are non-academic staff members of the University of Calgary may serve on the supervisory committee with the approval of the Dean of Graduate Studies.

K. Candidacy

K.1 Admission to Candidacy

Admission to candidacy for the doctoral degree is a judgment by the faculty members in the graduate program that the student is prepared to successfully complete the requirements of the doctoral degree program. Subject to any extension allowances, doctoral students must complete all candidacy requirements within 28 months of first registration. Those students who have transferred from a master's program must complete all candidacy requirements within 36 months of the first registration in that master's program.

If a student needs longer than the regulation time, the Faculty of Graduate Studies may grant an extension on recommendation of the Graduate Program Director.

Each graduate program specifies its requirements for candidacy in its Candidacy Requirements document. To be admitted to candidacy, the student must successfully:

1. Complete course requirements for their program as set out in the program's Calendar entry. Graduate Program Directors have the authority to require additional courses or waive course requirements for students in consultation with the supervisor and supervisory committee (where applicable).
2. Complete any other program-specific candidacy requirements such as language or seminar requirements, as set out in the program's Calendar entry.
3. Complete a written thesis proposal that is examined and approved by the supervisory committee (and additional examiners, if required by the program).
4. Pass one or more Field of Study examination(s) to demonstrate knowledge in their field of study, as required by the graduate program.

K.2 Candidacy Examination Outcomes

In their Candidacy Requirements, programs will establish what constitutes a "pass" on each component related to items (2) - (4) above (i.e., grade assigned, unanimity of the committee, etc.).

If, for any component related to (4) above, the examination committee requires that a student undertake remedial work, that remedial work must be completed before the student can be admitted to candidacy. Once a student has been admitted to candidacy, they cannot be required to undertake additional course work (excluding courses mandated as post-candidacy requirements in program Calendar entries).

A student who fails any component related to (3) and (4) above will be allowed to retake the examination no sooner than two months and no later than six months from the failed examination. The second failure of a candidacy component will result in a student being required to withdraw. In the case of failed outcomes, students have the right to appeal. Students must appeal directly to the Faculty of Graduate Studies (see Appeals Against Faculty of Graduate Studies Rulings).

K.3 Program Candidacy Requirements

Each graduate program offering a doctoral degree will establish its own Candidacy Requirements document, within the framework set out in K.1 Admission to Candidacy.

Together, the thesis proposal and Field of Study examination must include at least one oral and one written component.

The Candidacy Requirements document must be approved by the Faculty of Graduate Studies.

The Candidacy Requirements document must be posted on the program's website.

Candidacy Requirements must be the same for all students in a graduate program, except when they relate to an approved specialization within the degree program.

K.4 Oral Examination Process (for Field of Study and Thesis Proposal)

(1) It is the responsibility of the supervisor to schedule the oral examination. Under no circumstances are students permitted to make arrangements for an examination.

(2) When required, both the internal and external examiners normally must be members of the Academic Staff and:

a) have relevant research experience;

b) not be a close personal friend of the supervisor;

c) not have collaborated with the supervisor in past five years.

(3) A post-doctoral scholar whose supervisor is either on the supervisory committee (when it is part of the examination committee) or is the supervisor of the student, is not eligible to serve as a member of the examination committee.

(4) Prior to the oral examination, if an examiner suspects that academic misconduct has occurred in the thesis proposal or other written candidacy components, they must contact the Dean of Graduate Studies immediately. The examination will then be suspended until such time as the Dean (or designate) is able to determine whether academic misconduct has occurred and what penalties will be applied. Depending on the determination, the examination may proceed as scheduled, be rescheduled, or be cancelled.

(5) All examiners must be present, either in person or via teleconference, during the entire questioning process as well as the post-examination discussion and vote, unless precluded by the program. When they are part of the examination committee, the supervisor (or the co-supervisor, if applicable) normally must be present in person.

(6) The oral examination questioning will not exceed two hours. The student may be offered an opportunity to give a brief (15-minute) presentation that may be part of the two-hour examination time.

L. Theses

Every graduate student in a thesis-based program must complete a thesis that makes an original scholarly contribution based on research conducted while in program.

Complete information on the formatting, printing, submission and distribution of the thesis is contained in the Faculty of Graduate Studies Thesis Guidelines, available at grad.ucalgary.ca/current/thesis.

If required by the program, the student is responsible for the costs of printing and binding the required number of copies of the thesis, and for having the required number of copies bound.

Students must continue to pay the appropriate tuition and general fees until all degree requirements, including the submission of the thesis to the Faculty of Graduate Studies, have been completed.

L.1 Quality of Thesis

Doctoral

The doctoral thesis must reflect a significant contribution to knowledge, must contain evidence of a critical understanding of the relevant literature, and must employ appropriate research methodology. It is expected that the material embodied in the thesis must be of high quality and reflects the standards of the discipline.

Master's

The thesis must demonstrate that the candidate is acquainted with the published literature in the subject of the thesis, that appropriate research methodology has been used, and that appropriate levels of critical analysis have been applied.

L.2 Integrity in Scholarly Activity

The University's policy governing Integrity in Scholarly Activity applies to all thesis work. Plagiarism and fabrication or falsification of research data will be considered academic misconduct. (See Plagiarism/Cheating/Other Academic Misconduct in the University Calendar).

L.3 Research and Ethics

All research involving human participants, animals or biohazards must first be reviewed and approved by the appropriate certification committee before research can begin. Failure to obtain appropriate approvals prior to conducting research may result in an outcome of “fail” on the thesis examination.

Graduate students should consult with their departments or graduate programs, and review the Research Ethics site at ucalgary.ca/research/researchers/ethics-compliance for information about the ethics approval process.

L.4 Intellectual Property

The student holds the copyright on the thesis, but ownership of Intellectual Property included in the thesis is governed by the University of Calgary Intellectual Property Policy.

In the case of manuscript-based thesis, co-authored publications may be included (see L.5 Form and Style).

L.5 Form and Style

The general form and style of thesis may differ from program to program, but a thesis must be a cohesive document. This document may, with approval of the supervisory committee, include elements such as original creative works, digital elements, entrepreneurial/innovation components, or policy/implementation components. See Thesis Guidelines at grad.ucalgary.ca/current/thesis/guidelines.

In consultation with the Supervisor, students may choose to compose their theses using the traditional thesis style or the manuscript-based thesis style. The thesis must conform to the requirements and regulations described in the Thesis Guidelines, available at grad.ucalgary.ca/current/thesis/guidelines.

Students may hire an editor to copyedit their theses, unless their program’s calendar entry prohibits copyediting. Students who choose to hire an editor must comply with the regulations set out in the Thesis Guidelines.

The thesis must conform to all relevant legislation and policy governing copyright.

L.6 Public Release of Theses

Theses must be submitted to the University of Calgary Online Theses Repository and are normally made public through the Repository.

Under certain circumstances, the Dean of Graduate Studies may approve Thesis Withhold (see Thesis Withhold Regulations, available at grad.ucalgary.ca/current/thesis/withhold).

Theses that include digital elements must include a file capturing the digital element in its form at the time of submission. See Thesis Guidelines at grad.ucalgary.ca/current/thesis/guidelines.

L.7 Copyediting

Students may hire an editor to copyedit their theses, unless their program’s calendar entry prohibits copyediting. The student, supervisor and editor must abide by the following regulations:

1. Prior to hiring a copy editor, permission from the supervisor(s) must be obtained. An agreement outlining the permitted scope of editing must be signed by the student and the supervisor(s).
2. A disclosure statement is required in the thesis (e.g., a sentence in the preface or acknowledgment stating that the thesis has been professionally edited).
3. Under no circumstances should the copyediting alter the content, structure or contribution of the thesis.

Students must check their program’s regulations in the Graduate Calendar to see if copyediting is permitted before hiring a copy editor.

M. Thesis Examinations

M.1 Purpose

The purpose of the thesis oral examination is not only to defend independently the thesis, but also to serve as confirmation of the student’s knowledge of the research topic within the context of their field of study.

In order to safeguard and promote the quality of the graduate education, all students in thesis-based graduate programs must defend their theses in an oral examination before the degree may be granted. The Dean of Graduate Studies may waive this requirement in exceptional circumstances.

M.2 Scheduling

M.2.1

It is the responsibility of the supervisor to schedule the thesis oral examination, to recommend all examining committee members to the Graduate Program Director for approval, and to conform to the timelines set out in *Thesis and Thesis Examination Administrative Processes*, available at grad.ucalgary.ca/current/managing-my-program/examinations. Under no circumstances are students permitted to make arrangements for an examination.

M.2.2

The examination committee, which is approved by the Faculty of Graduate Studies, is convened to make a recommendation of the final outcome of the examination to the Dean of Graduate Studies.

M.2.3

No changes in the composition of examination committees may be introduced without prior approval from the Faculty of Graduate Studies.

M.2.4

With the exception of 2.6, the doctoral examination cannot be scheduled until all members of the supervisory committee have reviewed the student's research, including a relevant written sample of the material related to the thesis, or the draft thesis document, as required by the graduate program, and have provided written consent that the examination can be scheduled. The supervisor's signature on the Notice of Examination Form acknowledges that the entire thesis meets the minimum standard (see L.1 Quality of Thesis). An indication that the thesis is ready to defend does not commit a member of the supervisory committee to voting "pass" on the thesis at the final oral examination.

M.2.5

With the exception of 2.6, the master's examination cannot be scheduled until the supervisor has reviewed the student's research and the entire draft of the thesis document, as required by the graduate program. When supervisory committees are required, both the supervisor and the committee members must review the student's research, including a relevant written sample of the material related to the thesis, or the draft thesis document, as required by the graduate program. The supervisor's signature on the Notice of Examination Form acknowledges that the entire thesis meets the minimum standard (see L.1 Quality of Thesis). An indication that the thesis is ready to defend does not commit a member of the supervisory committee to voting "pass" on the thesis at the final oral examination.

M.2.6

A student who has successfully completed all Faculty of Graduate Studies and program requirements has the right to submit and defend a thesis even if doing so may be contrary to the advice of the supervisor and supervisory committee (where applicable).

M.3 Composition of the Examination Committee

The composition of the committee must be recommended by the Graduate Program Director and approved by the Dean of Graduate Studies.

M.3.1 Neutral Chair (Doctoral, Master's)

The oral thesis examination is chaired by a neutral member of the academic staff appointed by the Graduate Program Director.

The Neutral Chair is not a member of the examination committee and may not vote or question the student. The Neutral Chair's responsibility is to ensure that the examination is conducted in a fair and orderly fashion.

M.3.2 Non-Academic Staff Members (Doctoral, Master's)

The Faculty of Graduate Studies may approve qualified persons who are not academic staff members of the University of Calgary to serve on thesis oral examination committees.

M.3.3 Doctoral Oral Thesis Examination Committee

The examination committee will consist of:

1. the supervisory committee,
2. an internal examiner: a member of the University of Calgary academic staff whom programs may require to be external to the program,
3. an external examiner: external to the University,
4. other members (at the discretion of the Graduate Program Director, subject to the approval of the Dean of Graduate Studies).

A post-doctoral scholar whose supervisor is on the supervisory committee is not eligible to serve as a member of the examination committee.

M.3.4 Internal and External Examiners

Both the internal and external examiners normally must:

1. have a well-established research reputation
2. have expertise in the area of the student's research
3. have experience in evaluating theses at the graduate level
4. have experience in supervising to completion at the graduate level
5. not be a close personal friend of the supervisor
6. not have collaborated with the supervisor in past five years
7. not be closely related to, or have worked with the candidate

In addition, the external examiner normally

8. must not have been a supervisor in the candidate's graduate program in the past three years
9. must not have served as external examiner in the candidate's program in the past two years.

M.3.5 Master's Oral Thesis Examination Committee

The examination committee should consist of:

1. the supervisor
2. supervisory committee, where applicable,
3. an additional member of the University of Calgary academic staff,
4. an internal examiner: a member of the University of Calgary academic staff whom programs may require to be external to the program, or an external member who fits the criteria outlined in M.3.4 Internal and External Examiners.

If there is a formal supervisory committee, only one additional internal examiner or external examiner is required.

If there is a co-supervisor, but not a formal supervisory committee, an additional member of the University of Calgary academic staff and an internal examiner or external examiner are required.

A post-doctoral scholar whose supervisor is either on the supervisory committee (when applicable) or is the supervisor of the student, is not eligible to serve as a member of the examination committee.

M.4 Conflict of Interest

The examination committee must be seen as impartial and conflicts of interests must be avoided and disclosed. See Graduate Studies Conflict of Interest Policy at grad.ucalgary.ca/current/policies-forms/conflict-interest.

M.5 Rescheduling of Thesis Examinations

The Faculty of Graduate Studies must be informed of minor changes in the scheduling of the examinations (e.g., for illness or weather). Programs are allowed to postpone the examination by up to two weeks after the scheduled date.

Postponements of more than two weeks from the original date can be considered in exceptional circumstances and will require approval of the Dean of Graduate Studies.

M.6 Cancellation of Thesis Examinations

A scheduled examination may be cancelled under exceptional circumstances with the approval of the Dean of Graduate Studies.

M.7 Format of the Oral Thesis Examination

All examinations must be conducted according to the procedures described in *Thesis and Thesis Examination Administrative Processes*, available at grad.ucalgary.ca/current/managing-my-program/examinations.

The Oral Examination

1) The examination begins when the thesis is distributed to the examiners, at least three weeks prior to the date of the oral examination. The thesis may not be discussed amongst the examination members (with the exception of the Supervisor and/or Co-Supervisor) or the student. The student may not submit revisions while the examination is in progress.

2) The oral examination is normally open to the public but only members of the examination committee may question the student.

3) The oral examination questioning will not exceed two hours.

4) The thesis oral examination may be preceded by a separate public seminar, which will not include any questioning by members of the examination committee. If no public seminar preceded the examination the student may be offered an opportunity to give a brief (15 minute) presentation summariz-

ing the thesis in addition to the two-hour examination time.

5) Before the oral examination begins, all members of the examination committee must submit their written and signed examination reports to the Neutral Chair. Written reports are confidential and will not be communicated to the student or other members of the examination committee before the examination committee's recommendation has been finalized by completing the final examination form.

6) Examiners must be present, either in person or via teleconference, during the entire questioning process as well as the post-examination discussion and vote (see *Examination Guidelines* at grad.ucalgary.ca/current/managing-my-program/examinations). Normally, the supervisor (or the co-supervisor, if applicable) must be present in person.

7) All examiners must be given the opportunity to question the student and the questions must be relevant to the thesis document.

8) Prior to the oral examination, if an examiner suspects that academic misconduct has occurred in the thesis, they must contact the Dean of Graduate Studies immediately. The examination will then be suspended until such time as the Dean (or designate) is able to determine whether academic misconduct has occurred and what penalties will be applied. Depending on the determination, the examination may proceed as scheduled, be rescheduled, or be cancelled.

9) Any procedural irregularities must be reported to the Dean of the Graduate Studies within 5 working days of the examination date, regardless of the outcome of the examination.

M.8 Recommendations at the Conclusion of an Examination

Post-examination procedures must be conducted according to the *Thesis and Thesis Examination Administrative Processes*, available at grad.ucalgary.ca/current/managing-my-program/examinations.

Recommendation to the Dean of Graduate Studies must be unanimous. If it is not unanimous, the Dean of Graduate Studies will decide the outcome of the thesis and the oral examination.

The examination committee must recommend the outcome of the examination by indicating one of the following in each component:

M.8.1 Thesis

a) Unanimous pass with no revisions. All examiners must sign the Thesis Approval Form. The thesis must be submitted to the Faculty of Graduate Studies within five days from the date of examination.

b) Unanimous pass with minor revisions: At least one member of the examining committee considers the revisions to be minor while other examiners do not require revisions. Minor revisions involve stylistic changes and/or minor additions or clarifications; these must be correctable within one month from the date of the examination. The supervisor will inform the student of the necessary corrections. The supervisor will withhold their signature until satisfied with the revisions.

c) Unanimous pass with major revisions: At least one member of the examining committee considers the revisions to be major. Major revisions normally require more than changes in style and will typically involve clarification of textual materials, the qualification of research findings, conclusions, or limited additions to the text. Major revisions normally must be completed and submitted to Faculty of Graduate Studies within six months from the date of examination. The supervisor will withhold their signature, and one or more examiners may also withhold their signature, until satisfied with the revisions.

d) Unanimous fail. Student to be permitted one retake. No decision made on the oral examination.

e) Failure to reach unanimous decision.

M.8.2 Oral Examination

a) Unanimous pass.

b) Unanimous fail. If a unanimous fail was reached on the oral examination and the thesis was a pass, the oral component must be retaken within six months from the date of examination.

c) Failure to reach unanimous decision.

In the case of a failed thesis, whether by committee or Dean's decision, one retake will be allowed and a new defence will be required. In view of the magnitude of the revisions required, the retake oral examination must be held no sooner than six months and no later than twelve months from the date of the first examination.

The composition of the examination committee normally will remain the same. Upon the recommendation of the Graduate Program Director and approval of the Faculty of Graduate Studies, an examiner may be replaced.

N. Graduation

The deadline dates for Convocation requirements are set out in the Academic Schedule. Students are strongly encouraged to review these dates.

N.1 Application for Graduation

All students who expect to have their degrees or diplomas conferred must complete an online Application for Graduation, available through the Student Centre at my.ucalgary.ca. Students who do not complete an Application for Graduation before the posted deadlines will not be cleared to graduate. The deadlines to apply to graduate are available online at ucalgary.ca/registrar/graduation/when-apply.

At the time of the application, students will also be asked if they wish to attend the Convocation Ceremony (see ucalgary.ca/registrar/graduation/convocation/attendance-notification).

N.2 Convocation Requirements

In order to be cleared to graduate, thesis-based students must successfully pass a final thesis oral examination, submit an electronic copy of the thesis to the University of Calgary Theses Repository, the Vault (theses.ucalgary.ca), a University of Calgary Partial Copyright Licence, and a Department Recommendation for Convocation Clearance form to the Faculty of Graduate Studies, and fulfill graduate program requirements for the submission of thesis copies.

If a student has not been cleared to graduate before the student's next annual registration date, the student must register. If the student does not register, the student will be withdrawn for failure to register. When the student subsequently applies for re-admission to graduate, the student will be assessed fees retroactive to the date of withdrawal.

O. Appeals

The University recognizes that there are instances when a student may wish to challenge University decisions about grades or academic policy. When a dispute arises, every effort should be made to resolve the issues informally rather than resort to a formal appeal. If, however, a formal appeal is necessary, the student should follow the Appeals Procedures that are described below.

Appeals for reappraisal of graded term work, reappraisal of final grades, and other academic appeals are pursued through the teaching Faculty (the Faculty offering the course).

The Faculty of Graduate Studies Appeals Committee hears appeals against rulings by the Dean of Graduate Studies, or designate.

Students may obtain help in understanding the appeals process and in writing appeal letters from the Student Ombuds Office. For more information, visit: ucalgary.ca/provost/students/ombuds.

O.1 Reappraisal of Graded Term Work

A student who feels that a piece of graded term work (term paper, essay, test, etc.) has been unfairly graded may have the paper re-graded as follows. The student shall discuss the work with the instructor within **fifteen days** of being notified about the mark or of the item's return to the class. If not satisfied, the student shall **immediately** take the matter to the head of the department offering the course who will arrange for a reassessment of the work **within the next fifteen days.** Students in faculties without a departmental structure should take the matter to the Dean or the appropriate associate/assistant Dean (Academic/Student Affairs) of the Faculty offering the course. The result of that reassessment should be given to the student in writing.

The reappraisal of term work may cause the grade to be raised, lowered or to remain the same. There is no limit to the number of times that a student may request a reappraisal of term work.

O.1.A) Teaching Faculty Appeals Committee

Reappraisal of term work is generally settled at the departmental level. If the student is not satisfied with the decision and wishes to appeal, the student shall address a letter of appeal to the Dean of the Faculty offering the course **within fifteen days** of the unfavourable decision. In the letter, the student must clearly and fully state the decision being appealed, the grounds for appeal and the remedies being sought, along with any special circumstances that warrant an appeal of the reappraisal. The student should include as much written documentation as possible.

At this stage the Dean of the Faculty offering the course, at their discretion, may attempt to resolve the situation without proceeding to the Faculty Appeals Committee. If the matter is not resolved to the student's satisfaction, the appeal letter will be sent to the Faculty Appeals Committee.

The teaching Faculty Appeals Committee will not hear the appeal if the appeal letter does not detail the decision being appealed, grounds for appeal and outcome sought by the student, or if the chair of the Faculty Appeals Committee decides that sufficient grounds do not exist. If the appeal is to be heard and if the student has not already received a copy, the student is advised to request from the Dean's office, a copy of the principles and procedures that govern the Faculty Appeals Committee for that Faculty. These procedures will detail the composition of the committee, the right of the student to have an advocate at the hearing, how the hearing will be conducted, and other information.

The Faculty Appeals Committee will report its decision to uphold or deny the appeal in writing to the Dean of the Faculty, the Registrar and the appellant as quickly as possible.

O.1.B) Reappraisal of a Final Grade

In the reappraisal of a final grade, the only elements that will be considered are the grading of the final examination, if any, together with a recalculation of the weighted components that make up the final mark. An exception may occur when an instructor evaluates a piece of graded term work or other component at the end of the session; that grade may also be considered in a reappraisal of final grade.

A student wishing a reappraisal of an individual final grade should first attempt to examine the final examination at the department or faculty office. Then the student shall obtain a Request for Reappraisal of Final Grade form from ucalgary.ca/registrar/student-forms. On the form, the student must indicate exactly what error was made in marking the examination and/or in computing the final grade and where the error can be found. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected.

Students wishing a reappraisal of a final grade (excluding Law courses) must submit their request by the following dates:

Fall Term - March 1

Winter Term - June 30

Spring Intersession - August 15

Summer Term - October 15

Supplemental Examinations: 30 calendar days from the date the examination was written

The reappraisal form shall be sent/brought to the Registrar who shall forward it to the department head or Dean of the Faculty offering the course. Reappraisals of final grades are dealt with by the head of the academic unit in consultation with members of staff. Normally, the department/faculty will respond to a Request for Reappraisal of Final Grade within thirty days of its initiation. After the reappraisal is completed, the department shall return the form to the Registrar who shall inform the student in writing of the result of any request for reappraisal.

Students should be aware that the grade being reappraised may be raised, lowered or may remain the same. A student may request a reappraisal of final grade only twice in one academic year (July 1 - June 30).

Procedures for appealing a final grade reappraisal beyond the departmental level are detailed above in Appeals - Faculty Appeals Committee, and are the same for a final grade as for a piece of graded term work.

O.2 Appeals Against Faculty of Graduate Studies Rulings

Faculty of Graduate Studies Appeals Committee

If a student wishes to appeal a Faculty of Graduate Studies ruling (such as, but not limited to, the requirement to withdraw for academic reasons, the denial of continued registration, the denial of the right to graduate, specific requirements by the Faculty for the completion of a degree/course of study), the student shall address a letter of appeal to the Chair of the Graduate Studies Appeals Committee within fifteen days of the unfavourable decision.

In the letter of appeal, the student must clearly and fully state the ruling/decision being appealed, the grounds for appeal and the remedies being sought, together with all supporting evidence or documentation, if any. Mere dissatisfaction with a ruling is not sufficient grounds for an appeal.

In the process of deciding to initiate an appeal, the student may seek the assistance of the Student Ombuds Office.

If the appeal letter does not detail the decision being appealed, the grounds for appeal and the outcome sought by the student, or if the Chair of the Faculty Appeals Committee decides that sufficient grounds do not exist, the appeal will not be heard. If the appeal is to be heard and the student has not already received a copy, the student is advised to request from the Dean's office, a copy of the principles and procedures that govern the Faculty Appeals Committee. These procedures will detail the composition of the committee, the right of the student to have an advocate at the hearing, how the hearing will be conducted, and other information. This information can be found on the Faculty of Graduate Studies website: grad.ucalgary.ca/current/managing-my-program/appeal.

The Faculty Appeals Committee shall report, in writing, its decision to uphold or deny the appeal, to the Dean of Graduate Studies and the appellant as quickly as possible.

Please see the Faculty of Graduate Studies website for additional details on the procedures for appeals to the Faculty of Graduate Studies Appeals Committee: grad.ucalgary.ca/current/managing-my-program/appeal.

O.3 General Faculties Council's Student Academic Appeals Committee

Procedures for appealing a final grade reappraisal beyond the Faculty Appeals Committee level are detailed below and are the same for a final grade as for a piece of graded term work.

General Faculties Council's Student Academic Appeals Committee hears appeals of decisions made by Faculty Appeals Committees on matters of academic concern to students. The General Faculties Council's Committee will hear an appeal only if there is reason to believe that the Faculty Appeals Committee showed bias, unfair procedures, or if there is substantial new evidence that could not have been presented to a Faculty Appeals Committee. Grades obtained in courses completed by the student in the appeals process will not be considered as new evidence. Before the General Faculties Council's Committee will accept an appeal, the chair of that committee must be satisfied that departmental and Faculty appeals procedures have been fully utilized.

Students wishing to make an appeal to the Student Academic Appeals Committee must do so within **fifteen days** of the unfavourable decision from the Faculty Appeals Committee. A letter of appeal should be sent to the General Faculties Council's Committee (Administration Building, Room 165), and must indicate the decision being appealed, the grounds for appeal (i.e., alleged bias, alleged unfair procedures, or substantial new information), and the remedies being sought by the student, together with all supporting documentation. The appeal letter should also state the levels of appeal that have already been utilized.

The General Faculties Council's Committee will not hear the appeal if the chair decides that sufficient grounds do not exist.

A student whose appeal is to be heard by the General Faculties Council's Committee is entitled to obtain from the Secretary to General Faculties Council the principles and procedures governing the General Faculties Council's Committee. These procedures will detail the composition of the committee, the right of the student to have an advocate, how the hearing will be conducted and other information. The principles and procedures

are also available on the University Secretariat website: ucalgary.ca/secretariat.

The committee will normally give **fifteen days** written notice of a hearing to the appellant and to the head of the academic unit against whose office the appeal is being made. Normally, the General Faculties Council's Committee will hear an appeal **within thirty days** of its acceptance. The chair of the General Faculties Council's Committee will convey the committee's findings in writing to the appellant, the respondent, the Secretary to General Faculties Council and the Registrar.

For more specific information and other principles governing student academic appeals, the Secretary to General Faculties Council should be consulted.

O.4 Academic Appeals

1. The Appeals Process - In the case of appeal of a grade, the appeal should be to the Appeals Committee of that Faculty offering the course. A student who is placed on probation, suspended, or expelled from the Faculty of Graduate Studies, may appeal that decision, or any other Faculty of Graduate Studies ruling, to the Faculty of Graduate Studies Appeals Committee. The appeal, which must be initiated within fifteen days of the receipt of the letter from the Dean or their delegate, shall be in writing, addressed to the chairperson of the appropriate committee, and shall state specifically (a) the decision which is being appealed, (b) the grounds for the appeal, (c) the remedy being sought.
2. Sufficient Grounds - A student must satisfy the Appeals Committee that there are sufficient grounds for appeal. The principles applicable to an appeal to a Faculty Committee are those of fairness as set down in relation to the Student Academic Appeals Committee of General Faculties Council that are filed with the Secretary to General Faculties Council. It is recognized that the specific procedures used to attain fairness may vary from one Faculty to another.
3. Appeal from a Faculty Appeals Committee - Where a student is unsuccessful in an appeal to a Faculty Appeals Committee, they may appeal that decision to the Student Academic Appeals Committee of General Faculties Council, subject to the principles and procedures of the General Faculties Council's Committee as approved by General Faculties Council and filed with the Secretary to General Faculties Council.
4. Notification to the Registrar - When an appeal has been lodged by a student, the Registrar shall be notified by the chairperson of the Faculty Appeals Committee or General Faculties Council's Committee, as the case may be, of that fact, and of the disposition of the case by that body.
5. The Position of a Student Launching an Appeal Against Suspension or Expulsion - Where a student's appeal against suspension or expulsion is accepted for hearing and is under consideration by an appeals committee, a student shall be granted tentative registration and permitted to attend classes. If the appeal succeeds, the student will be officially registered and assessed fees retroactively to the beginning of the session.
6. The Position of a Student Whose Appeal Against Suspension or Expulsion is Unsuccessful - In cases in which the student has been allowed to attend classes pending the disposition of an appeal and the appeal fails, the original date of the suspension or expulsion stands.
7. The Effect on a Student's Permanent Record - Where a student has been suspended, expelled or placed on disciplinary probation and does not launch an appeal within fifteen days, or their appeal is unsuccessful, the notation "suspended or expelled from or placed on disciplinary probation by the Faculty of Graduate Studies, for academic misconduct" will be entered on the student's permanent record upon receipt of such notice by the Registrar from the Dean of the Faculty.

Where a student is suspended or expelled prior to the completion of the session, the symbols RW (required to withdraw) will be entered in the grade column on the student's record in the courses in which he or she was registered for that session except for the course(s) in which an "F" grade has been given as a penalty. Where a student is suspended or expelled after the completion of a session the final grade will be entered on the student's record in the courses in which he or she was registered for that session except for the course(s) in which an "F" grade has been given as a penalty.

A student's record will be cleared of the notation "placed on disciplinary probation for academic misconduct" when the probationary period has been completed, or upon completion of a degree program, or after three years have elapsed, whichever comes first. A student's record will be cleared of the notation "suspended for academic misconduct" at the time of readmission to the same Faculty, upon readmission to and completion of a degree program in another Faculty, or after three years have elapsed, whichever comes first. At the time the record is cleared of the notation, the "RW" symbols will be changed to "W", but any "F" grades, as given because of plagiarism, cheating or other academic misconduct, will remain "F"s. A student's record will not be cleared of the notation "expelled for academic misconduct." These regulations also apply to students on probation, suspension or expulsion for non-academic misconduct (see below).

O.5 Further Information About Other Appeals and Petitions to the University

It is expected that the procedures outlined above will be sufficient to deal with any student appeal. Students should note, however, that the current University Act, Section 45(2) states: "Subsection (1) does not take away or impair the right of any student or group of students to petition any of the governing bodies of the University in respect of any matter, but such petition shall be in writing and shall be transmitted to the governing body through the president of the university."

The Board of Governors has approved principles and guidelines to guide its Student Discipline Appeal Committee in considering student petitions. However, the Board of Governors recognizes that the General Faculties Council is the final body of appeal with respect to academic matters including, but not limited to, grades, examinations, refusal of continued registration, or the requirement to withdraw from the University for academic reasons. The Student Discipline Appeal Committee will not attempt to evaluate the merits of any course or program grade, or of any other decision relating to an academic matter. The Board of Governors and the Student Discipline Appeal Committee of the Board of Governors do not have any jurisdiction to determine petitions received from students pursuant to section 26(1) and 31(1) of the Post-Secondary Learning Act, where the petitions are in relation to courses offered and marked at an educational institution other than the University of Calgary, notwithstanding that the course may be credited toward a University of Calgary degree program.

A petition to the Board of Governors must be forwarded in writing to the University Secretary. The nature of the petition and the remedies sought by the petitioner(s) shall be clearly stated in a letter, and all supporting evidence or background materials included. If the Student Discipline Appeal Committee finds that the case has merit, the matter may be returned directly to the appropriate jurisdiction for a rehearing. In the case of substantially academic matters, referral will be to General Faculties Council for its determination as to the appropriate level of jurisdiction. The Student Discipline Appeal Committee may allow a hearing if it accepts jurisdiction in the matter and deems the facts to warrant such a hearing.

The Student Discipline Appeal Committee will not hear a petition for any remedy that may be obtained through existing appeal procedures within the University before those appeal procedures have been fully utilized, nor will academic decisions be set aside on the basis of minor irregularities in procedure.

In the case of a petition challenging a decision of the University body on procedural grounds such as breaches of natural justice or fairness, the Student Discipline Appeal Committee will normally refer the issue back to the level of appropriate jurisdiction for

a rehearing and new determination of the question. In the case of a petition challenging a decision in which the student is denied permission to register, the student shall not be registered while the petition is before the Board.

For more specific information on the principles and procedures governing student petitions to the Board of Governors, the Secretary to the Board of Governors should be consulted.

O.6 Continued Registration While Under Appeal

Students who appeal academic decisions to the teaching Faculty Appeals Committee or the General Faculties Council's Student Academic Appeals Committee have the right to continue their registration and to attend classes during the appeal process. The student is required to pay all fees. If the appeal fails, the student's registration will be cancelled, regardless of the date, and all fees refunded in full. Students petitioning the Board of Governors are not permitted to register while under petition.

P. Statement of Intellectual Honesty

Intellectual honesty is the cornerstone of the development and acquisition of knowledge. Knowledge is cumulative and advances are predicated on the contributions of others. In the normal course of scholarship these contributions are apprehended, critically evaluated, and form a foundation for further inquiry. Intellectual honesty demands that the contribution of others be acknowledged. To do less is to cheat. To pass off contributions and ideas of another as one's own is to deprive oneself of the opportunity and challenge to learn and to participate in the scholarly process of acquisition and development of knowledge. Not only will the cheater or intellectually dishonest individual be ultimately their own victim but also the general quality of scholarly activity will be seriously undermined.

It is for these reasons that the University insists on intellectual honesty in scholarship. The control of intellectual dishonesty begins with the individual's recognition of standards of honesty expected generally and compliance with those expectations.

With respect to student work in a course, it is the responsibility of the instructor to specify the academic requirements of the course.

Q. Statement on Principles of Conduct

This statement applies to all members of the University community – including students, faculty, administrators, any category of staff, practicum supervisors, examiners, and volunteers. This statement applies in all situations where the persons are acting in their University capacities, whether or not on the University's property. It also applies to visitors or any other persons on University property, and to persons with whom the University contracts for services.

All members of the University community have a responsibility to familiarize themselves with the *Statement on Principles of Conduct* and to conduct themselves accordingly. For more information, see Statement on Principles of Conduct section in the University Calendar.

R. Student Misconduct

A single offence of cheating, plagiarism, or other academic misconduct, on academic work may lead to disciplinary probation or a student's suspension or expulsion from the Faculty if it is determined that the offence warrants such action.

For more information, see the Student Misconduct section in the University Calendar.

S. Integrity in Scholarly Activity

In addition to its regulations dealing with student academic misconduct, the University has a policy and procedures governing the scholarly integrity of members of the University's Faculty and persons holding postdoctoral fellowships or their equivalent. The policy and procedures are titled *Integrity In Scholarly Activity* and apply to both teaching and research. For more information, see Integrity in Scholarly Activity section in the University Calendar.

T. Sexual Harassment

The University of Calgary recognizes its moral and legal responsibilities to protect its students, staff and Faculty against sexual harassment and has established a Sexual Harassment Policy and related procedures to deal with this serious issue. For more information, see Sexual Harassment section in the University Calendar.

U. Statement of Support for Persons with Life Threatening Communicable Illnesses

The University recognizes that persons suffering from life threatening communicable illnesses have a right and a responsibility to continue in their regular work or academic pursuits as long as they are capable of carrying out the duties and obligations associated with those pursuits; and recognizes that individuals who contract a life threatening communicable illness, including AIDS, are entitled to continue in their employment or studies provided that the health, safety and well being of others are not endangered.

The University is guided in the application of this policy by current research findings and medical advice relevant to the individual case.

All members of the University community are urged to recognize the responsibility they have for ensuring that those with such illnesses are treated in a caring and supportive manner.

V. Vacation

Graduate students are entitled to two weeks of annual vacation. The two weeks of vacation do not include statutory holidays or days designated by the University as closed.

V.1 Vacation Time and Scholarships

Graduate students holding twelve month scholarships are entitled to two weeks of vacation during the twelve month period. The two weeks of vacation do not interrupt the payment of the scholarship.

V.2 Vacation Time and Employment

In keeping with the Alberta Employment Standards Code and the Alberta Employment Standards Regulations, graduate students employed by the university or by a member of the academic staff at the university, are entitled to two weeks of vacation time after twelve months of employment or prior to competing a full twelve months of employment if the employer agrees. In the case of graduate student employees who have already received payment in lieu of vacation (for example, as a graduate assistant/teaching/non-teaching), the time off will be without pay.

See the GSA Collective Agreement, available at gsa.ucalgary.ca/services/collective-agreement-information, for more information.

Program Descriptions

Anthropology ANTH

Contact Information

Location: Earth Sciences Building, Room 620

Program number: 403.220.7131

Fax: 403.284.5467

Email address: anargrad@ucalgary.ca

Web page URL: antharky.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

Specialization:

- Biological Anthropology (Interdisciplinary)*

**See the Calendar section on Interdisciplinary Specializations for further information.*

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) A minimum grade point average of 3.30 or higher on a four-point scale.

b) An example of the applicant's written work: a term paper, research paper or other writing which the applicant considers representative of their best work.

c) A concise statement outlining the applicant's academic interests and reasons for wishing to pursue graduate work in this Department. The thesis research area should be clearly identified.

d) An up-to-date curriculum vitae.

e) Two letters of reference.

Doctor of Philosophy

a) A minimum grade point average of 3.40 or higher on a four-point scale.

b) Two letters of reference.

3. Application Deadline

Application deadline is available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/anthropology-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/anthropology-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to the required level for admission.

5. Program/Course Requirements

In addition to the Faculty requirements, the Department requires:

Master of Arts

Candidates for the MA degree are normally required to complete a minimum of 12 units (2.0 full-course equivalents) in Anthropology at the 600 level. At the discretion of the Graduate Studies Committee, students with deficient background may be required to take a total of 15 units (2.5 full-course equivalents) of course work in Anthropology. The following courses are required of all master's students: Anthropology 603, 605, 611 or 613, 631 or 635.

Doctor of Philosophy

a) A specialization of either primatology, or social and cultural anthropology.

b) Anthropology 701, a reading course in the student's substantive area. Beyond that, the supervisory committee will individually tailor each student's course requirements to the student's particular needs.

c) For social and cultural anthropology, field work outside the student's broad cultural milieu for a minimum of one year. Students in primatology will be required to collect primary data via experimental and/or observational research on wild or captive primate populations for a period of not less than twelve months.

d) Demonstrated proficiency in a language other than English. Normally, in the course of the doctoral program, competent faculty in other Departments will evaluate the student's linguistic competence, principally in reading and writing.

6. Credit for Undergraduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses.

7. Time Limit

Expected completion time is two years for the Master of Arts degree and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts degree and six years for the doctoral degree.

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8. Supervisory Assignments

A supervisor is assigned to each student upon entering the program.

9. Required Examinations

Candidacy

Doctoral students must complete a written thesis proposal, which will be evaluated by the supervisory committee. They must also pass oral and written Field of Study examinations and a second-language proficiency examination. For complete details of the candidacy requirements, see antharky.ucalgary.ca/CandidacyRequirements.

Thesis Examination

Final thesis oral examinations are open. In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

10. Financial Assistance

Financial assistance in the form of research and teaching assistantships is available to qualified students. Information on awards can be obtained from the Department office or in the Awards and Financial Assistance section of this Calendar. All students are strongly encouraged to seek external financial assistance for the program, as the Department of Anthropology and Archaeology cannot guarantee the availability of financial assistance.

Students applying for the Graduate Awards Competition scholarships must submit their applications to the Department by January 25.

11. Other Information

For information about the rules and regulations, and the facilities available to Anthropology graduate students, please contact the Graduate Administrator at anargrad@ucalgary.ca.

Archaeology ARKY

Contact Information

Location: Earth Sciences Building, Room 620

Program number: 403.220.7131

Fax: 403.284.5467

Email address: anargrad@ucalgary.ca

Web page URL: antharky.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

Specialization:

- Biological Anthropology (Interdisciplinary)*

**See the Calendar section on Interdisciplinary Specializations for further information.*

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) A specimen of relevant written work (an honours essay, term paper, or seminar essay bearing the grade and initials of the supervising professor, the analysis chapter of a Master of Arts thesis or a published article where the applicant is the sole or senior author).

b) A concise statement setting forth the reasons for wishing to pursue graduate work in this department.

c) An up-to-date curriculum vitae.

d) A 3.30 grade point average in the last two years of program or over the last 60 units (10 full-course equivalents).

e) Two letters of reference from individuals able to evaluate academic potential.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/archaeology-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/archaeology-doctor-philosophy-thesis-based.

4. Advanced Credit

The Department does not normally give advanced credit.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) Normally, 12 units (2.0 full-course equivalents) including one of the following, as determined by the student's evaluation committee: Archaeology 615 or 617.

b) Two courses, which may include: Anthropology 605, Archaeology 601, a course in human osteology, or other courses as determined by the student's evaluation committee.

c) One of: Archaeology 625, 627, 631, 633, 635.

d) A season of field work or the equivalent.

Doctor of Philosophy

a) Normally, 18 units (3.0 full-course equivalents) in Archaeology.

b) For those without a Master of Arts degree, normally 24 units (4.0 full-course equivalents).

Note: The number of courses required of each student may vary according to each student's particular needs as determined by the supervisory committee.

c) Unless previously satisfied, Archaeology 601 and one of the following: Archaeology 615 or 617.

d) Two of: Archaeology 625, 627, 631, 633, 635.

e) Anthropology 605 or its equivalent.

Other courses will be required as determined by the student's evaluation committee.

f) A research proposal approved by a committee consisting minimally of three members of the student's supervisory committee, and by the Graduate Program Director. This must be submitted within twenty months of entering the program.

g) A reading ability in a foreign language acceptable to the Department. The student's supervisory committee will decide the manner of demonstrating this ability.

Requirements (a) through (g) must be completed before sitting the written and oral components of the candidacy examination.

h) Normally, two seasons of field work. However, students specializing in laboratory-based topics, like physical anthropology, may substitute an approved program of laboratory work for one of the field work seasons.

6. Additional Requirements

During the first two weeks in program, each student will undergo an evaluation. This is not an examination but an assessment of academic background. The specific regulations and procedures covering evaluations and examinations are on file in the Department Office and are available to students. It is the responsibility of every student to become familiar with these regulations.

Field work may be counted towards fulfillment of the full-time study and research requirement.

7. Credit for Undergraduate Courses

Normally only courses at the 500 level or higher may be taken for credit toward a graduate program. No more than two courses may be at the 500 level.

8. Time Limit

Expected completion time is two years for the Master of Arts degree and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts degree and six years for the doctoral degree.

9. Supervisory Assignments

The Department assigns an interim advisor to each student upon arrival. At any time before the end of the first year of studies, each student must select a faculty member to serve as supervisor. The interim advisor may become the supervisor.

Doctoral supervisory committees may be appointed at any time during the first year of studies, but no later than three months after the appointment of the supervisor. The supervisor, in consultation with the student, selects the committee.

10. Required Examinations

Candidacy

Doctoral students must complete a written thesis proposal, which will be evaluated by the supervisory committee. They must also pass oral and written Field of Study examinations and a second-language proficiency examination. For complete details of the candidacy requirements, see antharky.ucalgary.ca/CandidacyRequirements.

Thesis Examination

Final thesis oral examinations are open.

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

11. Financial Assistance

Financial assistance in the form of research and teaching assistantships may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for Graduate Award Competition scholarships must submit their applications to the Department by January 25.

Funding is provided to students so that they can concentrate on their courses and research. Therefore, a graduate student is not allowed to work for more than 15 hours a week while holding departmental funding. Failure to abide by this policy will result in a decrease in or cancellation of departmental funding.

12. Other Information

The Department has laboratories equipped for anthropometric and osteological analysis, faunal analysis, and microbotanical and geoarchaeological research. A number of teaching and comparative archaeological and zooarchaeological collections are maintained. Field equipment including survey, photographic and camping equipment is available.

Art ART

Contact Information

Location: Art Building 612

Program number: 403.220.6260

Fax: 403.289.7333

Email address: artgrad@ucalgary.ca

Web page URL: art.ucalgary.ca/graduate

1. Degrees and Specializations Offered

Master of Fine Arts (MFA), thesis-based

Students applying for the MFA degree offered by the Department of Art may choose to identify one of the following formal specializations:

Specializations:

- Sculpture
- Printmaking
- Photography
- Painting
- Drawing
- Media art and technology

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) A four-year Bachelor of Fine Arts degree or equivalent qualification.

b) A portfolio of 20 recent works presented in jpeg format on disk.

c) A three to five page written statement of intent.

d) Two reference letters.

3. Application Deadline

Application deadline is available on the Future Students website at ucalgary.ca/future-students/graduate/explore-programs/art-master-fine-arts-thesis-based.

4. Advanced Credit

Not applicable.

5. Program/Course Requirements

The program core for all Master of Fine Arts students is a minimum of 24 units (4.0 full-course equivalents). Within the first twelve months of the program each student must complete 6 units (1.0 full-course equivalent) 600-level studio course; 3 units (0.5 full-course equivalent) 600-level graduate seminar, and Art 611 and 605. Three units (0.5 full-course equivalent) 600-level graduate seminar and 6 units (1.0 full-course equivalent) 600-level studio course must be completed in the second twelve months of the program. In some circumstances, the Department may require a student to complete more than the mandatory 24 units (4.0 full-course equivalents).

Typical course sequence is the following:

Year 1 Fall

Art 611 Research Methods in Art

Art 661.01 Advanced Studio Practice

Year 1 Winter

Art 609 Art Theory and Criticism

Art 661.01 Advanced Studio Practice

Year 1 Spring

Art 605 Critical Study and Research

Year 2 Fall

Art History 615 Conference Course in Art History

Art 661.02 Thesis Studio Practice

Year 2 Winter

Art 661.02 Thesis Studio Practice

6. Additional Requirements

Additional requirements for the Master of Fine Arts degree include an exhibition of the student's work, a supporting paper, and an oral examination.

The program requires an initial registration as a full-time graduate student for two consecutive years. A minimum of twenty-four months of full-time study is usually necessary to complete the degree requirements.

7. Credit for Undergraduate Courses

Not applicable.

8. Time Limit

Expected completion time for the Master of Fine Arts degree is two years. Maximum completion time is four years.

9. Supervisory Assignments

9.1 Each new student is assigned an interim advisor to assist in the planning of the academic program and in orienting the student to the Department's physical and academic resources. A permanent supervisor is appointed by January 1 of the first academic year of registration. The approval of a permanent supervisor, by the Graduate Program Director, is made after consultation with the student. Supervisors work closely with students in all phases of the program; they have the principal responsibility in assessing the student's performance, and advising the Department Head of the student's progress.

9.2 The Supervisory Committee should be constituted by the supervisor in consultation with the student. It will normally consist of the supervisor, and one internal or external member. If the student has a co-supervisor, then one additional member is still required. The composition must be approved by the Graduate Program Director (or delegate) and sent to the Faculty of Graduate Studies for information.

10. Required Examinations

Thesis Examination

Final thesis oral examinations are open. In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research,

including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards see the Awards and Financial Assistance section of this calendar.

Students applying for scholarships must submit their applications to the Department of Art by January 15.

Biological Sciences BISI

Contact Information

Location: Biological Sciences Building, Room 186

Program numbers: 403.220.6623 and 403.220.7790

Fax: 403.289.9311

Email address: biograd@ucalgary.ca

Web page URL: bio.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Specializations:

- Biochemistry
- Biophysical Chemistry
- Cell Biology
- Developmental Biology
- Ecology
- Environmental Microbiology
- Evolutionary Biology
- Molecular Microbiology
- Physiology
- Structural Biology
- Host-Pathogen Interactions
- Energy and Environmental Systems (Interdisciplinary Specialization)*

**See the Calendar section on Interdisciplinary Specializations for further information.*

2. Admission Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

a) A minimum grade point average of 3.20 on a four-point scale during the last two full years or equivalent.

b) For students required to provide proof of proficiency in English: a TOEFL score of 600 (paper-based), or 105 (Internet-based test), or an IELTS score of 7.5, or a MELAB score of 86, or a PTE score of 75, or completion of Tier III of the International Foundations Program with minimum grades of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

c) A concise statement outlining the applicant's research interests and reasons for wishing to attend the University of Calgary.

d) Three academic reference letters and the required reference form.

Exceptional students may apply to a PhD program without an MSc recognized by the Faculty of Graduate Studies. In such cases, requirements in addition to those outlined above include: a four-year BSc or equivalent degree from a recognized institution with a minimum GPA of 3.60 (four-point scale) during the last two full years; and a full-year research project with a minimum grade of 3.70.

Transfer from a MSc to a PhD program is allowed for students who have successfully completed all courses required for the MSc degree, and who have demonstrated outstanding research ability and potential to their Supervisory Committee. Normally, evidence of this ability will include, but not be limited to, a grade point average of 3.60 for the courses completed during the MSc program.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/biological-sciences-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/biological-sciences-doctor-philosophy-thesis-based.

4. Advanced Credit

Not applicable.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

a) Completion of a minimum of 6 units (1.0 full-course equivalent) for both the Master of Science and doctoral programs. Students transferring from the MSc program to the PhD program will be required to take a minimum of 3 units (0.5 full-course equivalent) in addition to work already completed. Please note that graduate courses must be chosen in consultation with the supervisor and approved by the Graduate Program Director. Course requirements may include courses offered by other Departments.

b) Completion of the appropriate number of Biology 601 Research Seminar courses in addition to (a) above.

c) Presentation of a Departmental Pre-Defence seminar on the results of the thesis research.

6. Credit for Undergraduate Courses

At least one-half of a graduate student's coursework must be at the 600 level or higher.

Only when appropriate to a student's program may graduate credit be received for courses numbered 500-599, which are considered undergraduate courses. Courses below the 500 level will not be accepted for graduate credit.

7. Time Limit

Expected completion time is two years for the Master of Science degree and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Science degree and six years for the Doctor of Philosophy degree.

8. Supervisory Assignments

Applicants must contact faculty members directly regarding supervision of their graduate program, prior to submitting an application. The Department does not accept students unless at least one faculty member has indicated a willingness to act as supervisor. For both MSc and PhD programs, the supervisor, in consultation with the student, selects a Supervisory Committee consisting of the supervisor and at least two other faculty members whose research experience will be beneficial to the student's graduate program.

9. Research Proposal Requirements

Master of Science students must present a written research proposal to their supervisory committee no later than six months after initial registration in program.

Doctoral students must complete a written thesis proposal no later than twelve months after initial registration in the program. The proposal will be evaluated in a supervisory committee meeting. See bio.ucalgary.ca/graduate/other_resources/grad_students_handbook for further information about the proposal requirements and evaluation process.

10. Required Examinations

Candidacy

Doctoral students must pass oral and written Field of Study examinations. For complete details of the examination format and other candidacy requirements, see bio.ucalgary.ca/graduate/other_resources/grad_students_handbook.

Thesis examination

Final Thesis Examinations are required at both the Master of Science and doctoral level. In addition to the Faculty of Graduate Studies regulations, the Department has the following requirements:

A public "Exit" Seminar preceding the examination is required.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

11. Special Registration Information

A request to transfer from the Master of Science program to the doctoral program may be made no later than twenty-four months after initial registration. Students who trans-

fer will be required to take one additional 3-unit course (0.5 full-course equivalent), regardless of course work completed before the transfer, and are expected to meet the 36-month deadline for completion of candidacy requirements.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for the Open Scholarship Competition must submit their scholarship applications to the Department of Biological Sciences by the appropriate deadline. Please contact georges@ucalgary.ca for further information.

Biomedical Engineering BMEN

Contact Information

Location: CCIT 012

Program number: 403.220.3835

Fax: 403.210.8119

Email address: bmegrad@ucalgary.ca

Web page URL: ucalgary.ca/bme/graduate

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng), thesis-based

Specialization:

- Medical Imaging (Interdisciplinary)*

**MSc and PhD degrees only. See the Calendar section on Interdisciplinary Specializations for further information.*

The curriculum is designed for students with degrees in Engineering, Medicine, Physical Sciences, or Life Sciences. Background experience and qualifications, as well as areas of interest of the applicants will be taken into account at the time of admission. The appropriateness of the undergraduate preparation of the applicant must be supported by the proposed supervisor(s). Students in the MSc and PhD degree programs are normally considered full-time.

2. Admission Requirements

In addition to Faculty of Graduate Studies, the program requires: minimum GPA requirements are 3.00 for the MEng (thesis-based) program, 3.20 for the MSc program, and 3.50 for the PhD program, all on a four-point scale.

For admission to the MEng (thesis-based), MSc or PhD program, students must provide two reference letters with their application package.

For admission to the MEng (thesis-based) program, students must have an approved four-year undergraduate degree in engineering.

MEng (thesis-based), MSc and PhD students can only be accepted upon identification of one or more approved Biomedical Graduate Engineering Program supervisors who are willing to supervise and fund the applicant (funding for MSc and PhD students only).

International students are required to demonstrate proficiency in the English language, in accordance with the admission requirements of the Faculty of Graduate Studies. All students must meet the admission requirements of both the Faculty of Graduate Studies and the Biomedical Engineering Graduate Program.

Transfer of appropriately qualified MSc students directly into the PhD program is encouraged. Students wishing to transfer must do so between 8 and 16 months of first registration. For transfer, a minimum GPA of 3.50 is required (over a minimum of 9 units (1.5 full-course equivalents)), including Biomedical Engineering 600 (or 612) and 614. In addition, a research proposal, approved by the supervisory committee, must be submitted to the Biomedical Engineering Graduate Program. Applications for transfer must be supported by both the supervisor and the supervisory committee.

3. Application Deadline

Application deadlines are available on the Future Students website:

Master of Engineering: ucalgary.ca/future-students/graduate/explore-programs/biomedical-engineering-master-engineering-thesis-based.

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/biomedical-engineering-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/biomedical-engineering-doctor-philosophy-thesis-based.

4. Advanced Credit

Credit may be granted with approval of the Biomedical Engineering Graduate Program. Advanced standing will not be granted for Biomedical Engineering 600, 602 or 604.

5. Program/Course Requirements

Master of Science

All students are required to take a minimum of 12 units (2.0 full-course equivalents) as approved by the Biomedical Engineering Graduate Program. This must include Biomedical Engineering 600, 602 and 604.

Doctor of Philosophy

For a Doctor of Philosophy (PhD) degree, all students are required to take a minimum of 6 units (1.0 full-course equivalent) as approved by the Biomedical Engineering Graduate Program.

If the student's completed MSc degree is not in Biomedical Engineering, they must take a further of 12 units (2.0 full-course equivalents), for a total of 18 units (3.0 full-course equivalents).

For students who transfer from an MSc program, 18 units (3.0 full-course equivalents) at the graduate level are required beyond the BSc, or equivalent, degree.

Biomedical Engineering 600, 602 and 604 must be included in the course requirements if not taken in the MSc.

All students may choose other courses from the listing of Additional Courses or approved courses from other departments (see website for most recent information: ucalgary.ca/bme/graduate). Other relevant courses, not on the Additional Course list or Program's website, require the approval of the supervisor and the Biomedical Engineering Graduate Program. Students may be required to take senior undergraduate courses as deemed by their Supervisory Committee, but graduate credit will only be granted for senior undergraduate courses as approved by the Biomedical Engineering Graduate Program.

In addition to the course requirements, all MSc and PhD students are required to complete a research project and to submit a written thesis in compliance with the regulations of the Faculty of Graduate Studies.

Medical Imaging Specialization

This specialization is open to MSc and PhD students and requires completion of a course sequence in Medical Imaging plus additional specialization requirements (see MEDI entry). MSc students must take a minimum of two courses (the MEDI core and a MEDI foundational course). PhD students must take three courses (including the MEDI core, a MEDI foundational and a MEDI elective course). PhD students previously completing the MSc Specialization in Medical Imaging will be required to complete one elective course in medical imaging. These requirements are in addition to the core program requirements of the BME Graduate Program. The Medical Imaging courses are counted towards BME Graduate Program elective courses.

Master of Engineering (thesis-based)

For a Master of Engineering (thesis-based), normally 24 units (4.0 full-course equivalents) are required, in accordance with the rules of the Biomedical Engineering Graduate Program and the Faculty of Graduate Studies.

All Master of Engineering (thesis-based) students are required to take Biomedical Engineering 600, 602 and 604 plus a project management course at the graduate level (usually Civil Engineering 691), a health economics course at the graduate level (usually Economics 679) and a clinical trials and biomanufacturing course at the graduate level (usually Medical Science 669). Two of the remaining four courses must be chosen from the Additional Courses approved by the Biomedical Engineering Graduate Program for Master of Engineering (thesis-based) students (see website for most recent information: ucalgary.ca/bme/graduate). The remaining two courses must include at least one Biomedical Engineering or Engineering course.

In addition to the course requirements, all Master of Engineering (thesis-based) students are required to complete a research project and to submit a written thesis in

compliance with the regulations of the Faculty of Graduate Studies.

Core Courses

1. Biomedical Engineering 600
2. Biomedical Engineering 602
3. Biomedical Engineering 604

Note that Biomedical Engineering 602 and 604 core courses are 1.5 units (0.25 full-course equivalent), usually taken in Fall and Winter, respectively, but, they may be taken out of sequence for students first registering in the Winter Term.

Additional Courses

1. Biomedical Engineering 609
2. Biomedical Engineering 619.XX

Additional Courses in Theme 1: Bioelectrical Engineering

1. Electrical Engineering 663
2. Electrical Engineering 631
3. Electrical Engineering 665

Additional Courses in Theme 2: Biomechanics

1. Biomedical Engineering 619.02
2. Civil Engineering 653
3. Mechanical Engineering 653
4. Mechanical Engineering/Kinesiology/ Medical Science 663

Additional Courses in Theme 3: Cell and Tissue Engineering (Biomaterials)

1. Chemical Engineering 659

Additional Courses in Theme 4: Medical Imaging

1. Electrical Engineering 697
2. Medical Science 689.01
3. Medical Science 689.02
4. Medical Science 689.03
5. Medical Science 689.04

Additional Biomedical Engineering related courses may be listed under other departmental listings - see website for most recent information: ucalgary.ca/bme/graduate.

Courses are listed by theme, but students are not restricted to taking courses from within a theme. The supervisor and supervisory committee should be consulted for course selection. Courses not listed under Additional Courses or on the list at ucalgary.ca/bme/graduate require the approval of the Biomedical Engineering Graduate Program. Directed studies courses require approval of the Biomedical Engineering Graduate Program.

6. Credit for Undergraduate Courses

Graduate credit may be given for 500-level courses. No more than 3 units (0.5 full-course equivalent) of credit will be allowed in MSc/PhD or MEng (thesis-based) program as approved by the supervisory committee, and the Biomedical Engineering Graduate Program.

7. Time Limit

In accordance with the Faculty of Graduate Studies regulations, the expected completion time for the MEng (thesis-based) degree is 18 months, for the MSc is 24 months and for the PhD is 48 months. Students transferring from the MSc to the PhD program are expected to complete studies within 60 months. Funding in the MSc and PhD programs may not be available after these expected completion times.

8. Supervisory Assignments

MSc and PhD students need a supervisor for admission to the program. The Supervisory Committee should be selected jointly by the student and supervisor immediately upon entry into the MSc or PhD program and approved by the Biomedical Engineering Graduate Program. MEng (thesis-based) students will choose a supervisor in consultation with the Biomedical Engineering Graduate Program for admission to the program. The Supervisory Committee consists of the supervisor, co-supervisor (if appropriate), and two other members who normally hold academic appointment at the University of Calgary. Appointment of individuals who do not hold academic appointments at the University of Calgary is possible but requires the support of the Biomedical Engineering Graduate Program and the prior approval of the Faculty of Graduate Studies.

The supervisory committee will advise on course selection and research topic for the student. The supervisory committee will usually be cross-disciplinary, as required by the student's research topic and deemed necessary by the supervisor in consultation with the Biomedical Engineering Graduate Program. The supervisory committee will recommend transfer to the PhD program for MSc students and certify the background preparation for PhD students prior to scheduling of the candidacy exam. All students will follow the guidelines of the Biomedical Engineering Graduate Program regarding supervision, frequency of committee meetings, course changes, thesis or project proposals, candidacy examinations, etc. as outlined in the Student Handbook. Membership on candidacy and examination committees requires the approval of the Biomedical Engineering Graduate Program.

9. Required Examinations

Doctoral Candidacy Examinations

Doctoral students must pass Thesis Proposal (oral and written) and Field of Study (oral) examinations. For complete details of the examination format and other candidacy requirements, see ucalgary.ca/bme/graduate/current-students/phd-timeline-and-procedures.

Scheduling of the Thesis Examination (MEng (thesis-based) and MSc, PhD)

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

MSc and MEng (thesis-based) Thesis Examination

In addition to Faculty of Graduate Studies regulations, the Biomedical Engineering Graduate Program requires the examining committee to consist of a minimum of five voting members: the supervisor (and co-supervisor if appropriate) and Supervisory Committee, one Internal Examiner, and one other member. The Internal Examiner must be external to the Biomedical Engineering Graduate Program. At least one of either a) the Supervisory Committee (excluding supervisor and co-supervisor) or b) the other member, must be a Biomedical Engineering Graduate Program Approved Supervisor.

The student shall make a public thirty minute presentation (20 minute presentation plus 10 minutes for questions) of their thesis research, normally immediately before the oral examination. Examining committee members should attend this presentation but should refrain from asking questions. The maximum allowable two-hour examination period does not include the time spent on student presentation.

Doctoral Thesis Examination

The examining committee consists of a minimum of six voting members: the Supervisory Committee members (including the supervisor and co-supervisor, if appropriate), one Internal Examiner, one member external to the University of Calgary (External examiner), and one other member. The Internal Examiner must be external to the Biomedical Engineering Graduate program. At least one of either a) the Supervisory Committee (excluding supervisor and co-supervisor) or b) the other member, must be a Biomedical Engineering Graduate Program Approved Supervisor.

The student shall make a public sixty minute presentation (45 minute presentation plus 15 minutes for questions) of their thesis research, normally immediately before the oral examination. Examining committee members should attend this presentation but should refrain from asking questions during the presentation. The maximum allowable two-hour examination period does not include the time spent on student presentation.

10. Research Proposal Requirements

Doctoral students must submit a written thesis proposal, which is approved by their Thesis Proposal Evaluation Committee in a Thesis Proposal Evaluation Committee Meeting. See ucalgary.ca/bme/graduate/handbook for further information.

11. Financial Assistance

Students in MSc and PhD programs will not be admitted without funding from an interested supervisor. Please see the Biomedical Engineering Graduate Program handbook for more details.

Students in the MEng (thesis-based) program do not receive funding, but may be eligible for awards or financial assistance.

For information on awards, see the Awards and Financial Assistance section of this Calendar.

12. Other Information

A Master of Science, Master of Engineering, or Doctor of Philosophy in Biomedical

Engineering does not entitle graduates to a designation of Professional Engineer. The title of Engineer, or Professional Engineer, is restricted to those who are members of a Provincial engineering association.

Please see the Biomedical Engineering Graduate Program website for the latest version of the Handbook of Policies and Procedures at ucalgary.ca/bme/graduate.

Chemistry CHEM

Contact Information

Location: Science A Building, Room 229

Program number: 403.220.6252

Fax: 403.284.1372

Email address: gradinfo@chem.ucalgary.ca

Web page URL: chem.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

PhD and MSc programs are available for full-time study only.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Science admission requirements, the Department requires:

Master of Science and Doctor of Philosophy

a) Two reference letters.

An appropriate letter of recommendation is one written by an individual who can provide an assessment of the applicant's background and capabilities with respect to our department. An applicant currently registered in a graduate degree program, or who has recently completed a graduate degree program, must request one letter of reference from their program supervisor.

b) For applicants required to prove proficiency in English: a minimum TOEFL score of 97 (Internet-based test) or 580 (paper-based test), or an IELTS score of 7.0, or a MELAB score of 83, or a PTE score of 68, or completion of Tier III of the International Foundations Program with minimum grades of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

Master of Science

For applicants with a Bachelor of Science (BSc) degree:

a) A four-year degree or its equivalent.

b) An admission grade point average of 3.00 or better on a four-point scale.

Doctor of Philosophy

For applicants with a Bachelor of Science (BSc) degree:

a) A four-year Honours degree or its equivalent.

b) An admission grade point average of 3.70 or better on a four-point scale.

For applicants with a Master of Science (MSc) degree:

a) A Master of Science degree recognized by the Faculty of Graduate Studies.

b) An admission grade point average of 3.30 or better on a four-point scale.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/chemistry-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/chemistry-doctor-philosophy-thesis-based.

4. Advanced Credit

Advanced credit for graduate courses taken as an unclassified student, or qualifying student may be given for courses in which the student obtains a grade of "B" or higher.

A reduction in course requirements may be given for students who completed graduate courses at other institutions. This will be determined on program entry and after consultation with the research supervisor and the graduate office.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

Master of Science

a) Nine units (1.5 full-course equivalents) at the 500 level or above. Normally a minimum of 6 units (1.0 full-course equivalent) will be Chemistry courses.

Doctor of Philosophy

a) Twelve units (2.0 full-course equivalents) at the 500 level or above, for students entering with a four-year Honours BSc degree or equivalent. Normally, a minimum of 9 units (1.5 full-course equivalents) will be Chemistry courses.

b) A minimum of 3 units (0.5 full-course equivalent) and a maximum of 12 units (2.0 full-course equivalents) for students entering with an MSc degree or equivalent. The number of courses will be determined by consultation between the student, the supervisor, and the Graduate Director.

Students who transfer to the doctoral program will be given credit for courses taken in the MSc program.

Copyediting

The department does not allow copyediting in students' theses.

6. Additional Requirements

Each student must participate in the Department's Chemistry 601 and 603 Research Seminars in each year they are registered in a graduate program.

A Master of Science student planning to apply for a transfer to a doctoral program must notify their supervisory committee at least one month before the committee meeting which takes place at the end of the student's first year in program.

7. Credit for Undergraduate Courses

At least one-half of a graduate student's course work must be at the 600 level or higher and only where appropriate to a student's program will graduate credit be given for courses numbered 500-599, which are considered undergraduate courses. In addition to course prerequisites, consent of the department is required.

8. Time Limit

Expected completion time is two years for the Master of Science degree and four for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Science degree and six years for the doctoral program.

9. Supervisory Assignments

Students are assigned an interim advisor (currently the Graduate Director) upon first registration in a program and must choose a permanent supervisor before the fifth month in program. Students in both the MSc and PhD programs must also choose two additional faculty members to serve as supervisory committee members.

10. Required Examinations

Candidacy

Doctoral students are required to complete written and oral candidacy examinations. Further details may be obtained from the Department's Handbook of Graduate Studies available at: ucalgary.ca/chem/graduate/current_students/grad_students_handbook.

The oral examination component will include questions on the research proposal.

Thesis Examination

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Scheduling of the Examination

Before an examination can be scheduled, all members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis.

Composition of the Committee

The Internal Examiner may be internal to the home program.

Thesis examinations are open.

11. Research Proposal Requirements

All doctoral students must successfully complete a written thesis research proposal that is evaluated and approved by the Candidacy Field of Study Oral Examination committee. Further details may be obtained from the Department's Handbook of Graduate Studies available at: ucalgary.ca/chem/graduate/current_students/grad_students_handbook.

12. Financial Assistance

Financial assistance is normally available to all qualified students in the form of Teaching Assistantships and Trust funded Assistantships. Assistantship funding is not normally

available beyond twenty-eight months in a master's program and fifty-two months in a doctoral program.

For further information on awards, see the Awards and Financial Assistance section of this calendar.

13. Faculty Members/Research Interests

Supported areas of research: Analytical, Applied, Bio-Organic, Bio-Physical, Electrochemistry, Environmental, Inorganic, Materials, Organic, Organometallic, Physical, Polymer, and Theoretical Chemistry.

These areas do not constitute formal divisions, and the thesis research may cut across the traditional lines.

The faculty members in the Department and their specific research interests can be found at chem.ucalgary.ca.

Communication and Media Studies CMMS

Contact Information

Location: Social Sciences Building, Room 222

Program number: 403.220.5623

Fax: 403.210.8164

Email address: gradprog@ucalgary.ca

Web page URL: commfilm.ucalgary.ca/graduate

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

The MA degree may be completed on a full-time or a part-time basis.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Graduate program in Communication and Media Studies requires:

Master of Arts

a) A statement of research intent (250-500 words).

b) Two samples of written work.

c) A detailed curriculum vitae.

d) A completed baccalaureate degree in Communications Studies, Culture Studies or related field.

e) Two completed Reference Forms.

There is no assurance of consideration for funding for part-time students.

Doctor of Philosophy

a) A statement of research intent (500-1000 words).

b) Two samples of written work.

c) A detailed curriculum vitae.

d) Completed baccalaureate and master's degrees in Communications Studies, Culture Studies, or equivalent.

e) Two completed Reference Forms.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/communication-media-studies-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/communication-media-studies-doctor-philosophy-thesis-based.

4. Advanced Credit

Advanced credit may be granted to students admitted to the MA and PhD programs. Approval of the Graduate Program Director is required.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Graduate Program in Communication and Media Studies requires the following:

Master of Arts (18 units or 3.0 full-course equivalents)

a) Nine units (1.5 full-course equivalents): Communication and Media Studies 601, 613 and 615.

b) Nine units (1.5 full-course equivalents) electives.

c) Three units (0.5 full-course equivalent) of the electives may be selected from other graduate programs; 3 units (0.5 full-course equivalent) of the electives may be Communication and Media Studies 711, Directed Studies.

Note: Master's students must take 9 units (1.5 full-course equivalents) in each of fall and winter terms in the first year of their program to be considered full-time.

Doctor of Philosophy (18 units or 3.0 full-course equivalents)

a) Nine units (1.5 full-course equivalents): Communication and Media Studies 601, 615 or equivalent, and 713.

b) Nine units (1.5 full-course equivalents) electives.

c) Three units (0.5 full-course equivalent) of the electives may be selected from other graduate programs; 3 units (0.5 full-course equivalent) of the electives may be Communication and Media Studies 711, Directed Studies.

Note: PhD students who can show that they have taken Communication and Media Studies 601 or equivalent may substitute an elective.

6. Additional Requirements

Students are encouraged to attend seminars offered by the Department: Thesis 112 for MA students and Thesis 212 for PhD students. These seminars cover a variety of practical topics related to academic work and careers.

7. Credit for Undergraduate Courses

Credit for undergraduate courses toward a master's program will be given only in the case of the course being developed for graduate-level work. Students in the doctoral program will not be given credit for undergraduate courses.

8. Time Limit

Expected completion time is two years of full-time study or three years of part-time study for the Master of Arts degree and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts degree and six years for the Doctor of Philosophy degrees.

9. Supervisory Assignments

Students are not required to choose a supervisor before they are admitted. An interim advisor is assigned by the program in the first year. The student must choose a thesis supervisor by the beginning of the second year.

Doctor of Philosophy

By June of the first year in program, the student must submit their proposed field of research and the name of a proposed supervisor for approval by the program. The supervisory committee must be appointed no later than three months after the appointment of the supervisor.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements for Candidacy and Thesis Examinations, the Department requires:

Candidacy

Doctoral students must pass oral and written Fields of Study examinations. For complete details of the examination format and other candidacy requirements, see commfilm.ucalgary.ca/candidacy-requirements.

Thesis Examination

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal or external to the home program.

11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection.

Master of Arts – Thesis supervisor must approve proposal.

Doctor of Philosophy – Students must submit a written thesis proposal, which is approved by their Supervisory Committee. See commfilm.ucalgary.ca/candidacy-requirements for further information.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on Awards, see the Awards and Financial Assistance section of this Calendar and grad.ucalgary.ca/awards.

Students applying for the Graduate Awards Competition must submit their applications to the Department of Communication, Media

and Film Graduate Programs Office by January 15.

Communications Studies COMS

The Communication Studies program was replaced by graduate program in Communication and Media Studies. Please refer to the new program entry for further information.

Computational Media Design CMD

Contact Information

Location: Information and Communications Technology Building, Room 645

Program number: 403.220.7495

Email address: cmd@ucalgary.ca

Web page URL: ucalgary.ca/cmd

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

These degrees are offered jointly through the Department of Computer Science, Faculty of Science; Faculty of Environmental Design; and Department of Art, Department of English, and School of Creative and Performing Arts, Faculty of Arts.

Students may register in the MSc and PhD programs as part-time students only with permission from the CMD Steering Committee.

2. Admission Requirements

In addition to Faculty of Graduate Studies admission requirements, the CMD program requires two reference letters dated within twelve months of the date of application and:

Master of Science

a) While applicants from any discipline will be considered, undergraduate degrees in Art, Computer Science, Dance, Design, Drama, English or Music are favoured. Starting CMD with a background in one area is possible, but background in two areas is preferred.

b) For applicants required to provide proof of proficiency in English, a TOEFL score of 600 (paper-based) or 105 (internet-based test), or an IELTS score of 7.5, or a minimum MELAB score of 86 or above is required. This requirement can also be met by completing Tier III of the International Foundations Program with minimum grades of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

c) A single page statement of interest. This is not a proposal but a declaration of interest in interdisciplinary research in art, dance, design, drama, English or music, and computer science.

d) Applicants must submit a portfolio that provides up to ten examples of their research and creative work. This may include any combination of academic publications and reports, images, video, audio recordings, musical scores, documentation of installations, and written works. Applicants may provide a URL to portfolio items that cannot be uploaded through the application system.

e) A demonstrated interest in interdisciplinary research in art, dance, design, drama, English or music and computer science.

f) A curriculum vitae.

Doctor of Philosophy

a) All the admission requirements for a Master of Science (above).

b) A master's degree from an accredited/recognized institution. For exceptional students applying directly to the PhD program with a bachelor degree, all the requirements for a Master of Science (above) apply, plus demonstrated exceptional research and/or creative ability. These direct entry students will be considered on a case-by-case basis.

3. Application Deadline

Deadlines for the submission of complete applications are available on the Future Students website:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/computational-media-design-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/computational-media-design-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

Graduate courses must be chosen in consultation with the supervisor(s) and approved by the CMD Director.

Students are required to achieve a grade of at least "B" in all courses taken to fulfill CMD course requirements.

Seminar Requirement: Students are required to give a CMD seminar presentation on a topic related to their graduate research/creative practice.

Master of Science

a) Course Requirement:

- One research methodology course from Computer Science, Art, Dance, Drama, English, Environmental Design or Music (3 units or 0.5 full-course equivalent).
- One Computer Science graduate-level course (3 units or 0.5 full-course equivalent).
- One graduate-level course from Art, Dance, Drama, English, Environmental Design or Music (3 units or 0.5 full-course equivalent), and
- Two additional graduate-level courses (6 units or 1.0 full-course equivalent), for a total of 15 units (2.5 full-course equivalents).
- Additional courses can be required on a case-by-case basis.

b) Supervision as specified in section 9.

c) A Master's Thesis Proposal as specified in section 11.

d) Master's Thesis.

e) Master's Thesis Oral Examination as specified in section 10.

Doctor of Philosophy

a) Course Requirements: At least three graduate-level courses (9 units or 1.5 full-course equivalents) must be taken while the student is enrolled as a PhD student in Computational Media Design at the University of Calgary.

b) Breadth Requirements:

- One research methodology course from Computer Science, Art, Dance, Drama, English, Environmental Design, or Music (3 units or 0.5 full-course equivalent)
- Two Computer Science graduate-level courses (6 units or 1.0 full-course equivalent)
- Two graduate-level courses (6 units or 1.0 full-course equivalent) from Art, Dance, Drama, English, Environmental Design and/or Music, and
- Three additional graduate-level courses (9 units or 1.5 full-course equivalents), for a total of 24 units (4.0 full-course equivalents).

c) An alternative breadth program that satisfies the student, the supervisor(s), the supervisory committee, and the CMD Director may be proposed in special cases.

d) Supervision as specified in Section 9.

e) PhD Candidacy requirements as specified in Section 10.

f) PhD Thesis.

g) PhD Thesis oral examination as specified in Section 10.

Exit requirements: MSc students

a) CMD MSc course requirements (see above).

b) Original research and/or creative practice body of work, appropriately scoped for an interdisciplinary MSc.

c) A seminar on the research and/or creative practice body of work conducted during the CMD MSc.

d) CMD MSc thesis and thesis defence (see sections 10 and 11 below).

Exit requirements: PhD students

a) CMD PhD course requirements (see above).

b) CMD PhD candidacy requirements (see section 10 below).

c) Original research and/or creative practice body of work, appropriately scoped for an interdisciplinary PhD.

d) A seminar on the research and/or creative practice body of work conducted during the CMD PhD.

e) CMD PhD thesis and thesis defence (see sections 10 and 11 below).

6. Credit for Undergraduate Courses

Undergraduate courses will not be considered for advanced standing in the CMD program. Permission that at most 3 units (0.5 full-course equivalent) at the 500 level be included as part of the course work requirement must be sought. This must be recommended by the supervisor(s) and approved by the CMD Director on the appropriate form.

7. Time Limit

MSc maximum time: 4 years; expected completion time 2 years.

PhD maximum time: 6 years: expected completion time 4 years.

8. Supervisory Assignments

For simplifying the explanations in this document and for the purposes of CMD requirements, Art, Dance, Drama, English, Environmental Design and Music are jointly referred to as Arts and Design. Generally, students are admitted to a specific research area and supervisor. Sometimes students are admitted to a specific lab or research area only, and are assigned an interim advisor.

Appointment of the Supervisor(s): CMD students will have a supervisor and a co-supervisor appointed on their acceptance letter. Between the supervisor and the co-supervisor the disciplines of Computer Science and Arts and Design will be covered. Students may seek a change in research area or supervisor after admission. The student must find a permanent supervisor and a permanent co-supervisor within six months of the start of the program. Such a change must be satisfactory to the student, and supported by the supervisors and must be approved by the CMD Director. The role of the supervisor is to take responsibility for overall guidance, instruction, and research/creative practice supervision. The role of the co-supervisor in this case is to provide supplementary guidance, instruction and research stimulation on a regular and extensive basis.

Doctoral Supervisory Committee: Composition of the Doctoral Supervisory Committee. The Doctoral Supervisory Committee should be constituted by the supervisor and co-supervisor in consultation with the student and must be approved by the CMD Director and sent to the Faculty of Graduate Studies for confirmation. It will consist of the supervisor and co-supervisor, and two additional members. The two additional committee members may be external to the student's program. At least one of the members of the Supervisory Committee should have had supervisory experience at the doctoral level. Exceptions to this will be considered on an individual basis.

9. Required Examinations

PhD Candidacy Examination

Doctoral students must complete a written thesis proposal, a written Field of Study examination, and an oral examination of the thesis proposal. For complete details of the requirements, see CMD Candidacy Requirements document.

Thesis Examination

In addition to the general Faculty of Graduate Studies Thesis and Thesis Examination Regulations, the following program policies apply:

Final thesis oral examinations are open examinations.

Master's Thesis Examination

This exam will be conducted as specified by the Faculty of Graduate Studies. A thesis component that describes research conducted and/or body of creative work completed is required to complete the program. Graduating students will have to demonstrate skills and expertise in Computer Science and Arts and Design. CMD encourages research and creative work that incorporates aspects of both Computer Science and Arts and Design, thus there is recognition for and appreciation of a thesis that represents an interdisciplinary balance between the fields.

Scheduling of the Examination

The Supervisor and Co-Supervisor must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Examination Committee

The Internal Examiner may be internal to the CMD program. The CMD program membership includes the set of faculty members actively engaged in the program and the supervisor/co-supervisor's academic units (i.e., the Department of Computer Science within the Faculty of Science, Department of Art and School of Creative and Performing Arts within the Faculty of Arts, or Faculty of Environmental Design).

An additional examiner will be from the CMD faculty membership.

PhD Thesis Oral Examination

This exam will be conducted as specified by the Faculty of Graduate Studies. A thesis that describes the research conducted and/or the body of creative work completed is required to complete the PhD in the CMD program. The thesis will set the research/work in its literary and new media context and present evidence that the work is worthy of either publication or external recognition. Graduating students will have to have demonstrated skills and expertise in Computer Science and Arts and Design. CMD encourages research and creative work that incorporates aspects of both Computer Science and Arts and Design, thus there is recognition for and appreciation of a thesis that represents an interdisciplinary balance between the fields.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Examination Committee

The Internal Examiner may be internal to the CMD program. The CMD program membership includes the set of faculty members actively engaged in the program and the supervisor/co-supervisor's academic units (i.e., the Department of Computer Science within the Faculty of Science, Department of Art and School of Creative and Performing Arts within the Faculty of Arts, or Faculty of Environmental Design).

The CMD PhD student's External Examiner will be an international expert in the research/creative practice area of the student's research. Faculty of Graduate Studies Conflict of Interest Policy applies (see grad.ucalgary.ca/current/policies-forms/conflict-interest).

10. Research Proposal Requirements

A research proposal is required for master's students. The proposal must be approved by both the supervisor and co-supervisor no later than twelve months after starting the program.

At the doctoral level, students are required to prepare a written thesis proposal and pass an oral examination of the proposal. For complete details of the thesis proposal requirements and examination format, see CMD Candidacy Requirements.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards see the Awards and Financial Assistance section of the calendar. Successful applicants may be offered departmental teaching assistantships and/or research assistantships in their offer letter.

Students applying for scholarships must submit their applications as appropriate according to the requirements of the scholarships. For the most up-to-date information, please see the CMD website, ucalgary.ca/cmd.

Computer Science CPSC

Contact Information

Location: Information and Communications Technology Building, Room 602

Program number: 403.220.6015

Fax: 403.284.4707

Email address: cpscappl@ucalgary.ca

Web page URL: cpsc.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Students may register in the MSc and PhD programs as part-time students only with permission from the department.

Specialization:

- Software Engineering (MSc students only). The specialization is offered jointly through the Department of Computer Science and the Department of Electrical and Computer Engineering.

Certificates:

- Post-baccalaureate Certificate in Network Security
- Post-baccalaureate Certificate in Software Security

2. Admission Requirements

Master of Science

a) An undergraduate background of either:

A four-year bachelor's degree or equivalent in Computer Science from a recognized institution with a minimum GPA of 3.30 in the last two years (i.e., last 60 units or 10 full-course equivalents) of the undergraduate program

OR

A four-year bachelor's degree or equivalent from a recognized institution with a minimum GPA of 3.30 in the last two years (i.e., last 60 units or 10 full-course equivalents) of the undergraduate program.

In addition, candidates must have an undergraduate course at the 3rd or 4th year level in each of the following computer science areas:

- Theory of Computation
- Software Engineering
- Systems (Operating Systems, Compilers, Distributed Systems, Networking)
- Application (Artificial Intelligence, Graphics, Databases, etc.)

The cumulative GPA for these courses must be at least 3.30.

Post-degree Computer Science courses may be considered in calculating the GPA. Exceptions to the GPA requirements may be considered for students with either:

- Demonstrated research excellence, or
- GRE General scores of at least 600 verbal and 750 quantitative and either 720 analytical (old test format) or 5.5 (new test format).

b) For applicants required to provide proof of proficiency in English, a TOEFL score of 580 (paper-based test) or 97 (Internet-based test), or an IELTS score of 7.0 or above, or a MELAB score of 83 or above, or a PTE score of 68 or above. This requirement can also be met by completing Tier III of the International Foundations Program with minimum grades of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

c) For students applying with degrees from outside Canada, GRE scores are generally expected and will be considered.

d) Two letters of reference.

Master of Science degree with a Specialization in Software Engineering (thesis-based)

Students applying for entry to the Master of Science with a specialization in Software Engineering will be assessed on qualification as in (a) above, but with a GPA of 3.00 and at least three years relevant experience in the software industry following the bachelor's degree.

Doctor of Philosophy

For students applying with a Master of Science degree, all the requirements for a Master of Science (above) apply, plus a thesis-based Master of Science degree from a recognized institution with a minimum GPA of 3.30.

For exceptional students applying with a Bachelor of Science degree, all the requirements for a Master of Science (above) apply, plus a four-year Honours degree or its equivalent from a recognized institution with a minimum GPA of 3.70 and demonstrated research ability.

Post-baccalaureate Certificate in Network Security and Post-baccalaureate Certificate in Software Security

In addition to Faculty of Graduate Studies requirements for Admission, the following are required:

a) Undergraduate preparation of either:

- A four-year Bachelor's degree or equivalent in Computer Science from a recognized institution; or
- A four-year Bachelor's degree or equivalent from a recognized institution. In addition, candidates must have successfully completed an undergraduate course in each of the following areas:
  - Computer programming with understanding of execution environments (e.g., CPSC 233 or equivalent)
  - Algorithms and data structures (e.g., CPSC 331 or equivalent)
  - Either Operating systems (e.g., CPSC 457 or equivalent); or Computer networks (e.g., CPSC 441 or equivalent).

b) Two letters of reference.

Alternate Routes to Admission: In exceptional circumstances (see Admissions - Qualifications), individuals who do not meet formal academic requirements but who have significant life achievement may be considered for admission to the post-baccalaureate certificate program. The candidate must provide the Information Security Program Director with evidence demonstrating the potential to successfully undertake this certificate program. Such candidates may also be required to participate in an in-person interview with the Program Director and be required to take additional courses to meet completion requirements.

Students who successfully complete one of the post-baccalaureate certificate programs, and who then apply to the other post-baccalaureate certificate program within 5 years of completing the first certificate, will not be required to submit reference letters or transcripts.

3. Application Deadline

The deadline for completed applications is available on the Future Students website:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/computer-science-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/computer-science-doctor-philosophy-thesis-based.

Post-Baccalaureate Certificate in Network security: ucalgary.ca/future-students/graduate/explore-programs/network-software-security-certificate-course-based-0.

Post-Baccalaureate Certificate in Software security: ucalgary.ca/future-students/graduate/explore-programs/network-software-security-certificate-course-based.

4. Advanced Credit

MSc and PhD

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

Post-baccalaureate Certificate in Network Security and Post-baccalaureate Certificate in Software Security

Advanced credit will not normally be given for either of the certificate programs.

5. Program/Course Requirements

Graduate programs must be chosen in consultation with the supervisor and approved by the Computer Science Graduate Affairs Committee. In addition to the Faculties of Graduate Studies and Science requirements, the Department requires:

Master of Science (thesis-based)

a) Course Requirements: Computer Science 699, plus:

b) Twelve units (2.0 full-course equivalents) of additional courses. At least 6 units (1.0 full-course equivalent) must be graduate-level computer science courses (labelled CPSC or SENG) and at most 3 units (0.5 full-course equivalent) can be an undergraduate course numbered at the 500 level.

We recommend that students who are considering continuing on to a doctoral program or entering certain career paths, select courses that demonstrate some breadth across Computer Science (see PhD Breadth Requirements for courses).

c) Seminar Requirement: Students are required to give a department seminar presentation on a topic related to their graduate research.

Master of Science degree with a Specialization in Software Engineering (thesis-based)

a) Course Requirements: Computer Science 699, plus:

b) Twelve units (2.0 full-course equivalents) of additional courses. At least 9 units (1.5 full-course equivalents) of these courses

must be taken from the approved SENG list (available from the Department), and at most 3 units (0.5 full-course equivalent) can be an undergraduate course numbered at the 500 level.

We recommend that students who are considering continuing on to a doctoral program or entering certain career paths, select courses outside the Approved SENG list that demonstrate some breadth across Computer Science (see PhD Breadth Requirements for courses).

c) Seminar Requirement: Students are required to give a department seminar presentation on a topic related to their graduate research.

Doctor of Philosophy

a) Course Requirements: Students will be required to have achieved at least a grade of "B" in at least 24 units (4.0 full-course equivalents) beyond the requirements for an undergraduate degree before completion of the PhD degree. At least 9 units (1.5 full-course equivalents) of these must be taken while the student is enrolled as a PhD student in Computer Science at the University of Calgary. Of the 24 units (4.0 full-course equivalents), at least 18 units (3.0 full-course equivalents) must be graduate-level courses, with the remaining 12 units (2.0 full-course equivalents) being either graduate-level courses or advanced (500-level) undergraduate courses. At least 12 units (2.0 full-course equivalents) of the required courses must be taken from a degree-granting Computer Science Department. In addition to the above courses, Computer Science 699 or equivalent experience is required and does not count toward the minimum 24 units (4.0 full-course equivalents) courses above.

b) Breadth Requirements: The above courses must be taken from multiple research areas. Not more than 3.0 full-course equivalents) six courses in one research area is counted toward the minimum 24 units (4.0 full-course equivalents). Courses in the intersection of two or more areas are counted in the area with the most completed course credits. The current research areas are: Artificial Intelligence and Multi-Agent Systems, Bioinformatics and Biological Computations, Computer Graphics, Computer Vision and Image Processing, Database, HCI and Visualization, Networks and Systems, Security, Theory and Foundations, Scientific Computing, Software Engineering, Other areas in Computer Science, External to Computer Science. Courses outside Computer Science must be approved by the student's supervisor. Credits for courses external to the Department of Computer Science are only given on condition that no Computer Science course which covers similar content is counted toward the required eight courses. These courses will be counted toward the appropriate areas in Computer Science.

c) Seminar Requirement: Students are required to give a department seminar presentation on a topic related to their graduate research.

Post-baccalaureate Certificate in Network Security

- Information Security 601: Applied Cryptography (3 units)
- Information Security 603: Network Security (3 units)
- Information Security 621: Ethical Hacking Laboratory (3 units)
- And one of:
  - Information Security 641: Governance and Risk Management (3 units); or
  - Information Security 643: Policies, Standards and Programs (3 units); or
  - Information Security 645: Incident Management and Forensics (3 units)

Post-baccalaureate Certificate in Software Security

- Information Security 605: System and Application Security (3 units)
- Information Security 623: Software Security Laboratory (3 units)
- Information Security 621: Mobile and Smart Device Security Laboratory (3 units)
- And one of:
  - Information Security 641: Governance and Risk Management (3 units); or
  - Information Security 643: Policies, Standards and Programs (3 units); or
  - Information Security 645: Incident Management and Forensics (3 units)

6. Credit for Undergraduate Courses

For MSc programs, at most 3 units (0.5 full-course equivalent) at the 500 level may be taken as part of the course work requirement. This must be recommended by the supervisor and approved by the Graduate Director.

For PhD programs, at most 6 units (1.0 full-course equivalent) at the 500 level may be taken as part of the course work requirement; at most one of these taken while registered in the current PhD program. This must be recommended by the supervisor and approved by the Graduate Director on the normal Doctor of Philosophy Course Approval Form (form available from the Department).

For post-baccalaureate certificate programs, credit will not normally be granted for undergraduate courses.

7. Time Limit

Expected completion time is two years for thesis-based Master of Science.

Expected completion time for doctoral students entering with a master's degree is four years, and five years for a student transferring to the doctoral program without a master's degree.

Expected completion time for the post-baccalaureate certificates is 12 months, and the maximum time allowed is two years.

8. Supervisory Assignments

MSc and PhD

Generally, students are admitted to a specific research area and supervisor. Sometimes students are admitted to a specific lab or research area only and are assigned an interim advisor. In the latter case, the student must find a permanent supervisor within six months of the start of the program. Students may seek a change in research area or supervisor after admission. Such a change must be satisfactory to the student, and to the proposed new supervisor. Provided this change meets any current supervisory load constraints, this change will be supported and approved by the Graduate Program Director.

Doctoral students select their supervisory committee members in consultation with their permanent supervisors.

Post-baccalaureate Certificates

Each cohort in the post-baccalaureate certificates will be assigned to an academic advisor.

9. Required Examinations

Candidacy

Doctoral students must complete a written Field of Study examination, a written thesis proposal, and an oral examination on the thesis proposal. For complete details of the candidacy requirements, see ucalgary.ca/cpsc/graduate/programs/doctoral_phd_thesis_based/current_regulations.

Thesis Examination (MSc and PhD)

In addition to the Faculty of Graduate Studies regulations for Thesis Examinations, the department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

Thesis examinations are open.

10. Research Proposal Requirements

At the master's level, research proposal requirements are determined by the supervisor.

At the doctoral level, thesis proposal must be approved by the student's supervisory committee before an oral examination on the proposal is scheduled. For complete details of the requirements, see ucalgary.ca/cpsc/graduate/programs/doctoral_phd_thesis_based/current_regulations.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Successful applicants may be offered departmental teaching assistantships and/or research assistantships in their offer letter.

Students should contact the department for information on scholarship deadlines.

Culture and Society CUSP

The Culture and Society program was replaced by graduate program in Communication and Media Studies. Please refer to the new program entry for further details.

Data Science and Analytics

Contact Information

Program number: 403.220.7495

Email address: datascience@ucalgary.ca

Web page URL: ucalgary.ca/science/data-science/graduate

1. Programs and Specializations Offered

The University of Calgary offers the following programs in Data Science and Analytics:

- Post-baccalaureate Certificate in Fundamental Data Science and Analytics
- Post-baccalaureate Diploma in Data Science and Analytics

Specializations offered under the Post-baccalaureate Diploma in Data Science and Analytics:

- Health Data Science and Biostatistics
- Data Science
- Business Analytics

2. Admission Requirements

In addition to the Faculty of Graduate Studies' admission requirements, all applicants must meet the following requirements:

- A four-year baccalaureate degree from a recognized institution;
- A minimum admission grade point average of 3.00 on a four-point scale or equivalent;
- The successful completion of the following undergraduate courses:
  - one course in computer programming or computer science or equivalent;
  - one course in statistics or equivalent, and
  - one course in either calculus or linear algebra or equivalent.

Students who successfully completed the Post-baccalaureate Certificate in Fundamental Data Science and Analytics with a GPA of 3.00 or higher will meet the minimum admission requirements for the Post-baccalaureate Diploma in Data Science and Analytics.

Note: In exceptional circumstances, individuals who do not meet formal academic requirements but who have significant life achievement may be considered for admission to this program (see Qualifications). The candidate must provide the Data Science Program Director with evidence demonstrating the potential to successfully undertake this certificate program. Such candidates may also be required to participate in an in-person interview with the Program Director.

3. Application Deadlines

The deadline for completed applications is available on the Future Students website:

Post-baccalaureate certificate: ucalgary.ca/future-students/graduate/explore-programs/data-science-analytics-certificate-course-based.

Post-baccalaureate diploma: ucalgary.ca/future-students/graduate/explore-programs/data-science-analytics-diploma-course-based.

Students who wish to use the post-baccalaureate certificate as a pathway to "ladder" into the post-baccalaureate diploma program must apply to the post-baccalaureate diploma program by the stated deadline.

4. Advanced Credit

Post-baccalaureate Certificate in Fundamental Data Science and Analytics

Normally, advanced credit or advanced standing is not awarded.

Post-baccalaureate Diploma in Data Science and Analytics

Advanced Credit may be given for a maximum of two 3-unit courses. See Advanced Credit.

Advanced Standing may be considered for students with extensive preparation at the senior undergraduate or graduate level, in mathematics, statistics, and computer science. Students may be given advanced standing in a maximum of two 3-unit courses. Advanced standing exempts students from taking specific courses, but they are still required to complete the total of 24 units required for the Diploma. The applicant must make advanced standing and advanced credit requests as part of the admission process.

5. Course Requirements

Post-baccalaureate Certificate in Fundamental Data Science and Analytics

The Certificate requires 12 units of coursework consisting of:

- Data Science 601: Working with Data and Visualization
- Data Science 602: Statistical Data Analysis
- Data Science 603: Statistical Modeling with Data
- Data Science 604: Big Data Management

Post-baccalaureate Diploma in Data Science and Analytics

The Diploma requires 24 units of course work consisting of:

a) 12 units of required courses:

- Data Science 601: Working with Data and Visualization
- Data Science 602: Statistical Data Analysis
- Data Science 603: Statistical Modeling with Data
- Data Science 604: Big Data Management

b) 12 units of coursework in one specialization area:

Business Analytics Specialization

- Data Science 611: Predictive Analytics
- Data Science 612: Decision Analytics
- Data Science 613: Introductory Data Analytics
- Data Science 614: Advanced Data Analytics

Health Data Science and Biostatistics Specialization

- Data Science 621: Advanced Statistical Modeling
- Data Science 622: Machine Learning for Precision Health
- Data Science 623: Big Data in Health
- Data Science 624: Advanced Exploration and Visualization in Health

Data Science Specialization

- Data Science 605: Actionable Visualization and Analytics
- Data Science 606: Statistical Methods in Data Science
- Data Science 607: Statistical and Machine Learning
- Data Science 608: Developing Big Data Applications

Laddering from the Post-baccalaureate Certificate to the Diploma

Students who complete the Post-baccalaureate Certificate in Fundamental Data Science and Analytics may receive credit for the 12 units of coursework completed in the certificate program if they are subsequently accepted to the Post-baccalaureate Diploma in Data Science and Analytics program within five years of completing the certificate.

6. Time Limits

The expected completion time for the Post-baccalaureate Certificate in Fundamental Data Science and Analytics is four months. The maximum completion time for the Certificate is three years from the start of the program.

The expected completion time for the Post-baccalaureate Diploma in Data Science and Analytics is 8 months (direct entry, full-time), and 4 months or 8 months (part-time) for students laddering from the certificate program, depending on the schedule set for that cohort/specialization. The maximum completion time for the Diploma is three years from the start of the program.

7. Supervisory Assignments

An Academic Co-ordinator is assigned to each cohort-based certificate and diploma.

8. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section.

Drama DRAM

Contact Information

Location: Craigie Hall D 100

Program number: 403.220.5313

Fax: 403.282.6925

Email address: dramgs@ucalgary.ca

Web page URL: arts.ucalgary.ca/schools/creative-performing-arts/drama/graduate

1. Degrees and Specializations Offered

Master of Fine Arts (MFA) (thesis-based)

Students will generally be accepted and registered on a full-time basis. Part-time registration will be considered on an individual basis.

Specializations:

- Directing
- Design/Technical
- Playwriting
- Theatre Studies

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, Drama requires:

a) A baccalaureate degree that has clearly included a major emphasis in the study of drama with study at the undergraduate level in the proposed area of specialization. Deficiencies of background may be corrected during a year of study as a qualifying student.

b) A written application including a biographical outline of the applicant's studies and experience in theatre and a statement of intent outlining proposed projects in Drama. When the applicant intends to study in the Design/Technical specialization, a portfolio of drawings and design work is required. Applicants to the Playwriting specialization must submit a portfolio of original creative writing. Applicants to the Theatre Studies specialization must submit samples of their written work. Directing applicants must submit a selected portfolio that might include reviews, photographs and/or video clips of productions directed.

c) Two letters of reference.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/drama-master-fine-arts-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, Drama also specifies the following requirements:

All candidates must take a minimum of 24 units (4.0 full-course equivalents) of graduate courses, including Drama 605. All candidates must complete a thesis.

Courses required for specific specializations are described below:

a) **Directing** candidates must enrol in Drama 610, 647 and 649 in the first year.

b) **Design/Technical** candidates must enrol in at least four of the decimalized series that includes Drama 623, 625, 627 and 629. Candidates must complete, to the satisfaction of an examining committee, a portfolio and an oral review relating to their design work at the completion of the first 18 units (3.0 full-course equivalents). Details concerning the portfolio and procedures to be followed in case of failure are on file in the Drama office.

c) **Playwriting** candidates must enrol in Drama 671 and 673 in the first year. Drama 647 and 649 are also required courses.

d) **Theatre Studies** candidates must enrol in Drama 647 and 649 in the first year.

6. Additional Requirements

a) For **Directing** candidates, the thesis will consist of the direction of a full-length play and a supporting paper that reflects critically on the production and on the process of its creation.

b) For **Design/Technical** candidates, the thesis will consist of the design of a full-length production in two of the following areas: scene design, costume design, light design, sound design. Technical Direction may serve as one of the areas. Pictorial material and a supporting paper that reflects critically upon the production and the process of its creation are also required.

c) For **Playwriting** candidates, the thesis will consist of a full-length play and a supporting paper that reflects critically on the play and the process of its creation.

d) For **Theatre Studies** candidates, the thesis will be a substantial scholarly research paper that may be in some cases informed by a creative performance project.

7. Credit for Undergraduate Courses

Drama may give credit for undergraduate courses at the 500 level at the discretion of the supervisor and graduate committee. No more than half of a student's program may be done at the undergraduate level.

8. Time Limit

The Master of Fine Arts degree must be completed within four years.

9. Supervisory Assignments

The graduate committee assigns a supervisor after discussion with the student.

10. Required Examinations

Thesis Examination

In addition to Faculty of Graduate Studies regulations for Thesis Examinations, the Department requires:

Composition of the Committee

The Internal Examiner must be external to the home program.

Final thesis oral examinations are open.

11. Research Proposal Requirements

Research proposals are formulated by the student in consultation with the supervisor and approved by the graduate committee. The committee will follow the University's policies on ethical conduct in research in its review of proposals.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of the Graduate Calendar. Students applying for scholarships must submit their applications to Drama by February 1.

Economics ECON

Contact Information

Location: Social Sciences Building, Room 454

Program number: 403.220.6064

Fax: 403.282.5262

Email address: econgrad@ucalgary.ca

Web page URL: econ.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based and course-based

There is a requirement of full-time study for the course-based and thesis-based Master of Arts and doctoral programs.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) A minimum of 24 units (4.0 full-course equivalents) of economics courses. These must include the following University of Calgary courses or their equivalents: Economics 395/495/497 (econometrics), Economics 387/389 (mathematics for economists), Economics 557 (senior microeconomics), and Economics 559 (senior macroeconomics), with at least a "B" average in senior economics courses.

b) International students must hold a four-year degree from a recognized institution. If you received your degree from a university outside Canada, please refer to the country-specific degree requirements: grad.ucalgary.ca/prospective/admissions/international-admission-requirements.

c) Three reference letters.

Doctor of Philosophy

a) The requirements listed above for the Master of Arts program. Doctoral candidates may require greater proficiency in Mathematics.

b) A Master of Arts degree in Economics or its equivalent, with a high level of proficiency in Microeconomic Theory, Macroeconomic Theory, and Econometrics. If courses have been taken more than five years ago, students may be required to upgrade their knowledge in these fields.

c) Three reference letters.

3. Application Deadline

Deadline for submission of complete applications is available on the Future Students website:

Master of Arts (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/economics-master-arts-thesis-based.

Master of Arts (course-based): ucalgary.ca/future-students/graduate/explore-programs/economics-master-arts-course-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/economics-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts (thesis-based)

a) For students holding an Honours Economics degree with credits in Economics 387, 389, 395, 495, 497, 557, and 559 or their equivalents, the completion of 18 units (3.0 full-course equivalents) of graduate-level Economics courses. Such students may be able to complete the degree in one year. In special cases the Department may allow students to substitute a maximum of 6 units (1.0 full-course equivalent) from a related discipline for one of the elective graduate courses in Economics.

b) For students without an Honours Economics degree or students whose Honours degree in Economics does not include the undergraduate courses specified in (a) or their equivalents, the completion of such courses as are required to raise their competence to the appropriate level. Graduate course requirements for such students are the same as in (a). Such students may be able to complete the degree in two years.

c) The completion of Economics 615, 657, and 659 unless one or more of them is explicitly exempted by the graduate program director.

Students, with the approval of the graduate program director, may replace Economics 657 and 659 with Economics 707/757 and 709/759 respectively

d) Successful completion and examination of the MA thesis (in accord with examination procedures of the Faculty of Graduate Studies).

Master of Arts (course-based)

The departmental academic requirements for the course-based Master of Arts degree are comparable to those for the thesis-based Master of Arts specified above. The differences in the course-based program are:

a) The thesis requirement is replaced by additional 12 units (2.0 full-course equivalents) of graduate courses (making a total of 30 units or 5.0 full-course equivalents).

b) The maximal number of courses from a related discipline is increased to 9 units (1.5 full-course equivalents) of the elective graduate courses in Economics.

c) A research paper. The topic may be a limited empirical research project, a critical review of the literature in a particular area, or a critical analysis of a theoretical or important policy problem. This paper is completed through Economics 695 and 697.

d) An exit requirement consisting of a research defence in an open conference (at the end of Economics 697) and if unsuccessful a comprehensive written examination.

Doctor of Philosophy

The Department of Economics requires that doctoral students take 36 units (6.0 full-course equivalents). Required courses include two courses each in econometrics, Economics 705 and 715, microeconomic theory, Economics 707 and 757, and macroeconomic theory, Economics 709 and 759. In addition, students must take 18 units (3.0 full-course equivalents) in "field" areas. Doctoral students must also write and pass a second-year research paper prior to scheduling the Thesis Proposal Oral Examination. For further information see the website: econ.ucalgary.ca/graduate/resources-current-students.

Students are also recommended to take a non-credit one-week course in the Fall Session Block Week (the week prior to the start of classes) of the first year in Mathematical Economics.

The Department allows for the possibility that master's-level courses and course work taken at other institutions may be substituted for some of the required doctoral courses. Decisions concerning course substitutions and the transferability of graduate courses from other institutions are made on a case-by-case basis. Students are advised that the field of study exams in microeconomics and macroeconomics, which are required of all doctoral students, include material from the core courses listed above.

Graduate students must obtain a grade standing of "B" or better in graduate course work. A grade of "B-" or less will trigger a departmental review of the student's suitability for the graduate program and may result in a loss of funding.

6. Credit for Undergraduate Courses

Credit is not given for undergraduate courses.

7. Time Limit

Expected completion time for students studying on a full-time basis is two years for the Master of Arts thesis-based and one year course-based, and five years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Arts (thesis-based and course-based) and six years for the Doctor of Philosophy.

8. Supervisory Assignments

The process by which students are matched with supervisors is an informal one, based on mutual research interest.

9. Required Examinations

Doctor of Philosophy

In addition to the Faculty of Graduate Studies requirements for Candidacy and Thesis Examinations, the Department requires:

Candidacy

Candidacy must be completed within 28 months from the program start date.

Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) pass the microeconomics and macroeconomics comprehensive field of study exams, (3) pass the second-year paper requirement, and (4) have their thesis proposal approved by the Supervisory Committee. For further information, please consult the Department of Economics website: econ.ucalgary.ca/graduate/phd-program.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program. A full description of all candidacy requirements is available at: econ.ucalgary.ca/graduate/resources-current-students.

Thesis Examination

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

10. Research Proposal Requirements

Information on research proposals is available from the interim advisor/grant mentor/supervisor.

11. Financial Assistance

Financial assistance is available to qualified students. Departmental funding is determined at the time of admission. See the Department of Economics Funding Opportunities website: econ.ucalgary.ca/graduate/funding-opportunities-0.

For information on awards, please see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to the Department by January 15.

To be eligible for funding beyond the first year, a student must pass field of study exams in microeconomics and macroeconomics by the beginning of classes of their second year. To be eligible for funding beyond the Fall Term of the third year, a student must receive a passing grade on their second-year research paper and their oral

thesis proposal by the beginning of Winter Term in their third year.

Education Graduate Programs

Contact Information

Location: Education Tower, Room 114

Program number: 403.220.5675

Toll free in Canada 877.623.0292

Fax: 403.282.3005

Email address: gpe@ucalgary.ca

Web page URL: werklund.ucalgary.ca/gpe

Educational Psychology (EDPS)

Contact Information

Location: Education Tower, Room 114

Program number: 403.220.5675

Toll free in Canada: 877.623.0292

Fax: 403.282.3005

Email address: gpe@ucalgary.ca

Web page URL: werklund.ucalgary.ca/gpe

Degrees and Specializations Offered

Degrees

- Master of Science (MSc) (thesis-based)
- Master of Counselling (MC) (course-based)
- Master of Education (MEd) (course-based) (Counselling Psychology specialization suspended)
- Doctor of Philosophy (PhD)

Specializations

- Counselling Psychology
- School and Applied Child Psychology

Educational Psychology offers specializations in Counselling Psychology (CNPY) and School and Applied Child Psychology (SACP) at master's and doctoral levels. We offer both thesis-based degrees (MSc) and course-based degrees (MEd and MC) at the master's level. Both degree streams prepare students for roles as psychologists and counsellors though further steps (and possibly, courses) will be required to meet professional registration requirements.

Note: The Doctoral Program in Educational Psychology with specialization in Counselling Psychology has been granted accreditation by the Canadian Psychological Association (CPA).

Counselling Psychology (PhD)

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD) in Educational Psychology with specialization in Counselling Psychology - on campus

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, entry requirements include:

a) A completed thesis-based master's degree in Counselling Psychology or equivalent from an approved university, with a minimum grade point average of 3.50 in the master's program. If coursework from an applicant's master's program is not equivalent to courses from the Master of Science in Counselling Psychology at the University of Calgary, the student may be admitted as a qualifying student. A qualifying student is required to take additional courses within the doctoral program to ensure equivalent training. A qualifying student may take up to 12 units (2.0 full-course equivalents) to meet equivalency requirements during the qualifying year. Qualifying status will not be granted for a period exceeding one year.

b) Two senior undergraduate or one graduate course (3 units or 0.5 full-course equivalent each) in (i) biological bases of behaviour, (ii) cognitive-affective bases of behaviour, (iii) social bases of behaviour, and (iv) individual behaviour.

c) One senior undergraduate or one graduate course in the historical and scientific foundations of general psychology.

d) If all of the prerequisite courses for admission to the PhD program in Counselling Psychology have not been completed at the time of application, students who have up to 12 units (2.0 full-course equivalents) in deficiencies may still be admitted, but the prerequisite courses will need to be completed before the doctoral candidacy examination.

e) A curriculum vitae and a concise rationale (500 words or less) for the application.

f) Three references, including two academic references, one of which is normally from the former thesis advisor.

g) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar; "B" on Reading Comprehension & Proficiency; and "B" on Listening Comprehension & Oral Fluency.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/counselling-psychology-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies requirements, the degree program requires the following:

Students who have completed the prerequisites in the areas of (a) biological bases of behaviour, (b) cognitive-affective bases of behaviour, (c) social bases of behaviour, (d) individual behaviour, (e) historical and scientific foundations of general psychology, and (f) the courses and thesis, are required to complete:

a) Twelve units (2.0 full-course equivalents) at the doctoral-level normally including three units (0.5 full-course equivalent) in research methods, and Educational Psychology 731 and 742. Note section 6 **Police Information Check** below.

b) Candidacy requirements.

c) Dissertation.

d) A twelve-month full-time internship: Educational Psychology 788. Note section 6 **Police Information Check** below.

A qualifying student is required to take additional courses within the doctoral program to ensure equivalent training. A qualifying student may take up to 12 units (2.0 full-course equivalents) to meet equivalency requirements during the qualifying year. Qualifying status will not be granted for a period exceeding one year.

Course content addresses theory, research, and practice in the domains identified by the Canadian Psychological Association (CPA) for accreditation of doctoral programs in professional psychology.

Detailed information on program and core course requirements can be obtained from the Werklund School of Education's Graduate Programs Office.

6. Additional Requirements

Police Information Check

All successful applicants to the Werklund School of Education Counselling Psychology program are required to provide a current Police Information Check which includes a Criminal Record Check and a Vulnerable Sector Search. All successful applicants will be also required to acknowledge the requirement for a Police Information Check by submitting a "Notice Regarding Requirement for Police Information Check" declaration form prior to the start of the program. Students who are not residents of Calgary must arrange for a Police Information Check through their nearest police service or RCMP detachment in the area where they reside. In order to be considered "current", the Police Information Check must be completed no earlier than June 30 and students will be required to request a new Police Information Check every 12 months. The original Police Information Check must be presented in person to the administration in the Graduate Program Office in the Werklund School of Education before the start of classes (September 1) and to the organization hosting the student on or before the first day of the practicum or internship course (Educational Psychology 742, 788).

Students who are concerned about the presence of a criminal record should contact the police department to discuss the process for eliminating or erasing such a record.

A current Police Information Check is required for all third-party and University of Calgary practicum and internship placements. Failure to present a Police Information Check may result in the student being unable to complete their Practicum or Internship. Successful completion of both Practicum and Internship are required for graduation.

Students are obligated to inform the Faculty immediately of any change in the status of their criminal record.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

The Doctor of Philosophy degree is designed to be completed in four years. Maximum completion time allowed for the Doctor of Philosophy degree is six years.

9. Supervisory Assignments

An interim advisor is assigned to each first-year student in a thesis-based program. Students are responsible for initiating discussions with potential permanent supervisors and are expected to have finalized supervisory arrangements by their second annual registration.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements for Candidacy and Thesis Examinations, the program requires:

Candidacy

Admission into Candidacy in the Werklund School of Education Graduate Programs: 1) requires that students have abilities to conceptualize, interpret, critique and synthesize comprehensive, substantive knowledge that is relevant to the discipline and practice of educational psychology; and 2) ensures that students have a well-developed plan for their dissertation research, a sound proposal with a well-developed research question and potential for the ability to pursue and complete original independent research at the doctoral level.

In compliance with the Faculty of Graduate Studies Candidacy Regulations, the requirements for Admission to Candidacy at the Werklund School of Education is a four-stage process:

- Completion of all course requirements as identified in the calendar;
- Field of study (FoS) written candidacy examination;
- A research proposal approved by the Supervisory Committee (recognizing changes may be made after successful completion of exams prior to submission for ethics approval);
- An oral examination of the research proposal.

All Candidacy requirements must be completed within 28 months of the start of the program.

For further information, please consult the Graduate Programs in Education website, werklund.ucalgary.ca/gpe/student-supervisor-relationships.

Thesis

The doctoral thesis is the focus of the degree program. In consultation with the supervisor, the student should formulate an appropriate thesis topic as early as possible in the program because the thesis proposal affects the choice and number of courses needed in order to complete the program.

Thesis Examination

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Information on research proposals is available through the interim advisor/supervisor.

Ethics approval is required for all research projects involving the use of human subjects, before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss/.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships for September admission must submit their scholarship applications to the Graduate Programs in Education office by he posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Graduate Programs in Education also provides assistance for students through teaching assistantships, graduate research scholarships and other scholarships. Application forms and deadline information for these awards can be obtained from Graduate Programs in Education.

School and Applied Child Psychology (PhD)

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD) in Educational Psychology with specialization in School and Applied Child Psychology - on campus.

2. Admission Requirements

In addition to the Faculty of Graduate Studies and Education requirements, entry requirements include:

a) A completed thesis-based master's degree in School and Applied Child Psychology or equivalent from an approved university, with a minimum grade point average of 3.50 in the Master's degree. If coursework from an applicant's Master's degree is not equivalent to courses from the Master of Science in School and Applied Child Psychology at the University of Calgary, the student may be admitted as a qualifying student. A qualifying student is required to take additional courses within the doctoral program to ensure equivalent training. A qualifying student may take up to 12 units (2.0 full-course equivalents) to meet equivalency requirements during the qualifying year. Qualifying status will not be granted for a period exceeding one year.

b) Two senior undergraduate courses or one graduate course (3 units or 0.5 full-course equivalent each) in (i) biological bases of behaviour, (ii) cognitive-affective bases of behaviour, (iii) social bases of behaviour, and (iv) individual behaviour.

c) One senior undergraduate or one graduate course (3 units or 0.5 full-course equivalent each) in the historical and scientific foundations of general psychology.

All prerequisite coursework must be completed with a grade of "B-" or above.

d) If all of the prerequisite courses for admission have not been completed at the time of application, students who have up to 12 units (2.0 full-course equivalents) in deficiencies may still be admitted, but the prerequisite courses will need to be completed prior to the doctoral candidacy exam.

e) Curriculum Vitae.

f) Three references, including two academic references, one of which is normally from the former thesis advisor.

g) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar; "B" on Reading Comprehension & Proficiency; and "B" on Listening Comprehension & Oral Fluency.

Additional Requirements:

h) A concise rationale (500 words or less) for the application including statements about your research and professional interests in school psychology, your previous research experience and the research you would like to pursue in this degree, and specification of a prospective research supervisor from among current faculty.

i) A list of any academic awards, achievements, honours or other distinctions you have received. Itemize the monetary amount and the total.

j) A list of all publications and conference presentations you have on your résumé and specify whether the work was peer reviewed or non-peer reviewed.

k) Information about any financial support for your degree in the form of an award, sponsorship, or other. Please indicate the dollar amount and duration of the support, and when it is to start.

l) A list of any professional school psychology experience you have had (employment or volunteer). Please specify full-time or part-time and for how long. If part-time, please specify how many hours per week.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/school-applied-child-psychology-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies requirements, the degree program requires the following:

a) A minimum of 33 units (5.5 full-course equivalents) at the doctoral-level, including 21 units (3.5 full-course equivalents) of content courses and 12 units (2.0 full-course equivalents) of practicum courses.

Content Courses:

Educational Psychology 691, 731, 732, 760, 762, 763 and 764.

Practicum Courses:

9 units (1.5 full-course equivalents) from Educational Psychology 761 **and** Educational Psychology 766 (Educational Psychology 761 may be repeated for credit). Note section 6. **Police Information Check** below.

Internship Course:

Educational Psychology 798. Note section 6 **Police Information Check** below.

b) Candidacy requirements;

c) A twelve-month (min. 1600 hours) full-time internship; and

d) Dissertation.

A qualifying student is required to take additional courses within the doctoral program to ensure equivalent training. A qualifying student may take up to 12 units (2.0 full-course equivalents) to meet equivalency requirements during the qualifying year. Qualifying status will not be granted for a period exceeding one year.

Detailed information on core course requirements can be obtained from the Werklund School of Education, Graduate Programs in Education website werklund.ucalgary.ca/gpe.

First year students are assigned an interim advisor who will assist with course selection.

6. Additional Requirements

PhD students are expected to undertake clients from the Werklund School of Education Integrated Services in Education Clinic and mentor MSc students in the on-campus practicum courses under the guidance of a qualified professional.

Police Information Check

All successful applicants to the Werklund School of Education School and Applied Child Psychology program are required to provide a current Police Information Check which includes a Criminal Record Check and a Vulnerable Sector Search. All successful applicants will be also required to acknowledge the requirement for a Police Information Check by submitting a "Notice Regarding Requirement for Police Information Check" declaration form prior to the start of the program. Students who are not residents of Calgary must arrange for a Police Information Check through their nearest police service or RCMP detachment in the area where they reside. In order to be considered "current", the Police Information Check must be completed no earlier than June 30 and students will be required to request a new Police Information Check every 12 months. The original Police Information Check must be presented in person to the administration in the Graduate Program Office in the Werklund School of Education before the start of classes (September 1) and to the organization hosting the student on or before the first day of the practicum or internship course (Educational Psychology 761, 766, 798).

Students who are concerned about the presence of a criminal record should contact the police department to discuss the process for eliminating or erasing such a record.

A current Police Information Check is required for all third-party and University of Calgary practicum and internship placements. Failure to present a Police Information Check may result in the student being unable to complete their Practicum or Internship. Successful completion of both Practicum and Internship are required for graduation.

Students are obligated to inform the Faculty immediately of any change in the status of their criminal record.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

The Doctor of Philosophy degree is designed to be completed in four years. Maximum completion time allowed for the Doctor of Philosophy degree is six years.

9. Supervisory Assignments

Students are responsible for initiating discussions with potential permanent supervisors and are expected to have finalized supervisory arrangements by their second annual registration.

10. Required Examinations

Candidacy

Admission into Candidacy in the Werklund School of Education Graduate Programs: 1) requires that students have abilities to conceptualize, interpret, critique and synthesize comprehensive, substantive knowledge that is relevant to the discipline and practice of educational psychology; and 2) ensures that students have a well-developed plan for their dissertation research, a sound proposal with a well-developed research question and potential for the ability to pursue and complete original independent research at the doctoral level.

In compliance with the Faculty of Graduate Studies Candidacy Regulations, the requirements for Admission to Candidacy at the Werklund School of Education is a 4 stage process:

1. Completion of all course requirements as identified in the calendar;
2. Field of study (FoS) written candidacy examination;
3. A research proposal approved by the Supervisory Committee (recognizing changes may be made after successful completion of exams prior to submission for ethics approval);
4. An oral examination of the research proposal;
   All Candidacy requirements must be completed within 28 months of the start of the program.

For further information, please consult the Graduate Programs in Education website, werklund.ucalgary.ca/gpe/student-supervisor-relationships.

Thesis

The doctoral thesis is the focus of the degree program. In consultation with the supervisor, the student should formulate an appropriate thesis topic as early as possible in the program because the thesis proposal affects the choice and number of courses needed in order to complete the program.

Thesis Examination

In addition to the Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination
All members of the Supervisory Commit-

tee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee
The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Information on research proposals is available through the interim advisor/supervisor.

Ethics approval is required for all research projects involving the use of human subjects, before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss/.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships for September admission must submit their scholarship applications to the Graduate Programs in Education office by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Graduate Programs in Education also provides assistance for students through teaching assistantships, graduate research scholarships and other scholarships. Application forms and deadline information for these awards can be obtained from Graduate Programs in Education.

Counselling Psychology (MSc)

1. Degrees and Specializations Offered

Master of Science (MSc) in Educational Psychology with specialization in Counselling Psychology - on campus.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, entry requirements for the Counselling Psychology Master of Science program include:

a) A four-year undergraduate degree with a minimum grade point average of 3.00 over the courses taken during the last two years of study.

b) Normally, a minimum of 18 units (3.0 full-course equivalents) in Educational Psychology and/or Psychology. This must include:

i Two undergraduate statistics courses (Note: For those who completed a psychology degree at the University of Calgary, Psychology 312 acts as an equivalent);

ii A senior undergraduate psychology or educational psychology course in the area of Communication Skills in Guidance and Counselling, or its equivalent, Communication Skills – Interpersonal and Verbal Facilitation;

iii A senior undergraduate Psychology or Educational Psychology course in each of learning theory, developmental psychology, and personality theory.

c) A curriculum vitae and a concise rationale for the application (500 words or less).

d) Two academic references; one of which is from the undergraduate honours supervisor, if applicable.

e) One optional supplementary practice supervisor reference.

f) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 97 (Internet-based test) or a MELAB score of 83 or an IELTS score of 7.0 (Academic version). When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar; "B" on Reading Comprehension & Proficiency; and "B" on Listening Comprehension & Oral Fluency.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students webpage: ucalgary.ca/future-students/graduate/explore-programs/counselling-psychology-master-science-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies requirements, the MSc Counselling Psychology program requires the following:

a) Forty-eight units (8.0 full-course equivalents) from Educational Psychology at the 600 level, including 36 units (6.0 full-course equivalents) of content courses, 9 units (1.5 full-course equivalents) of practicum courses (500 hours of experience) and 3 units (0.5 full-course equivalent) of electives.

Content Courses:

Educational Psychology 609, 611 or 618, 614, 615, 617 or 682 (one of 682.01 or 682.02 or 682.03), 621, 623, 625, 627, 631, 641 or 643, 691.04 (1.5 units) and 691.06 (1.5 units)

Practicum Courses:

Educational Psychology 640, 695.06. Note section 6 **Police Information Check** below.

Elective Courses:

Educational Psychology 637, 639

b) A thesis.

Detailed information on core course requirements can be obtained from the Graduate Programs in Education website werklund.ucalgary.ca/gpe.

6. Additional Requirements

Police Information Check

All successful applicants to the Werklund School of Education Counselling Psychology program are required to provide a current Police Information Check which includes a Criminal Record Check and a Vulnerable Sector Search. All successful applicants will be also required to acknowledge the requirement for a Police Information Check by submitting a "Notice Regarding Requirement for Police Information Check" declaration form prior to the start of the program. Students who are not residents of Calgary must arrange for a Police Information Check through their nearest police service or RCMP detachment in the area where they reside. In order to be considered "current", the Police Information Check must be completed no earlier than June 30, and students will be required to request a new Police Information Check every 12 months. The original Police Information Check must be presented in person to the administration in the Graduate Program Office in the Werklund School of Education before the start of classes (September 1) and to the organization hosting the student on or before the first day of the practicum course (Educational Psychology 640, 695).

Students who are concerned about the presence of a criminal record should contact the police department to discuss the process for eliminating or erasing such a record.

A current Police Information Check is required for all third-party and University of Calgary practicum placements. Failure to present a Police Information Check may result in the student being unable to complete their Practicum. Successful completion of Practicum is required for graduation.

Students are obligated to inform the Faculty immediately of any change in status of their criminal record.

7. Credit for Undergraduate Courses

Graduate Programs in Education do not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

The Master of Science requires two years of full-time study to complete. Maximum time allowed for completion of the Master of Science degree is four years.

9. Supervisory Assignments

An interim advisor is assigned to each first-year student in a thesis-based program. Students are responsible for initiating discussions with potential permanent supervisors and are expected to have finalized supervisory arrangements by their second annual registration.

A supervisory committee, approved by the Graduate Program Director, is required for MSc students choosing the manuscript-based thesis route. Normally, the committee will consist of the supervisor and two members (see Academic Regulations – Supervision)

10. Required Examinations

Thesis Examination

In addition to the Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination
All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee
The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Information on research proposals is available through the interim advisor/supervisor.

Ethics approval is required for all research projects involving the use of human subjects, before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships for September admission must submit their scholarship applications to the Graduate Programs in Education by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Graduate Programs in Education also provides assistance for students through teaching assistantships, graduate research scholarships and other scholarships. Application forms and deadline information for these awards can be obtained from Graduate Programs in Education.

School and Applied Child Psychology (MSc)

1. Degrees and Specializations Offered

Master of Science (MSc) in Educational Psychology with specialization in School and Applied Child Psychology - on campus

2. Admission Requirements

In addition to Faculties of Graduate Studies and Education requirements, entry requirements include:

a) Honours degree in Psychology (or equivalent) is preferred; applicants with a degree in Psychology, previous experience in the Psychological field, and a grade point average of 3.00 (equivalent to a "B" or 70 per cent average) over the courses taken during the last two years of study will be considered.

b) Normally, a minimum of 18 units (3.0 full-course equivalents) in Educational Psychology or Psychology. This must include:

i. One undergraduate course in statistics
ii. One senior undergraduate Psychology or Educational Psychology course in each of (1) cognitive-affective bases of behaviour and (2) social bases of behavior.

All prerequisite coursework must be completed with a grade of "B-" or above.

c) Curriculum Vitae.

d) Two academic references, one of which is normally from the undergraduate honours supervisor, if applicable.

e) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code 0813. Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

Additional Requirements:

f) A short statement of intent (approximately 500 words) of your research and professional interest in school psychology (e.g., expected contribution to the field; understanding of school psychology) indicating your reasons for wanting to pursue graduate work in this degree.

g) A list of any academic awards, achievements, honours or other distinctions you have received. Itemize the monetary amount and the total.

h) A list of all publications and conference presentations you have on your résumé and specify whether the work was peer reviewed or non-peer reviewed.

i) Information about any financial support for your degree in the form of an award, sponsorship, or other. Please indicate the dollar amount and duration of the support, and when it is to start.

j) A list of any professional school psychology experience you have had (employment or volunteer). Please specify full-time or part-time and for how long. If part-time, please specify how many hours per week.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/school-applied-child-psychology-master-science-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Education requirements, the MSc SACP degree program requires the following:

a) Forty-two units (7.0 full-course equivalents) including a minimum of 400 practicum hours comprised of 36 units (6.0 full-course equivalents) of content courses and 6 units (1.0 full-course equivalent) of practicum courses.

Content Courses:

Educational Psychology 609, 614, 618, 651, 653, 654, 655, 659, 665, 669, 683, 685.

Practicum Courses:

Educational Psychology 662, 663. Note section 6 **Police Information Check** below.

b) A thesis.

6. Additional Requirements

Police Information Check

All successful applicants to the Werklund School of Education School and Applied Child Psychology program are required to provide a current Police Information Check which includes a Criminal Record Check and a Vulnerable Sector Search. All successful applicants will be also required to acknowledge the requirement for a Police Information Check by submitting a "Notice Regarding Requirement for Police Information Check" declaration form prior to the start of the program. Students who are not residents of Calgary must arrange for a Police Information Check through their nearest police service or RCMP detachment in the area where they reside. In order to be considered "current", the Police Information Check must be completed no earlier than June 30 and students will be required to request a new Police Information Check every 12 months. The original Police Information Check must be presented in person to the administration in the Graduate Program Office in the Werklund School of Education before the start of classes (September 1) and to the organization hosting the student on or before the first day of the practicum course (Educational Psychology 662, 663).

Students who are concerned about the presence of a criminal record should contact the police department to discuss the process for eliminating or erasing such a record.

A current Police Information Check is required for all third-party and University of Calgary practicum placements. Failure to present a Police Information Check may result in the student being unable to complete their Practicum. Successful completion of Practicum is required for graduation.

Students are obligated to inform the Faculty immediately of any change in status of their criminal record.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

The Master of Science requires two years of full-time study to complete. Maximum completion time is four years.

9. Supervisory Assignments

An interim advisor is assigned to each first-year student in a thesis-based program. Students are responsible for initiating discussions with potential permanent supervisors and are expected to have finalized supervisory arrangements by their second annual registration.

A supervisory committee, approved by the Graduate Program Director, is required for MSc students choosing the manuscript based thesis route. Normally, the committee will consist of the supervisor and two members (see Academic Regulations - Supervision).

10. Required Examinations

Thesis Examination

In addition to the Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination
All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee
The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Information on research proposals is available through the interim advisor/supervisor.

Ethics approval is required for all research projects involving the use of human subjects, before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships for September admission must submit their scholarship applications to the Graduate Programs in Education by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Graduate Programs in Education also provides assistance for students through teaching assistantships, graduate research scholarships and other scholarships. Application forms and deadline information for these awards can be obtained from Graduate Programs in Education.

Counselling Psychology (MEd)

1. Degrees and Specializations Offered

Master of Education (MEd) with specialization in Counselling Psychology - on campus

Please note that Graduate Programs in Education is not admitting students to the MEd with specialization in Counselling Psychology this year.

Counselling Psychology (MC)

1. Degrees and Specializations Offered

Master of Counselling (MC) with specialization in Counselling Psychology - blended delivery: online and blended courses with some face-to-face/on-campus meeting times at the University of Calgary main campus.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, entry requirements include:

a) A minimum of 9 units (1.5 full-course equivalents) in Psychology or Educational Psychology, including one course each in human development and learning. In addition, applicants are required to have a senior undergraduate Psychology or Educational Psychology course in the area of Communication Skills in Guidance and Counselling, or its equivalent, Communication Skills – Interpersonal and Verbal Facilitation. All prerequisite coursework must be completed with a grade of "B-" or above.

b) A curriculum vitae and a concise rationale for the application (500 words or less).

c) Two references; either academic or practice supervisor.

d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

e) Paid employment or volunteer work in counselling-related and research-related roles will be an asset.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/counselling-psychology-master-counselling-course-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies requirements, the MC Counselling Psychology program requires the following:

A total of 45 units (7.5 full-course equivalents), from which 39 units (6.5 full-course equivalents) are content and 6 units (1.0 full-course equivalent) are practicum courses.

Content Courses:

Educational Psychology 602, 604, 610, 616, 622, 624, 626, 630, 638, 646, 648, 664, 670.

Practicum Courses:

Educational Psychology 642, 644. Note section 6 **Police Information Check** below.

Detailed information on course requirements can be obtained from Graduate Programs in Education website: werklund.ucalgary.ca/gpe/programs/master-counselling-mc.

6. Additional Requirements

Applicants to the Master of Counselling should have reasonable computer literacy as portions of the program are delivered online. Additionally, students are expected to have access to the necessary hardware and a stable internet connection to fully participate in online portions of the program.

Police Information Check

All successful applicants to the Werklund School of Education Master of Counselling program are required to provide a current Police Information Check which includes a Criminal Record Check and a Vulnerable Sector Search. All successful applicants will be also required to acknowledge the requirement for a Police Information Check by submitting a "Notice Regarding Requirement for Police Information Check" declaration form prior to the start of the program. Students who are not residents of Calgary must arrange for a Police Information Check through their nearest police service or RCMP detachment in the area where they reside. In order to be considered "current", the Police Information Check must be completed within two months of the student's

first time on campus. The official Police Information Check must be presented in person to the Graduate Program Office during summer residency, and to the organization hosting the student prior to the first day of the practicum (Educational Psychology 642, 644).

Students will be required to request a new Police Information Check every 12 months.

Students who are concerned about the presence of a criminal record should contact the police department to discuss the process for eliminating or erasing such a record.

A current Police Information Check is required for all third-party and University of Calgary practicum placements. Failure to present a Police Information Check may result in the student being unable to complete their Practicum. Successful completion of Practicum is required for graduation.

Students are obligated to inform the Faculty immediately of any change in status of their criminal record.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

The Master of Counselling can be completed in three years of full-time study, but students may take up to six years to complete the degree on a part-time basis.

9. Supervisory Assignments

The Academic Program Co-ordinator serves as students' academic advisor.

10. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships for September admission must submit their scholarship applications to the Graduate Programs in Education office by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

School and Applied Child Psychology (MEd)

1. Degrees and Specializations Offered

Master of Education (MEd) with specialization in School and Applied Child Psychology (SACP) – blended delivery: online and blended courses with some face-to-face/ on-campus meeting times at the University of Calgary main campus.

Applicants considering the field of school psychology should keep in mind that a master's degree is only the first step to obtaining the credentials necessary for professional practice. To practice, graduates register with the regulatory body in their own jurisdiction (i.e. province, state, or territory). Registration is a process independent from completing the MEd program. The registration options available differ depending on: a) the jurisdiction in which graduates reside, b) the level of education required for registration, and c) the regulatory body with which they register. Students are encouraged to review the registration requirements in their own jurisdiction prior to enrolling in the program.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, entry requirements include:

a) A completed bachelor's degree in Education or Psychology with a grade point average of 3.00 (equivalent to a "B" or 70 per cent in many universities) over the courses taken during the last two years of study.

b) A minimum of 30 units (5.0 full-course equivalents) completed in psychology is required prior to application. All prerequisite coursework must be completed with a grade of "B-" or above.

c) A curriculum vitae and a concise rationale for the application (500 words or less).

d) Two letters of reference.

e) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/school-applied-child-psychology-master-education-course-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies requirements, the MEd SACP program requires a total of 51 units (8.5 full-course equivalents), inclusive of a minimum of 400 practicum hours and a 1200-hour internship:

a) SACP specialization courses: Educational Psychology 614, one of Educational Psychology 650 or 688, Educational Psychology 652, 653, 654, 681, 687, 689, 690, 696.

b) Practicum courses: Educational Psychology 676, 697. Note section 6 **Police Information Check** below.

c) Two required research courses: Educational Psychology 612.01, 612.04.

d) Final Project Portfolio: Educational Psychology 684 is the students' capstone course and is evaluated as an exit portfolio. Educational Psychology 684 must be taken as the final course (or concurrently with final courses) prior to the internship.

e) Internship: Educational Psychology 698 – equivalent to 6 units (1.0 full-course equivalent). Note section 6. **Police Information Check** below.

Detailed information on core course requirements can be obtained from Graduate Programs in Education website werklund.ucalgary.ca/gpe/programs/master-education-school-amp-applied-child-psychology.

6. Additional Requirements

Applicants to the Master of Education in School and Applied Child Psychology should have reasonable computer literacy as portions of the programs are delivered online.

Police Information Check

All successful applicants to the Werklund School of Education School and Applied Child Psychology program are required to provide a current Police Information Check which includes a Criminal Record Check and a Vulnerable Sector Search. All successful applicants will also be required to acknowledge the requirement for a Police Information Check by submitting a "Notice Regarding Requirement for Police Information Check" declaration form prior to the start of the program. Students who are not residents of Calgary must arrange for a Police Information Check through their nearest police service or RCMP detachment in the area where they reside. In order to be considered "current", the Police Information Check must be completed no earlier than April 30 and students will be required to request a new Police Information Check every 12 months. The original Police Information Check must be presented in person to the administration in the Graduate Program Office in the Werklund School of Education during the first summer residency and to the organization hosting the student on or before the first day of the practicum or internship (Educational Psychology 676, 697, 698).

Students who are concerned about the presence of a criminal record should contact the police department to discuss the process for eliminating or erasing such a record.

A current Police Information Check is required for all third-party and University of Calgary practicum placements. Failure to present a Police Information Check may result in the student being unable to complete their Practicum. Successful completion of Practicum is required for graduation.

Students are obligated to inform the Faculty immediately of any change in status of their criminal record.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

The Master of Education School and Applied Child Psychology program can be completed in three years of full-time study but students may take up to six years to complete the degree on a part-time basis.

9. Supervisory Assignments

The Academic Program Co-ordinator serves as students' academic advisor.

10. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships for September admission must submit their scholarship applications to the Graduate Programs in Education office by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Educational Research (EDER)

Contact Information

Location: Education Tower, Room 114

Program number: 403.220.5675

Toll free in Canada 877.623.0292

Fax: 403.282.3005

Email address: gpe@ucalgary.ca

Web page URL: werklund.ucalgary.ca/gpe

1. Degrees and Specializations Offered

Degrees Offered

Graduate Programs in Education offers Doctor of Philosophy (PhD), Doctor of Education (EdD), Master of Arts (MA), Master of Science (MSc), and Master of Education (MEd) degrees in Educational Research in six areas of specialization as noted below. The Doctor of Philosophy degree program is normally intended to prepare scholars for careers in research and teaching. The Doctor of Education degree program is normally intended for practicing professionals in education-related situations. The Master of Arts and Master of Science are equivalent thesis-based research degrees that prepare students for further research. The Master of Education is a course-based professional degree intended to enhance the professional practice of the student.

Specializations Offered

Adult Learning

This specialization is informed by a rich heritage rooted in a commitment to human, community and social development. As a hub of interdisciplinary research, the focus of graduate studies within this Specialization is on adult learning and adult education. Our graduate students come from multiple and diverse contexts and interest areas which include: post-secondary and continuing education; business and industry; NGOs; community development and international organizations. (PhD, EdD, MA, MEd)

Research interests of faculty members can be found at: werklund.ucalgary.ca/gpe/adult-learning-faculty-members.

Curriculum and Learning

This specialization offers graduate students the opportunity to understand how critical approaches to curriculum and theories of learning provide meaningful ways of thinking about schooling, knowledge, teaching, learning, research, and the nature of pedagogical relationships. Curriculum and Learning encompasses issues of content, context, and teaching in both formal and non-formal educational settings. Students explore contemporary themes in curriculum and learning, including issues related to power, culture, affect, democracy, ecology transnationalism, gender and sexuality, indigenous education and social justice. Students may examine these themes from social, cultural, historical, political, discursive, ecological and other interpretive perspectives. (PhD, EdD, MA, MSc, MEd)

Research interests of faculty members can be found at: werklund.ucalgary.ca/gpe/curriculum-and-learning-faculty-members.

Interdisciplinary Studies

This specialization is informed by an academic shift from a generalist notion of interdisciplinarity, in which a single individual is expected to have a mastery of a range of domains, towards one understood in terms of teams of specialists with varied but compatible and complementary expertise. Upon becoming familiar in two Specialization topic areas, this Specialization area provides graduate students with competencies to connect and integrate these topic areas. (MEd)

Language and Literacy

Language and Literacy prepares students to understand and conduct research on various dimensions of literacy, linguistic and cultural diversity, especially as they relate to the acquisition, use, teaching, and learning of languages, multiliteracies (multiple meaning-making systems, including print, visual, oral, audiovisual, and gestural texts), and new literacies and digital media. This program is open to applicants from a broad array of regions/countries, It will be of interest to prospective educators and researchers in the areas of literacy, English as an additional language (EAL) or second language (ESL), bilingual education, teaching and learning French as first and second language and other languages, including Aboriginal languages, Spanish, Mandarin, Japanese, German. (PhD, EdD, MA, MEd)

Research interests of faculty members can be found at: werklund.ucalgary.ca/gpe/languages-and-diversity-faculty-members.

Leadership

This specialization prepares researchers and practitioners for the analysis and resolution of issues and problems related to educational policy and leadership specifically related to: the direction and management of schools; school systems; post-secondary institutions; and both governmental bodies and non-governmental organizations concerned with public and private education. Graduates in this specialization will be well-placed to pursue academic, administrative and research-related careers with an understanding of organizational change in the field of educational leadership and policy. (PhD, EdD, MA, MEd)

Research interests of faculty members can be found at: werklund.ucalgary.ca/gpe/leadership-faculty-members.

Learning Sciences

As our theories about knowledge change in concert with rapid advancements in the learning sciences, graduate students in learning sciences need to consider the cultural, social, political and economic implications for learners and for learning in diverse contexts. Studies in learning sciences seek to balance the practice of education and research in education as a hands-on, minds-on discipline that emphasizes knowing and doing. Our graduate programs provide active learning and mentoring opportunities that engage students with both the cognitive and technological tools of their discipline. Graduate students will develop in-depth competency in educational research methods, comprehensive understanding of the learning sciences field and its research methods, and be able to propose, design and carry out supervised research and inquiry in the field of learning sciences. (PhD, EdD, MA, MEd)

Research interests of faculty members can be found at: werklund.ucalgary.ca/gpe/learning-sciences-faculty-members.

Online Graduate Programs

Graduate Programs in Education offers online graduate programs via the web and other multi-media components to local, regional, national, and international communities. Programs include the thesis-based Doctor of Education (EdD), course-based Master of Education (MEd), Graduate Diploma and Graduate Certificate. Topics within each of these are offered in direct response to the needs of working professionals in a variety of settings including administrators, program directors, and deans in colleges and institutes of technology.

Contact: gpe@ucalgary.ca or 403.220.5675 or toll free in Canada (877) 623-0292.

Doctor of Philosophy (PhD)

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD) in Educational Research – on campus

Please note: This degree requires a two year residency. Students must be available during the day to attend research seminars, courses, and to perform teaching and research related duties at the university campus for the first two years of their program.

2. Admission Requirements

In addition to the Faculty of Graduate Studies admission requirements, Graduate Programs in Education requires:

a) A thesis-based master's degree in an appropriate field. Outstanding applicants holding master's degrees without thesis may be considered.

b) A minimum grade point average of 3.50 on a four-point scale in a master's degree program.

c) A written statement indicating the applicant's reasons for wishing to pursue a graduate program.

d) Where appropriate, candidates will be expected to have, or to obtain, relevant practical experience in their area of specialization.

e) For applicants required to prove proficiency in English, a TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

f) Two reference letters.

Admission Portfolio

Applicants to the Doctor of Philosophy program are encouraged to submit an Admission Portfolio containing examples of their work. The purpose of the Admission Portfolio is to give applicants the opportunity to provide additional documentation that demonstrates their suitability and qualification for doctoral studies. The Admission Portfolio is particularly relevant for program applicants who do not hold a thesis-based master's degree.

The Doctoral Admission Portfolio may contain the following:

a) Thesis (if applicable).

b) Reports.

c) Research grants or scholarships.

d) Articles.

e) Curriculum documents.

f) Non-print materials, (e.g. multimedia).

g) Evidence of relevant prior learning (see below).

h) Personal statement documenting research skills and interests.

The Doctoral Admission Portfolio must include a Table of Contents and an Executive Summary that outlines the contents of the Portfolio.

Relevant Prior Learning Considerations

In exceptional circumstances, individuals who do not meet formal academic requirements but who have significant life achievements may be considered for admission to the program. The candidates must provide Graduate Programs in Education with evidence demonstrating a potential to undertake successfully the proposed program of studies. Such candidates are advised to make early contact with Graduate Programs in Education, and supply additional supporting documents as part of their application package, such as:

a) Evidence of personal continuing education/training.

b) Results in these continuing education efforts.

c) Experience in a field related to the aspired degree.

d) Evidence of successful management of people, resources, finances, situations.

e) Increasing or varying responsible positions in organizations related to the aspired degree.

f) Work-related products, e.g. reports, programs of learning or training, handbooks, videos, manuals, workshops, seminars.

g) Evidence of personal growth in knowledge, understanding, management skills, and intellectual resources.

h) Evidence of innovation.

i) Evidence of leadership or co-ordination responsibilities.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/educational-research-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit request as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma, or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the requirements of the Faculty of Graduate Studies, Graduate Programs in Education requires that students be available on campus for the first two years of their program.

a) Educational Research 700;

b) Additional nine units (1.5 full-course equivalents) of 600- or 700-level courses in research methods;

c) Additional graduate courses or seminars as required by the student's specialization (see below);

- Adult Learning requires six units (1.0 full-course equivalent) selected from Educational Research 735 and any additional courses as determined by the supervisor in consultation with the student.
- Curriculum and Learning requires Educational Research 780, and six units (1 full-course equivalent) selected from Educational Research 783, 786 or 787.
- Language and Literacy requires nine units (1.5 full-course equivalents) selected from Educational Research 764.
- Leadership requires nine units (1.5 full-course equivalents) including Educational Research 705 and six units (1.0 full-course equivalent) from 700- courses in any Educational Research specialization
- Learning Sciences requires nine units (1.5 full-course equivalents) in Educational Research at the 700 level from the Learning Sciences specialization.

d) Candidacy requirements;

e) Dissertation.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

Expected completion time for full-time students is four years with a maximum completion time of six years.

9. Supervisory Assignments

A supervisor is normally appointed at the time of admission.

10. Required Examinations

Candidacy

Admission into Candidacy in the Werklund School of Education Graduate Programs: 1) requires that students have abilities to conceptualize, interpret, critique and synthesize comprehensive, substantive knowledge that is relevant to the discipline and practice of educational research; and 2) ensures that students have a well-developed plan for their dissertation research, a sound proposal with a well-developed research question, and appropriate methodology that demonstrates the ability to pursue and complete original independent research at the doctoral level.

In compliance with the Faculty of Graduate Studies Candidacy Regulations, the requirements for Admission to Candidacy at the Werklund School of Education is a 4-stage process:

1. Completion of all course requirements as identified in the calendar;
2. Field of study (FoS) written candidacy examination;
3. A research proposal approved by the Supervisory Committee (recognizing changes may be made after successful completion of exams prior to submission for ethics approval);
4. An oral examination of the research proposal;

All Candidacy requirements must be completed within 28 months of the start of the program.

For further information, please consult the Graduate Programs in Education website, werklund.ucalgary.ca/gpe/student-supervisor-relationships.

Thesis

The Doctoral thesis is the focus of the degree program. In consultation with the

supervisor, the student should formulate an appropriate thesis topic as early as possible in the program because the thesis proposal affects the choice and number of courses needed in order to complete the program.

Thesis Examination
In addition to the Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination
All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee
The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Information on research proposals is available through the interim advisor/supervisor.

Ethics approval is required for all research projects involving the use of human subjects, before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Students applying for scholarships must submit their applications to Graduate Program in Education by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Doctor of Education (EdD)

1. Degrees and Specializations Offered

Doctor of Education (EdD) – blended delivery: online and blended courses with some face-to-face/on-campus meeting times at the University of Calgary main campus.

2. Admission Requirements

In addition to the Faculty of Graduate Studies admission requirements, Graduate Programs in Education requires:

a) A course or thesis-based master's degree in an appropriate field.

b) A minimum grade point average of 3.50 on a four-point scale in a master's degree program.

c) A written statement indicating the applicant's reasons for wishing to pursue a graduate program.

d) Candidates will be expected to have, or obtain, relevant practical experience in their area of specialization.

e) For applicants required to prove proficiency in English, a TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

f) Two reference letters.

Admission Portfolio

Applicants to the Doctor of Education program are encouraged to submit an Admission Portfolio containing examples of their work. The purpose of the Admission Portfolio is to give applicants the opportunity to provide additional documentation that demonstrates their suitability and qualification for doctoral studies. The Admission Portfolio is particularly relevant for program applicants who do not hold a thesis-based master's degree.

The Doctoral Admission Portfolio may contain the following:

a) Thesis (if applicable).

b) Reports.

c) Research grants or scholarships.

d) Articles.

e) Curriculum documents.

f) Non-print materials, e.g., multimedia.

g) Evidence of relevant prior learning (see below).

h) Personal statement documenting research and professional skills and interests.

The Doctoral Admission Portfolios must include a Table of Contents and an Executive Summary that outlines the contents of the Portfolio.

Relevant Prior Learning Considerations

In exceptional circumstances, individuals who do not meet formal academic requirements but who have significant life achievements may be considered for admission to the program. The candidates must provide Graduate Programs in Education with evidence demonstrating a potential to undertake successfully the proposed program of studies. Such candidates are advised to make early contact with Graduate Programs in Education, and supply additional supporting documents as part of their application package, such as:

a) Evidence of personal continuing education/training.

b) Results in these continuing education efforts.

c) Experience in a field related to the aspired degree.

d) Evidence of successful management of people, resources, finances, situations.

e) Increasing or varying responsible positions in organizations related to the aspired degree.

f) Work-related products, e.g. reports, programs of learning or training, handbooks, videos, manuals, workshops, seminars.

g) Evidence of personal growth in knowledge, understanding, management skills, and intellectual resources.

h) Evidence of innovation.

i) Evidence of leadership or co-ordination responsibilities.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/educational-research-doctor-education-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma, or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

The EdD is a three-year cohort-based program consisting of:

a) Course work;

Year 1 is designed primarily to develop students' competencies as critical consumers of educational research, and skills to conduct practitioner-inquiry. As outlined within the program to which the student has applied, first year students must complete:

i. Six units (1.0 full-course equivalent) in research: Participatory Methodology in Education (Educational Research 701.09), and either Design-Based Research (Educational Research 701.07) or Action Research (Educational Research 701.08).
ii. Six units (1.0 full-course equivalent) in the Specialization area to which the student has applied.

Year 2 is designed to engage students in an in-depth analysis of an identified problem of practice through diverse academic disciplines (e.g., leadership, adult learning, etc.). Specialization coursework exposes students to context specific best practices and cutting edge research and emphasizes the application of theory and research to practice within collaboratories of practice. As outlined within the program to which the student has applied, students must complete:

i. Six units (1.0 full-course equivalent) in the Specialization area.
ii. Six units (1.0 full-course equivalent) in Specialization's Collaboratory of Practice (Educational Research 707 and 708).

b) Candidacy examination. For more information, see section 10 below or visit the Graduate Programs in Educa-

tion website, werklund.ucalgary.ca/gpe/student-supervisor-relationships.

Year 3 is designed to support students in synthesizing their Year 2 inquiry projects into a dissertation. Students work collaboratively with faculty and practitioners from their field to complete a dissertation that addresses a contemporary issue in education. As outlined within the program to which the student has applied, students must complete:
Dissertation Seminar I,
Dissertation Seminar II, and

c) Doctoral dissertation.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

Expected completion for students in the EdD program is three years with a maximum completion time of six years.

9. Supervisory Assignments

A supervisor is normally appointed at the time of admission.

10. Required Examinations

Candidacy

Admission into Candidacy in the Werklund School of Education Graduate Programs: 1) requires that students have abilities to conceptualize, interpret, critique and synthesize comprehensive, substantive knowledge that is relevant to the discipline and practice of educational research; and 2) ensures that students have a well-developed plan for their dissertation research, a sound proposal with a well-developed research question and appropriate methodology that demonstrates the ability to pursue and complete original independent research at the doctoral level.

In compliance with the Faculty of Graduate Studies Candidacy Regulations, the requirements for Admission to Candidacy at the Werklund School of Education is a 4 stage process:

1. Completion of all course requirements as identified in the calendar;
2. Field of study (FoS) written candidacy examination (EdD portfolio);
3. A research proposal approved by the Supervisory Committee (recognizing changes may be made after successful completion of exams prior to submission for ethics approval);
4. An oral examination of the research proposal;

All Candidacy requirements must be completed within 28 months of the start of the program.

For further information, please consult the Graduate Programs in Education website, werklund.ucalgary.ca/gpe/student-supervisor-relationships.

Thesis

The doctoral thesis is the focus of the degree program. In consultation with the supervisor, the student will undertake a thematic or field-based thesis (see course descriptions for further information).

Thesis Examination

In addition to the Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination
All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee
The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

The Research Proposal will be approved by the supervisory committee and then examined as part of the candidacy process.

Ethics approval is required for all research projects involving the use of human subjects, before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to Graduate Programs in Education by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Master of Arts or Master of Science (MA/MSc)

1. Degrees and Specializations Offered

Master of Arts or Master of Science in Educational Research – on campus

Please note: This degree requires a one year residency. Students must be available during the day for research seminars, courses and research related duties for the first year of their program.

2. Admission Requirements

In addition to the Faculty of Graduate Studies admission requirements, Graduate Programs in Education requires:

a) A written statement indicating the applicant's reasons for wishing to pursue a graduate program.

b) For students required to prove proficiency in English, a TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

c) Two reference letters.

d) Admission to the Learning Sciences specialization requires a 3.50 GPA.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/educational-research-master-arts-thesis-based.

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/educational-research-master-science-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma, or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the requirements of the Faculty of Graduate Studies, Graduate Programs in Education requires students to be available on campus for the first year of their program.

a) Six units (1.0 full-course equivalent) 600-level courses in research methods, one of which must be Educational Research 603.26;

b) Additional graduate courses or seminars as required by specializations as follows:

- Adult Learning – 12 units (2.0 full-course equivalents) from Educational Research 635 and any additional courses as determined by the supervisor in consultation with the student.
- Curriculum and Learning – 9 units (1.5 full-course equivalents) in Educational Research as follows:
  - Educational Research 682;
  - Educational Research 684;
  - 3 units as determined by the supervisor in consultation with the student.
- Language and Literacy – 9 units (1.5 full-course equivalents) from Educational Research 664 and any additional courses as determined by the supervisor in consultation with the student.
- Leadership - 12 units (2.0 full-course equivalents) from Educational Research 619 and any additional courses as deter-

mined by the supervisor in consultation with the student.

- Learning Sciences – 12 units (2.0 full-course equivalents) selected from the Learning Sciences course offerings and any additional courses as determined by the supervisor in consultation with the student.

c) Thesis.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

Expected completion time for full-time students is two years in thesis-based master's programs. Maximum completion time is four years for thesis-based master's programs.

9. Supervisory Assignments

A supervisor is normally appointed at the time of admission.

A supervisory committee, approved by the Graduate Program Director, is required for MA or MSc students choosing the manuscript-based thesis route. Normally, the committee will consist of the supervisor and two members (see Academic Regulations - Supervision).

10. Required Examinations

Thesis Examination

In addition to the Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Information on research proposals is available through the supervisor.

Ethics approval is required for all research projects involving the use of human subjects before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the Graduate Programs in Education by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Master of Education (MEd)

There are two distinct routes toward the Master of Education (MEd) degree: 1) Master of Education: Specialist route and 2) Master of Education: Interdisciplinary route.

Master of Education: Specialist Route

1. Degrees and Specializations Offered

Master of Education: Specialist Route

The MEd, Specialist Route, is a course-based degree program which provides students with a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of their academic discipline, field of study or area of professional practice in one specialization area.

For current specialization areas being offered and program delivery format, please consult the website werklund.ucalgary.ca/gpe/med-specialist.

2. Admission Requirements

In addition to the Faculty of Graduate Studies admission requirements, Graduate Programs in Education requires:

a) A University of Calgary four-year baccalaureate degree or an equivalent degree from a recognized institution. Degrees and grades from foreign institutions are evaluated for their equivalency to those of the University of Calgary.

b) A minimum GPA of 3.00 (on the University of Calgary four-point system). This is based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

c) A written statement indicating the applicant's reasons for pursuing a graduate program in Graduate Programs in Education.

d) Candidates will be expected to have a minimum of two years of teaching experience OR alternative professional experience.

e) For students required to prove proficiency in English, a TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83 is required. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

f) Two reference letters.

Relevant Prior Learning Considerations

In exceptional circumstances, individuals who do not meet formal academic requirements but who have significant life achievements may be considered for admission to the program. The candidates must provide the relevant graduate program with evidence demonstrating a potential to undertake successfully the proposed program of studies. Such candidates are advised to make early contact with Graduate Programs in Education, and supply additional supporting documents as part of their application package, such as:

a) Evidence of personal continuing education/training.

b) Results in these continuing education efforts.

c) Experience in a field related to the aspired degree.

d) Evidence of successful management of people, resources, finances, situations.

e) Increasing or varying responsible positions in organizations related to the aspired degree.

f) Work-related products, e.g. reports, programs of learning or training, handbooks, videos, manuals, workshops, seminars.

g) Evidence of personal growth in knowledge, understanding, management skills, and intellectual resources.

h) Evidence of innovation.

i) Evidence of leadership or co-ordination responsibilities.

3. Application Deadline

The deadline for submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/educational-research-master-education-specialist-course-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma, or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

The MEd Specialist route is a two or three-year, cohort-based, course-based program.

a) A minimum of three research courses consisting of: Educational Research 603.21, 603.24, and 603.23; and

b) Twenty-seven units (4.5 full-course equivalents) as outlined in the student's area of Specialization.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

Expected completion time is two or three years, per admission cohort. Maximum completion time is six years for a course-based master's program. Students taking more than three years to complete the twelve courses within a topic area will be required to pay continuing fees.

9. Supervisory Assignments

An academic advisor is assigned to students in the course-based Master of Education program.

10. Required Examinations

None.

11. Research Proposal Requirements

Information on course-based research is available through the Academic Co-ordinator.

Ethics approval is required for all research projects involving the use of human subjects before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to Graduate Programs in Education by he posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Master of Education: Interdisciplinary Route

1. Degrees and Specializations Offered

Master of Education: Interdisciplinary Route

Graduate Certificate, Graduate Diploma, Master of Education (CCDP)

For current topic areas and program delivery format, please consult the website werklund.ucalgary.ca/gpe.

This degree consists of a three-stage laddering structure: Graduate Certificate, Graduate Diploma, and the Master of Education. That is, it may be possible for students to "ladder" with full academic and fee credit from a 12 unit (2.0 full-course equivalents) Graduate Certificate into a Graduate Diploma requiring an additional 12 units (2.0 full-course equivalents), and from there into a Master of Education program requiring another 12 units (2.0 full-course equivalents). A direct entry into a 24 unit (4.0 full-course equivalents) Graduate Diploma may be possible with the approval of Graduate Programs in Education.

2. Admission Requirements

In addition to the Faculty of Graduate Studies admission requirements, the Office of Graduate Programs in Education requires:

a) A University of Calgary four-year baccalaureate degree or an equivalent degree from a recognized institution. Degrees and grades from foreign institutions are evaluated for their equivalency to those of the University of Calgary.

b) A minimum GPA of 3.00 (on the University of Calgary four-point system). This is based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

c) For students required to prove proficiency in English, a TOEFL score of 97 (Internet-based test), an IELTS score of 7.0 (Academic version), or a MELAB score of 83 is required. The test must have been taken within the last two years. When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code **0813.** Proficiency may also be met by completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

3. Application Deadline

Application deadline is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/educational-research-master-education-interdisciplinary-course-based.

Students following the MEd Interdisciplinary laddered structure route must apply at each stage; first, to the Graduate Certificate, then to the Graduate Diploma and finally to the MEd, within 5 years between each stage.

4. Advanced Credit

The applicant must make advanced credit requests as part of the application process. Credit will not be given for course work taken as part of another completed degree/diploma, or for courses taken to bring grade point average to a required level for admission.

5. Program/Course Requirements

Topics for the Graduate Certificate and Graduate Diploma courses are designed in response to the professional community and therefore change year to year. For topics being offered for Graduate Certificates and Graduate Diplomas, please consult the Graduate Programs in Education website werklund.ucalgary.ca/gpe/med-interdisciplinary.

The final year of the Interdisciplinary MEd is a prescribed one-year course-based program consisting of:

a) Nine units (1.5 full-course equivalents) in research, consisting of: Educational Research 603.21, 603.24, and 603.23; and

b) Three units (0.5 full-course equivalents), Educational Research 692.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Graduate Programs in Education does not normally accept undergraduate courses for credit toward graduate degrees.

8. Time Limit

The expected completion time is one year for each of the program components in the laddering structure to a maximum of two years for the Graduate Certificate, Graduate Diploma and Master of Education. Students taking more than one year to complete the four courses within a topic area will be required to pay continuing fees.

9. Supervisory Assignments

An academic advisor is assigned to students in the course-based Master of Education program.

10. Required Examinations

None.

11. Research Proposal Requirements

Information on course-based research is available through the Academic Co-ordinator.

Ethics approval is required for all research projects involving the use of human subjects before data collection begins. In order to submit an ethics application, students are required to complete the TCPS2 tutorial and upload the certificate of completion into their Researcher Profile in IRISS. Register on the TCPS2 website at tcps2core.ca/register.

To initiate the ethics approval process, the student, in consultation with the supervisor, must submit an application to either the Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board. Applications to the CFREB or CHREB are created and submitted online using IRISS ucalgary.ca/iriss.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to Graduate Programs in Education by the posted deadline dates for individual awards as noted at werklund.ucalgary.ca/gpe/graduate-programs-education-award-opportunities.

Graduate Certificate: Bridge to Teaching

Graduate Programs in Education offers a Graduate Certificate: Bridge to Teaching for foreign-trained, experienced teachers who

require additional advanced course credits in order to teach in K-12 schools in Alberta. Bridge to Teaching is a full-time program with 18 graduate course credits in education, including practicum. All courses need to be taken in a prescribed sequence, over one school year (September to April). For additional information please consult: werklund.ucalgary.ca/gpe.

1. Admission Requirements

Requirements for admission to the Bridge to Teaching Certificate include:

a) A four-year baccalaureate degree in Education or an equivalent degree from a recognized institution, with a grade point average of at least 3.00 or equivalent. See the Faculty of Graduate Studies' International Admission Requirements webpage at ucalgary.ca/future-students/graduate/international for specific country requirements.

b) A letter from an evaluator at Alberta Education's Teaching Excellence and Certification. For further information, go to education.alberta.ca/teaching-in-alberta-what-you-need-to-know/teacher-certification/everyone/teacher-certification/.

c) Language Proficiency Requirement:

i. An overall score of 98 with a minimum score of 27 in the speaking component on TOEFL (Internet-based Test). Note: When requesting that official TOEFL test scores are forwarded to the University of Calgary, please indicate institution code 0813.

OR

ii. A minimum overall band average of 7.0 on the International English Language Test System (Academic version);

OR

iii. Completion of Tier III of the International Foundations Program (IFP) with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

d) One official transcript from all post-secondary institutions attended.

e) A written 300-word statement of intent that includes answers to the following questions:

- Please identify your reasons for applying to the Bridge to Teaching program.
- In what way is this program related to your desired career path or employment objectives?

f) Two references – References are submitted directly through the online application system.

g) A successful interview with the Program Co-ordinator for Bridge to Teaching.

Note: Completion of the International Foundations Program is highly recommended prior to program start (see werklund.ucalgary.ca/ifp for more information).

2. Application Deadline

Application deadlines are available on the Future Students webpage at: ucalgary.ca/future-students/graduate/explore-programs/bridge-teaching-certificate-course-based.

3. Program Requirements

A total of 18 course credits including 10 weeks of practicum.

Required Courses:

Semester 1

Educational Research 696.01

Educational Research 696.02

Educational Research 696.03

Semester 2

Educational Research 696.04

Educational Research 696.05

Educational Research 696.06

Notes:

- Failure to attend the term to which a student has been admitted will result in the admission being rescinded.
- Failure to successfully complete the practicum component will result in withdrawal from the program.

General Notes:

- Completion of the Bridge to Teaching Certificate may not fulfill the requirements for teacher certification in Alberta.
- The Bridge to Teaching courses are recognized by the Teaching Excellence and Certification Branch of Alberta Education as fulfilling the requirements for 18 credits in Education coursework at the advanced level, and 10 weeks of supervised student teaching placement (practicum) in an Alberta classroom.

4. Additional Requirements

Police Information Check

All successful applicants to the Werklund School of Education are required to provide a current Police Information Check which includes a Criminal Record Check and a Vulnerable Sector Search. Students who are not residents of Calgary must arrange for a Police Information Check through their nearest police service or RCMP detachment in the area where they reside. In order to be considered "current", the Police Information Check must be completed no earlier than June 30, and students will be required to request a new Police Information Check every 12 months. The original Police Information Check must be presented in person to the administration in the Graduate Programs in Education Office in the Werklund School of Education before the start of classes and to the partner school administration on the first day of Field Experience Practicum (Educational Research 696.03, 696.06).

Students who are concerned about the presence of a criminal record should contact the police department to discuss the process for eliminating or erasing such a record.

Police Information Check is required for all third-party practicum placements. Failure to present a clear Police Information Check may result in the student being unable to complete their Field Experience Practicum.

Successful completion of Field Experience Practicum is required for graduation.

Students are obligated to inform the Faculty immediately of any change in status of their criminal record.

5. Time Limit

Expected completion time is eight (8) months.

Engineering Programs ENGG

Contact Information

Location: Schulich School of Engineering, Room EEEL 403

Program number: 403.220.5738

Fax: 403.284.3697

Email address: schulich@ucalgary.ca

Web page URL: schulich.ucalgary.ca/future/grad

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng), thesis and course-based

Areas: Chemical and Petroleum, Civil, Electrical and Computer, Geomatics, and Mechanical and Manufacturing Engineering.

In addition, the Schulich School of Engineering offers PhD, MSc, and MEng degrees with interdisciplinary specializations in Environmental Engineering and Energy & Environment.

Master's thesis and doctoral graduate students are normally admitted as full-time students. The Head of the Department or designate may however, approve requests for registration as part-time or transfer from a full-time to a part-time status.

The Faculty of Kinesiology, the Cumming School of Medicine and the Schulich School of Engineering co-lead the multi-faculty Biomedical Engineering Graduate Program. Further information on degrees and specializations is provided under the Biomedical Engineering section in this calendar.

2. Admission Requirements

The Schulich School of Engineering has established common minimum student admission requirements for all its graduate programs, with the exception of students with project management background entering the Manufacturing Engineering program. Departments and graduate programs may have additional requirements over and above those of the Schulich School of Engineering.

In addition to the Faculty of Graduate Studies requirements for admission, the Schulich School of Engineering minimum requirements are as follows:

Master's Programs

a) BSc degree or equivalent.

b) A minimum admission grade point average of 3.00 on a four-point scale or equivalent.

c) Holders of BSc or equivalent degrees in Science, Medicine, Kinesiology or other Engineering, if accepted, may be required to take additional senior undergraduate engineering courses. These courses will not be counted for credit toward their graduate program. Holders of bachelor's degrees from disciplines other than Engineering, Science, Medicine or Kinesiology are required to complete a minimum of 30 units (5.0 full-course equivalents) make-up undergraduate engineering courses with a minimum GPA of 3.00 on a four-point scale before admission.

d) Two reference letters.

In exceptional circumstances, students who do not meet the entrance requirements (but have BSc degrees in the same or equivalent Engineering discipline and a GPA of at least 2.70) may be considered for admission after upgrading requirements have been met. These include a minimum of 18 units (3.0 full-course equivalents) make-up courses, or 9 units (1.5 full-course equivalents) make-up courses if they have acceptable industrial experience, with a minimum grade of 3.00 on a four-point scale in each course. At least 12 or 6 units (2.0 or 1.0 full-course equivalents) of these courses, respectively, must be graduate-level courses.

Doctor of Philosophy

a) MSc degree, or transfer from MSc program, or, in exceptional cases, BSc degree or equivalent.

b) A minimum admission grade point average of 3.50 on a four-point scale or equivalent.

c) Transfer from MSc to PhD program is allowed only after the successful completion of all courses required for the MSc degree with a minimum GPA of 3.50.

d) Two reference letters.

Holders of MSc or equivalent degrees in Science, Medicine, Kinesiology or other Engineering, if accepted, may be required to take additional senior undergraduate Engineering courses. These courses will not count for credit toward their doctoral program.

3. Application Deadline

See individual programs' pages on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process, in consultation with the proposed supervisor and the Graduate Director. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Students who receive advanced course credit when admitted to a master's program may be able to accelerate the completion of their degree.

5. Program/Course Requirements

The Schulich School of Engineering has established common minimum program/course requirements for all its graduate programs. Departments and graduate programs may have additional requirements over and above those of the Schulich School of Engineering.

In addition to Faculty of Graduate Studies requirements, the Schulich School of Engineering minimum requirements are as follows:

Master of Engineering (course-based)

A minimum of 30 units (5.0 full-course equivalents), of which at least 18 units (3.0 full-course equivalents) must be graduate courses.

Master of Engineering (thesis-based)

A minimum of 12 units (2.0 full-course equivalents) graduate courses.

Master of Science

A minimum of 12 units (2.0 full-course equivalents) graduate courses.

Doctor of Philosophy

A minimum of 6 units (1.0 full-course equivalent) graduate courses beyond the Master of Science course requirements. For students who transfer from an MSc program, 18 units (3.0 full-course equivalents) graduate courses beyond the BSc, or equivalent, degree.

All Degree Programs

After consultation with the supervisor and the Graduate Director, courses outside the Department or the University may be approved towards the degree requirements.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Credit may be granted for undergraduate courses. See individual program sections.

8. Time Limit

Typical completion times are two years for full-time students in a master's program and three to four years in a doctoral program. The Master of Engineering (course-based) can be completed in one year. Maximum completion times are four years for a Master of Science and a Master of Engineering (thesis-based), and six years for a Master of Engineering (course-based) or doctoral program.

9. Supervisory Assignments

Supervisors and supervisory committees are assigned according to the Faculty of Graduate Studies regulations (see Academic Regulations) and are approved by the Department Head or the Graduate Program Director.

10. Required Examinations

Doctoral Candidacy Requirements

See individual program sections.

Thesis Examinations

The Schulich School of Engineering has established common minimum examination requirements for all its graduate programs. Departments and graduate programs may have additional requirements over and above those of the Schulich School of Engineering.

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Schulich School of Engineering minimum requirements are as follows:

MEng (course-based) Comprehensive Examination

None.

MSc and MEng (thesis-based) Final Oral Examination

Composition of the Committee

The examining committee consists of: the Supervisor, an additional member of the University of Calgary academic staff, and Internal Examiner who may be internal to the home program. If applicable, the Co-Supervisor will also be part of the committee. The examination is chaired by a neutral chair (non-voting), proposed by the Department Head or Graduate Director. The examining committee must be approved by the Faculty of Graduate Studies.

The student shall make a public twenty-minute presentation of their thesis research, normally immediately before the oral examination. Examining committee members should attend this presentation but should refrain from asking questions. The maximum allowable two-hour examination period does not include the time spent on student presentation.

Doctoral Final Oral Examination

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis before an examination can be scheduled.

Composition of the Committee

The examining committee consists of: the Supervisory Committee, an Internal Examiner who may be internal to the home program, and one member external to the University of Calgary. The examination is chaired by a neutral chair (non-voting), proposed by the Department Head or Graduate Director. The examining committee must be approved by the Faculty of Graduate Studies.

The student shall make a public twenty-minute presentation of their thesis research, normally immediately before the oral examination. Examining committee members should attend this presentation but should refrain from asking questions during the presentation. The maximum allowable two-hour examination period does not include the time spent on student presentation.

Thesis oral examinations are open.

11. Research Proposal Requirements

See individual program sections.

12. Financial Assistance

Thesis-based candidates are typically admitted with financial support provided by

an interested supervisor, the department, or an official organization. MEng students are typically admitted without funding from the program. For information on awards, see the Awards and Financial Assistance section of this Calendar.

13. Other Information

Students enrolled in any of the engineering graduate programs may opt, in addition to their normal required course load, to undertake an international project outside Canada. The duration of the project should be between 4 and 6 months. Upon successful completion (on a credit/fail basis) of Engineering 689, the statement "International Graduate Internship Project" will appear on the parchment. The course is not repeatable for credit.

Engineering, Chemical and Petroleum ENCH

Contact Information

Location: Schulich School of Engineering, Room B212

Program number: 403.220.4802

Fax number: 403.284.4852

Email address: chemandpetenggrad@ucalgary.ca

Web page URL: schulich.ucalgary.ca/departments/chemical-and-petroleum-engineering

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng), thesis-based and course-based

For registration status of thesis-based graduate students, see "Engineering Programs".

Specializations:

- Chemical Engineering
- Petroleum Engineering
- Biomedical Engineering (thesis-based only)*
- Environmental Engineering (See the Calendar section on Interdisciplinary Specializations)
- Energy and Environment (See the Calendar section on Interdisciplinary Specializations)
- Energy and Environmental Systems (Thesis-based only. See the Calendar section on Interdisciplinary Specializations)

The following specializations are offered only to course-based MEng degrees:

- Petroleum Reservoir Engineering*
- Petroleum Exploration Engineering*
- Reservoir Characterization (See the Calendar section on Interdisciplinary Specializations)

**The Department is currently not accepting applications for these specializations.*

International Foundations Program (IFP) MEng Pathways:

IFP MEng Pathways students take MEng courses within the Schulich School of Engineering concurrently with English language support courses offered by the International Foundations Program, normally over twelve months. IFP MEng Pathways curriculum is available in the following specialization:

- MEng (course-based), specialization in Petroleum Engineering.

2. Admission Requirements

See "Engineering Programs".

International Foundations Program (IFP) MEng Pathways

IFP MEng Pathways applicants must meet the academic admission requirements for Master's programs stated in Engineering Programs. In addition, they must meet the English Language Proficiency requirement for IFP MEng Pathways in one of the following ways: a minimum IELTS score of 6.0, a minimum TOEFL score of 69 (Internet-based test), a minimum TOEFL score of 540 (paper-based test), a minimum MELAB score of 78, or a minimum PTE score of 54.

3. Application Deadline

Deadlines for submission of complete applications for admission to thesis-based degrees:

MEng: ucalgary.ca/future-students/graduate/explore-programs/chemical-petroleum-engineering-master-engineering-thesis-based.

MSc: ucalgary.ca/future-students/graduate/explore-programs/chemical-petroleum-engineering-master-science-thesis-based.

PhD: ucalgary.ca/future-students/graduate/explore-programs/chemical-petroleum-engineering-doctor-philosophy-thesis-based.

Deadlines for submission of complete applications for admission to MEng course-based: ucalgary.ca/future-students/graduate/explore-programs/chemical-petroleum-engineering-master-engineering-course-based

4. Advanced Credit

See "Engineering Programs".

5. Program/Course Requirements

See "Engineering Programs".

6. Additional Requirements

Thesis-Based Programs

The Department has established core courses for the following specializations in thesis-based programs:

- Chemical Engineering specialization, Biomedical Engineering specialization, Environmental Engineering specialization, Energy and Environment specialization, Energy and Environmental Systems specialization: Chemical Engineering 613, 623, 625, 631, 633, 701 and 703.
- Petroleum Engineering specialization: Chemical Engineering 621, 629, 647, 657, 677, 701 and 703.

All Master of Science students in the Chemical Engineering, Petroleum Engineering and Biomedical Engineering specializations must complete at least two of the core courses of their specialization. All doctoral students in these specializations must have completed at least four of the core courses of their specialization before proceeding to the candidacy examination. Doctoral students in the Chemical Engineering specialization can substitute one core course for a core course in the Petroleum Engineering specialization. Doctoral students in the Petroleum Engineering specialization can substitute one core course for a core course in the Chemical Engineering specialization.

All Master of Science students in the Environmental Engineering specialization and the Energy and Environment specialization must complete at least one of the core courses in their specialization. All doctoral students in these specializations must have completed at least two of the core courses in their specialization before proceeding to the candidacy examination. Requirements for these specializations are listed under the corresponding sections.

All Master of Science students in the Energy and Environmental Systems specialization must complete at least one of the core chemical engineering courses. All doctoral students in this specialization must have completed at least two of the core chemical engineering courses before proceeding to the candidacy examination.

All Master of Science and doctoral students in the program are required to register and participate in the Professional Development I (Engineering 601) and Professional Development II (Engineering 603) courses in the first year of their degree program. All Master of Science and doctoral students must also present one research seminar at the annual Graduate Student Conference in the Winter Term.

Course-Based Programs

For Master of Engineering course-based students (except for Petroleum Engineering specialization), at least 18 units (3 full-course equivalents) at the graduate level must be from the declared area of specialization.

All Master of Engineering (course-based) students in the Petroleum Engineering specialization will be required to complete 30 units (5 full-course equivalents) of coursework as follows:

A. 12 units (2 full-course equivalents) of Core Engineering Courses:

1. Engineering 681 Engineering Tools (3 units)
2. Engineering 682 Sustainability (3 units)
3. Engineering 683 Innovation and Entrepreneurship (3 units)
4. Engineering 684 Introduction to Project Management (3 units)

B. 18 units (3 full-course equivalents) of Petroleum Engineering Specialization Courses from the list below.

At least one of Petroleum Engineering 625 or 627 must be included in the 18 units. Any

variations in required courses will be with the approval of the Department.

- Petroleum Engineering 621 Applied Reservoir Engineering (3 units)
- Petroleum Engineering 622 Subsurface Production Operations (3 units)
- Petroleum Engineering 623 Reservoir Analysis and Description (3 units)
- Petroleum Engineering 624 Enhanced Oil Recovery (3 units)
- Petroleum Engineering 625 Natural Gas Engineering (3 units)
- Petroleum Engineering 626 Economic Analysis of Petroleum Systems (3 units)
- Petroleum Engineering 627 Drilling Engineering (3 units)

ENPE courses attempted but failed (with a grade of "D+" or higher) may each be challenged once through an examination. Courses with a grade of "D" and "F" must be successfully repeated with a grade of at least a "B-" for each course. If a student passes a challenge examination, a "B-" grade will be recorded on the student's transcript. If a student fails the challenge examination, the original grade will stand, and the student will be required to repeat the course. Enrolling in a course but withdrawing before completion is not an attempt that qualifies for a challenge. Challenge examinations are available only for the ENPE courses, and there is a limit of two challenge examinations for a student's program.

Any course deficiency must be cleared at the next available opportunity. In the case that a student is unable to register for a course or withdraws from a course for valid reasons, the student may be able to substitute a similar course from the courses approved for the graduate thesis-based program with the approval of the Department.

IFP MEng Pathways: Course-Based MEng with Specialization in Petroleum Engineering

Students admitted to IFP MEng Pathways complete a structured curriculum in place of the regular MEng curriculum for the specialization in Petroleum Engineering. IFP MEng Pathways students take courses offered by the Schulich School of Engineering concurrently with English language support courses offered by the International Foundations Program, over either ten or twelve months:

- International Foundations Program 651 (3 units)
- International Foundations Program 655 (3 units)
- Petroleum Engineering 621 (3 units) with International Foundations Program Engineering 621 (1 unit)
- Engineering 682 (3 units) with International Foundations Program Engineering 682 (1 unit)
- Engineering 683 (3 units) with International Foundations Program Engineering 683 (1 unit)
- Engineering 684 (3 units) with International Foundations Program Engineering 684 (1 unit)
- Engineering 681 (3 units)
- Petroleum Engineering 622 (3 units)
- Petroleum Engineering 623 (3 units)
- Petroleum Engineering 624 (3 units)
- Petroleum Engineering 625 or 627 (3 units)
- Petroleum Engineering 626 (3 units)

International Foundations Program (IFPX) and International Foundations Program Engineering (IFPE) courses cannot be used for credit toward the degree program unless specifically allowed by that program.

7. Credit for Undergraduate Courses

Not applicable.

8. Time Limit

Master of Engineering (course-based) students in the Petroleum Engineering Specialization are normally expected to enrol in full-time studies and to complete the Master of Engineering (course-based) with a specialization in Petroleum Engineering in 8, 10 or 12 months, based on a schedule appropriate to their background and needs as assessed by the Department.

For other degrees, see "Engineering Programs".

9. Supervisory Assignments

All students are required to have a supervisor before the second annual registration. For students in the Master of Science and Doctor of Philosophy degree programs, a supervisor is normally appointed at the time of admission.

10. Required Examinations

All final thesis oral examinations involve a public seminar/presentation before the oral examination. See Engineering Programs for more information about the examination.

For candidacy requirements, see the website of the Chemical and Petroleum Engineering program.

11. Research Proposal Requirements

Doctor of Philosophy

See the website of the Chemical and Petroleum Engineering program for more information.

12. Financial Assistance

See "Engineering Programs".

13. Other Information

See "Engineering Programs".

Engineering, Civil ENCI

Contact Information

Location: Schulich School of Engineering, Room F262

Program number: 403.220.5821

Fax: 403.282.7026

Email address: civgrad@ucalgary.ca

Web page URL: schulich.ucalgary.ca/civil

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng) thesis-based and course-based

Specializations:

- Avalanche Mechanics
- Biomechanics*
- Bituminous Materials
- Geotechnical Engineering
- Materials Engineering
- Project Management
- Structures and Solid Mechanics
- Transportation Engineering
- Water Resources
- Energy and Environment (Interdisciplinary)**
- Environmental Engineering (Interdisciplinary)**

**See the Calendar section under Biomedical Engineering for further information.*

***See the Calendar section under Interdisciplinary Specializations for further information.*

MEng students may also elect to not have an area of specialization.

2. Admission Requirements

Master's Programs

See "Engineering Programs".

Doctor of Philosophy

See "Engineering Programs".

Project Management Specialization

In addition to the Engineering Programs degree requirements, a minimum of five years industrial experience, except in thesis-based degrees.

3. Application Deadline

Deadlines for submission of complete applications:

MEng (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/civil-engineering-master-engineering-thesis-based.

MEng (course-based): ucalgary.ca/future-students/graduate/explore-programs/civil-engineering-master-engineering-course-based.

MSc (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/civil-engineering-master-science-thesis-based.

PhD: ucalgary.ca/future-students/graduate/explore-programs/civil-engineering-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

Note: If the student does not consult the supervisor before selecting courses, Department approval may be withheld.

In addition to Faculty of Graduate Studies and the Schulich School of Engineering requirements, the Department normally requires:

Master of Science

a) A minimum of 12 units (2.0 full-course equivalents) and a maximum of 24 units (4.0 full-course equivalents).

b) Research and thesis work as major components of the program.

Master of Engineering (thesis-based)

a) A minimum of 18 units (3.0 full-course equivalents) and a maximum of 24 units (4.0 full-course equivalents), no more than 6 units (1.0 full-course equivalent) of which can be senior undergraduate courses.

b) A thesis related to original analysis and/or design.

Master of Engineering (course-based)

a) A minimum of 30 units (5.0 full-course equivalents) and a maximum of 6 units (1.0 full-course equivalent) of which can be senior undergraduate courses.

Doctor of Philosophy

a) A minimum of 18 units (3.0 full-course equivalents) beyond the baccalaureate.

b) A minimum of 6 units (1.0 full-course equivalent) and a maximum of 18 units (3.0 full-course equivalents) beyond the master's degree.

c) A detailed research proposal.

d) All doctoral students are required to successfully complete the candidacy requirements, which consist of four components: PhD coursework, a written Field of Study (FOS) examination, a written Thesis Proposal (TP), and an oral TP examination. Specific details of the candidacy requirements are found on the Departmental website: schulich.ucalgary.ca/departments/civil-engineering.

6. Additional Requirements

All Master of Science and Doctoral students must complete the professional development courses Engineering 601 and 603. These courses are in addition to the "Program/Course Requirements".

All graduate students who require access to Civil Engineering laboratories are required to complete a Workplace Hazardous Materials Information Systems (WHMIS) course and other required safety training courses.

7. Credit for Undergraduate Courses

See Section 5.

8. Time Limit

See "Engineering Programs".

9. Supervisory Assignments

See Supervision in the Academic Regulations section of this calendar.

10. Required Examinations

See "Engineering Programs" for information on Thesis Examinations. For information on candidacy requirements, see Program Requirements on the website: schulich.ucalgary.ca/education/future-students/graduate/degree-programs-department/civil-engineering.

11. Financial Assistance

See "Engineering Programs".

Engineering, Electrical and Computer ENEL

Contact Information

Location: ICT Building, Room 402

Program number: 403.220.5806

Fax: 403.282.6855

Email address: ecegapp@ucalgary.ca

Web page URL: schulich.ucalgary.ca/departments/electrical-and-computer-engineering

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng), thesis and course-based

Specializations:

- Software Engineering*
- Energy and Environment (Interdisciplinary)**
- Environmental Engineering (Interdisciplinary)**
- Energy and Environmental Systems (Interdisciplinary)**

For a list of other supported research areas, please see section 15.

**The Master of Science and Doctor of Philosophy degrees with a specialization in Software Engineering are offered jointly through the Department of Electrical and Computer Engineering and the Department of Computer Science.*

***See the Calendar section on Interdisciplinary Specializations for further information.*

Part-time/Full-time

All three degree programs (PhD, MSc and MEng) may be completed on a full-time or a part-time basis. For details, see Engineering Programs.

2. Admission Requirements

In addition to Faculty of Graduate Studies and the Schulich School of Engineering requirements, the Department requires:

Master of Engineering and Master of Science

A bachelor's degree in electrical engineering or computer engineering.

Master of Science, Specialization in Software Engineering

a) At least one year of experience in software development.

b) Background knowledge in C or C++.

c) Knowledge of object-oriented design and human-computer interaction.

Note: Applicants with degrees in other disciplines may be considered, but additional undergraduate courses in electrical engineering may be required prior to admission.

Doctor of Philosophy

A master's degree in electrical engineering, computer engineering, or software engineering.

Note: Transfer to the doctoral program without completing the master's degree may be approved for exceptional students whose BSc degrees are in electrical engineering, computer engineering or software engineering.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

MEng (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/electrical-computer-engineering-master-engineering-thesis-based.

MEng (course-based): ucalgary.ca/future-students/graduate/explore-programs/electrical-computer-engineering-master-engineering-course-based.

MSc (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/electrical-computer-engineering-master-science-thesis-based.

PhD: ucalgary.ca/future-students/graduate/explore-programs/electrical-computer-engineering-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission or for grades below "B".

5. Program/Course Requirements

In addition to Faculty of Graduate Studies and the Schulich School of Engineering requirements, the Department requires:

Master of Engineering (course-based)

a) Thirty to 36 units (5.0-6.0 full-course equivalents) of which at least 21 units (3.5 full-course equivalents) must be graduate courses in the Department of Electrical and Computer Engineering.

Students are encouraged to include Electrical Engineering 698 - Graduate Project in their programs. Normally Electrical Engineering 698 is taken as the last course, or concurrently with the last courses of the program. A copy of the Procedures and Guidelines is found on the departmental website.

Master of Engineering (thesis-based)

a) Normally, 12-21 units (2.0-3.5 full-course equivalents) at the graduate level.

Master of Science

a) Normally, 12-21 units (2.0-3.5 full-course equivalents) at the graduate level of which at least 9 units (1.5 full-course equivalents) must be in the area of specialization.

Master of Science, Specialization in Software Engineering

a) Twelve units (2.0 full-course equivalents) selected from a specified list of courses.

b) An applied software engineering project written up as a Master of Science thesis and examined by an examination committee as specified in the Faculty regulations.

Doctor of Philosophy

a) Normally, 18 to 27 units (3.0 to 4.5 full-course equivalents) at the graduate level beyond the bachelor's degree, or 6 to 15 units (1.0 to 2.5 full-course equivalents) at the graduate level beyond the master's degree with no fewer than half the courses in the Departmental program.

b) A grade of at least a "B+" in each graduate course with a grade point average of at least 3.30 and a grade of CR in Engineering 601/603.

c) All Doctoral students are required to successfully complete the candidacy requirements, which consist of four components: PhD coursework, a written Field of Study examination in Electrical, Computer, and Software Engineering, a written thesis proposal, and an oral thesis proposal examination. Specific details of the candidacy requirements can be found on the Departmental website.

6. Additional Requirements

While studying full-time in the MSc or PhD program:

a) Students will be required to attend only two semesters of Engineering 601/603 at the beginning of their graduate studies program.

b) Students in the PhD program who completed the course in the MSc program will not be required to take the Engineering 601/603 for the second time.

c) Students who are required to take Engineering 601/603 must successfully present two seminars.

7. Credit for Undergraduate Courses

Where appropriate, MSc and PhD students may take 500-level undergraduate courses for credit with approval of the supervisor and the Department (a maximum of 6 units or 1.0 full-course equivalent for MSc and 3 units or 0.5 full-course equivalent for PhD). Undergraduate courses will not count toward the MSc and PhD program requirements (see section 5).

MEng (course-based) students may take 9 units (1.5 full-course equivalents) of 500-level undergraduate courses for credit toward the program requirements, if graduate course requirements are met (see section 5).

8. Time Limit

Expected completion time is 20 months of full-time study for the Master of Science and four years for the Doctor of Philosophy. The maximum completion time is four years for the Master of Science and the Master of Engineering (thesis-based) and six years for the Master of Engineering (course-based) and the Doctor of Philosophy.

9. Supervisory Assignments

In all programs, a supervisor to provide guidance to the student is normally selected at the time of admission.

10. Required Examinations

Candidacy

All Doctoral students are required to pass a written Field of Study examination in Electrical, Computer, and Software Engineering and an oral thesis proposal examination. Specific details of the examination format and other candidacy requirements can be found on the Departmental website.

Thesis Examination

For details on required Thesis Examinations, see "Engineering Programs", section 10. In addition, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The internal examiner may be internal to the home program.

11. Research Proposal Requirements

Master of Science and Master of Engineering (thesis-based)

As required by the supervisor.

Doctor of Philosophy

The written thesis proposal is evaluated and approved by the candidacy examination committee as part of the candidacy requirements. Specific requirements for the proposal and the format of its evaluation can be found on the Departmental website.

12. Financial Assistance

See "Engineering Programs".

13. Other Information

Students enrolled in any of the engineering graduate programs may opt, in addition to their normal required course load, to undertake an international project outside Canada. The duration of the project should be between four and six months.

Details of research, courses, and financial assistance and other information are on the Departmental website.

Engineering, Geomatics ENGO

Contact Information

Location: Schulich School of Engineering, Room E228

Program number: 403.220.4979

Fax: 403.284.1980

Email address: geo.grad@ucalgary.ca

Web page URL: geomatics.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng), thesis* and course-based

Specializations:

- Positioning, Navigation and Wireless Location
- Geodesy, Remote Sensing and Earth Observation
- Digital Imaging Systems
- GIScience and Land Tenure
- Energy and Environmental Systems (Interdisciplinary)**
- Environmental Engineering (Interdisciplinary)**

**The Department is not currently accepting applications for the thesis-based MEng.*

***See the Calendar section on Interdisciplinary Specializations for further information.*

2. Admission Requirements

See "Engineering Programs".

3. Application Deadline

Application deadlines are available on the Future Students website:

MEng (course-based): ucalgary.ca/future-students/graduate/explore-programs/geomatics-engineering-master-engineering-course-based.

MSc (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/geomatics-engineering-master-science-thesis-based.

PhD: ucalgary.ca/future-students/graduate/explore-programs/geomatics-engineering-doctor-philosophy-thesis-based.

4. Advanced Credit

See "Engineering Programs".

5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements and the Schulich School of Engineering, the Department requires:

Master of Engineering (course-based)

A minimum of 30 units (5.0 full-course equivalents), of which at least 18 units (3.0 full-course equivalents) must be graduate courses, with no fewer than 12 units (2.0 full-course equivalents) of Geomatics Engineering specific graduate courses.

Master of Engineering (thesis-based)

a) A minimum of 12 units (2.0 full-course equivalents) at the graduate level, with no fewer than 6 units (1.0 full-course equivalent) of Geomatics Engineering specific graduate courses.

b) Professional Development Seminar (Geomatics Engineering 698).

c) A thesis related to original engineering analysis or design.

Master of Science

a) A minimum of 12 units (2.0 full-course equivalents) at the graduate level, with no fewer than 6 units (1 full-course equivalent) of Geomatics Engineering specific graduate courses.

b) Attend the Professional Development Seminar (Geomatics Engineering 698).

c) A thesis related to original engineering research.

Doctor of Philosophy

a) A minimum of 9 units (1.5 full-course equivalents) at the graduate level beyond the Master of Science course requirements, with no fewer than 3 units (0.5 full-course equivalents) of Geomatics Engineering specific graduate courses. For students who transfer from a Master of Science to a doctoral program, a minimum of 6 units (1.0 full-course equivalent) at the graduate level beyond the Master of Science course requirements.

b) Attend the Professional Development Seminar (Geomatics Engineering 698).

c) A literature review, a thesis proposal and a Field of Study oral examination (see **10. Required Examinations**).

d) A thesis related to advanced original engineering research.

Independent Study Courses

Course-based Master of Engineering students can have no more than three independent study courses count towards their degree requirements.

Thesis-based Master's and Doctor of Philosophy students can have no more than one independent study course count towards their degree requirements. Students who transfer from the Master of Science to the Doctor of Philosophy program can have no more than two independent study courses count towards their degree requirements.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

None.

8. Time Limit

See "Engineering Programs".

9. Supervisory Assignments

For thesis-based Master's or Doctor of Philosophy programs, see "Engineering Programs". For course-based Master of Engineering program, all students will be assigned an advisor at the time of registration.

10. Required Examinations

Master's Programs

See “Engineering Programs”.

Doctoral Programs

Candidacy Examination

Doctoral students are required to pass a candidacy examination. The candidacy consists of three components: the literature review, the thesis proposal and the Field of Study oral examination. All three components will be assessed by the supervisory committee and/or examining committee. Specific details of the examination format and other candidacy requirements can be found on the Department website at Geomatics PhD Program Requirements.

Doctoral Thesis Examination

See “Engineering Programs”.

11. Research Proposal Requirements

Master of Engineering (thesis-based)

A thesis proposal accepted by the supervisor is required no later than 16 months after initial registration. Contents of the thesis, reflecting an applied approach to a problem, should contain new elements of engineering principles and applications.

The thesis proposal should include the following:

1. Statement of the problem.
2. Research objectives.
3. Literature review.
4. Methodology and procedures.
5. Outline of thesis contents.
6. Proposed time schedule.
7. Bibliography and references.

Master of Science

The Master of Science thesis proposal requirements, including the outline of the proposal's contents, are the same as those for the Master of Engineering (thesis-based). The thesis topic, however, should deal with original theoretical or practical research in Geomatics Engineering.

Doctor of Philosophy

The doctoral thesis proposal requirements, including the outline of the proposal's contents, are the same as those for the Master of Engineering (thesis-based). The thesis, however, must demonstrate the candidate's ability to pursue original research at a high level and represent a distinct advance in knowledge on the subject. The research should be of the recognized standard of technical journals requiring critical review. The supervisor and supervisory committee will normally require progress reports every six months during the doctoral program.

12. Financial Assistance

See “Engineering Programs”.

13. Other Information

See “Engineering Programs”.

In addition, the Department offers a designated set of graduate courses in each of the specialization areas and interdisciplinary areas. Additional graduate courses are offered as Special Studies and Project courses. The Department also offers a Distinguished International Lecturer Series, which consists of approximately four to five courses offered annually by invited professors and researchers.

Engineering, Mechanical and Manufacturing ENME

Contact Information

Location: Mechanical Engineering Building, Room 506

Program number: 403.220.4153/3541

Fax: 403.282.8406

Email address: gradenme@ucalgary.ca

Web page URL: schulich.ucalgary.ca/Mechanical

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc) thesis-based

Master of Engineering (MEng), thesis and course-based

The MEng program may be completed on a full-time or a part-time basis.

Specializations:

- Pipeline Engineering
- Engineering, Energy & Environment (Interdisciplinary Specialization)*
- Environmental Engineering (Interdisciplinary Specialization)*
- Energy & Environmental Systems (Interdisciplinary, thesis-based only)*

**See the Calendar section under Interdisciplinary Specializations for further information.*

2. Admission Requirements

In addition to the Faculty of Graduate Studies and the Schulich School of Engineering minimum requirements, the Department's requirements are as follows:

Master's Programs (MSc and MEng)

a) BSc degree or equivalent.

b) A minimum admission grade point average of 3.00 on a four-point scale or equivalent.

c) The admission requirements for both the MEng program and MSc program are the same.

Doctor of Philosophy

See “Engineering Programs”.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

MEng (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/mechanical-manufacturing-engineering-master-engineering-thesis-based.

MEng (course-based): ucalgary.ca/future-students/graduate/explore-programs/mechanical-manufacturing-engineering-master-engineering-course-based.

MSc (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/mechanical-manufacturing-engineering-master-science-thesis-based.

PhD: ucalgary.ca/future-students/graduate/explore-programs/mechanical-manufacturing-engineering-doctor-philosophy-thesis-based.

4. Advanced Credit

See “Engineering Programs”.

5. Program/Course Requirements

In addition to Faculty of Graduate Studies and the Schulich School of Engineering minimum requirements, the Department requires:

Master of Engineering (course-based)

Thirty units (5.0 full-course equivalents), of which 12 units (2.0 full-course equivalents) may be taken from outside of the Depart-

ment, and no more than 12 units (2.0 full-course equivalents) can be senior undergraduate courses (500-level).

Master of Engineering (thesis-based)

a) At least 15 units (2.5 full-course equivalents), of which 6 units (1.0 full-course equivalent) may be taken from outside the Department, and no more than 3 units (0.5 full-course equivalent) can be a senior undergraduate course (500-level).

b) In addition to the 15 units (2.5 full-course equivalents), students must present at the annual Mechanical Engineering Graduate Student Conference in the Winter Term to receive credit for Mechanical Engineering 613 Research Seminar.

Master of Science

a) At least 15 units (2.5 full-course equivalents), of which 6 units (1.0 full-course equivalent) may be taken from outside the Department, and no more than 3 units (0.5 full-course equivalent) can be a senior undergraduate course (500-level).

b) One course to be selected from Mechanical Engineering 631 or 633.

c) In addition to the 15 units (2.5 full-course equivalents), students must present at the annual Mechanical Engineering Graduate Student Conference in the Winter Term to receive credit for Mechanical Engineering 613 Research Seminar.

Doctor of Philosophy

a) For students entering the PhD program with an MSc or equivalent, at least 6 units (1.0 full-course equivalent) beyond the Master's degree are required and must be higher than senior undergraduate courses (500-level).

b) For students without an MSc or equivalent, at least 21 units (3.5 full-course equivalents) at the graduate level are required. Of these courses, 6 units (1.0 full-course equivalent) may be taken from outside the Department, no more than 3 units (0.5 full-course equivalent) can be a senior undergraduate course (500-level), and three units (0.5 full-course equivalent) must be selected from Mechanical Engineering 631 or 633.

c) In addition to the courses listed in (a) or (b), students must present at the annual Mechanical Engineering Graduate Student Conference before their candidacy exam to receive credit for Mechanical Engineering/ Manufacturing Engineering 713 Research Seminar.

d) Following the candidacy exam, students must make one additional presentation at the Mechanical Engineering Graduate Student Conference in the Winter Term as partial fulfillment of the degree requirement.

Note: All courses taken outside the department must be approved by the student's supervisor and the graduate program director.

For all degrees, graduation requires successful completion of all required courses with a minimum grade of "B".

Pipeline Engineering Specialization

Students wishing to complete the Pipeline Engineering Specialization must complete the degree requirements stated above and include the following:

- MEng (course-based): 18 units of Pipeline Engineering approved courses;
- MSc: 9 units of Pipeline Engineering approved courses with a Pipeline Engineering project;
- PhD: 6 units of Pipeline Engineering approved courses with a Pipeline Engineering project.

Pipeline Engineering Approved Courses

ENME 619.10 or 620	ENME 619.46
ENME 619.11 or 622	ENME 619.49 or 630
ENME 619.12 or 624	ENME 619.50
ENME 619.16 or 626	ENME 619.55
ENME 619.20	ENME 619.57 or 634
ENME 619.23	ENME 619.67 or 636
ENME 619.26	ENME 619.74 or 638
ENME 619.27 or 628	ENME 619.90 or 640
ENME 619.35	ENME 667
ENME 619.40 or 632	ENME 669
ENME 619.45	

This list is provided as a reference. Please be advised that not all of these courses are offered in any one semester. For more information about approved courses, contact the Graduate Program Advisor at pec@ucalgary.ca.

Further information about this specialization can be found on the Pipeline Engineering Centre's website.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

See Section 5 for details.

8. Time Limit

See "Engineering Programs".

9. Supervisory Assignments

MEng students in the department require a supervisor. See "Engineering Programs".

10. Required Examinations

Candidacy Examinations

Doctoral students must pass an oral Field of Study examination and an oral defence of the thesis proposal. For complete details of the examination format and other candidacy requirements, see the Candidacy Requirements document available at schulich.ucalgary.ca/education/current-students/graduate/program-resources.

Thesis Examination

See "Engineering Programs". In addition to the Faculty of Graduate Studies and Schulich School of Engineering requirements, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

11. Research Proposal Requirements

Doctoral students must complete a written thesis proposal and a thesis proposal oral defence. See the Candidacy Requirements document available at schulich.ucalgary.ca/education/current-students/graduate/program-resources for further information about the proposal requirements and evaluation process.

12. Financial Assistance

The MEng program is self-funded.

See "Engineering Programs".

13. Other Information

Students may hire an editor to copyedit their theses subject to the conditions outlined in the Faculty of Graduate Studies Thesis Guidelines.

See "Engineering Programs".

English ENGL

Contact Information

Location: Social Sciences Building, Room 1148

Program number: 403.220.5484

Fax: 403.289.1123

Email address: enggrad@ucalgary.ca

Web page URL: english.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), one year course-based or two year thesis-based. Both the one-year and two –year MA programs include significant independent research. One year course-based MA program is SSHRC-eligible and is appropriate for students who intend to proceed to doctoral studies.

All students (PhD, thesis-based MA, and course-based MA) must be registered full-time. Students may be considered for part-time status with departmental approval. Please consult the Department of English for more information.

Specialization:

- Literature in English

A Creative Writing option is also available. Consult the department website for further details.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) A completed four-year undergraduate program (or equivalent) with a Major in English Literature or in a closely related discipline.

b) A Statement of Intent.

c) A 5-10 page sample of critical writing; for creative writing applicants, an additional 10-page sample of creative writing.

d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (paper-based), 105 (Internet-based test), a MELAB score of 86, an IELTS score of 7.5 with no band less than 7.0, or a PTE score of 75. This requirement can also be met by completing Tier III of the International Foundations Program with minimum grades of "B" on Academic Writing & Grammar, "B" on Reading Comprehension & Proficiency, and "B" on Listening Comprehension & Oral Fluency.

e) Two reference letters.

Doctor of Philosophy

a) A completed four-year undergraduate program (or equivalent), and a completed Master's degree. At least one of the degrees must be in English Literature. In exceptional circumstances, degrees in a closely related discipline may meet admission requirements.

b) A grade point average of 3.5 on a four-point scale at the graduate level.

c) A Statement of Intent.

d) A 5-10 page sample of critical writing; for creative writing applicants, an additional 10-page sample of creative writing.

e) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 600 (paper-based), 105 (Internet-based test), a MELAB score of 86, an IELTS score of 7.5 with no band less than 7.0, or a PTE score of 75. This requirement can also be met by completing Tier III of the International Foundations Program with minimum grades of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

f) Two reference letters.

g) A curriculum vitae.

3. Application Deadline

Deadline for submission of complete applications is available on the Future Students website:

Master of Arts (thesis-based): http://www.ucalgary.ca/future-students/graduate/explore-programs/english-master-arts-thesis-based.

Master of Arts (course-based): http://www.ucalgary.ca/future-students/graduate/explore-programs/english-master-arts-course-based.

Doctor of Philosophy: http://www.ucalgary.ca/future-students/graduate/explore-programs/english-doctor-philosophy-thesis-based.

4. Advanced Credit

Application for advanced credit must be made to the Department Head at the time of admission.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department normally requires:

Master of Arts (one-year course-based with research project)

a) Twenty-one units (3.5 full-course equivalents) in English at the 600 or 700 level beyond the Honours BA or equivalent, which must meet the Historical Breadth Requirement.

Historical Breadth Requirement: at least 3 units (0.5 full-course equivalent) in literature from the twentieth century and after, AND at least 3 units (0.5 full-course equivalent) in literature from before the twentieth century.

b) English 710 (includes a final major research project of approximately 50 pages).

c) English 691 or its equivalent.

Master of Arts (two-year thesis-based)

a) Eighteen units (3.0 full-course equivalents) in English at the 600 or 700 level beyond the Honours BA, which must meet the Historical Breadth Requirement.

Historical Breadth Requirement: at least 3 units (0.5 full-course equivalent) in literature from the twentieth century and after, AND at least 3 units (0.5 full-course equivalent) in literature from before the twentieth century.

b) English 691 or its equivalent.

c) A scholarly and/or critical thesis (approximately 100 pp) approved by the Faculty of Graduate Studies.

Doctor of Philosophy

a) Eighteen units (3.0 full-course equivalents) in English at the 600, 700 or 800 level beyond the Master's, which must meet the Historical Breadth Requirement.

Historical Breadth Requirement:

- at least 6 units (1.0 full-course equivalent) in literature from the twentieth century and after, AND
- at least 9 units (1.5 full-course equivalents) in literature from before the twentieth century, of which 6 units (1.0 full-course equivalent) must be from any of the following fields: (i) Medieval literature; (ii) Early Modern literature; (iii) Restoration and eighteenth-century literature.

NOTE: This requirement may be fulfilled by graduate courses completed during the Master's degree. Students must provide documentation of previous course work to the Graduate Program Office.

b) English 691 or its equivalent.

c) A demonstrated reading knowledge of a language other than English. Students are encouraged to establish competency in a language that contains a body of texts relevant to their program of study. This requirement can be met in one of the following ways:

1. A minimum grade of "B" in 6 units (1.0 full-course equivalent) at a senior (300) level in a language course.
2. Passing the department reading exam, which is set twice a year.
3. Documentation establishing native proficiency in a language other than English. It is the responsibility of the student to supply evidence of native proficiency or evidence that course work in a language at another university meets the requirement spelled out in this guide. Students who do not meet the requirement upon entry should consult with the Associate Head (Graduate Program) no later than the week before classes begin about the best approach to take.

d) A General Comprehensive Examination.

e) Written and oral Field of Study Examinations.

f) A thesis proposal.

g) A doctoral thesis on approved topic and an oral thesis examination.

Copyediting

While suggestions for editorial changes are a normal part of the collaboration between a student, the supervisory committee and the academic community, having a thesis professionally edited is prohibited by the department.

6. Additional Requirements

All students must attend an orientation session.

Master of Arts

Knowledge of one language other than English is a great asset and an advantage for future doctoral studies. Students are encouraged to establish competency in a language that contains a body of texts relevant to their program of study. This can be discussed with the Graduate Director.

7. Credit for Undergraduate Courses

With the approval of the Department, all MA students may take for credit up to 3 units (0.5 full-course equivalents) at the 500 level (excluding English 504).

8. Time Limit

Expected completion time is up to twelve months for the course-based (with research project) Master of Arts, two years for the thesis-based Master of Arts and four years for the Doctor of Philosophy degrees. Maximum completion time is two years for the course-based (with research project) Master of Arts, four years for the thesis-based Master of Arts and six years for the Doctor of Philosophy degrees.

9. Supervisory Assignments

Master of Arts

Students are initially assigned an interim advisor to give them time to familiarize themselves with faculty members' research before securing a permanent supervisor.

Thesis-based: By March 1 of the first year, each student must submit a proposed field of research and the name of a proposed supervisor to the Graduate Executive Committee for approval.

Course-based: By June 1, students will approach a faculty member, normally one with whom they have completed (or are complet-

ing) a graduate course, to request supervision for their capstone research project.

Doctor of Philosophy

For the first eight months of the program, students are assigned an interim advisor to give them time to familiarize themselves with faculty members' research before securing a permanent supervisor.

By April 1 of the first year, each student will submit the name of a proposed supervisor and the proposed thesis research focus to the Graduate Executive Committee for approval.

By September 30 of the second year, the student, in consultation with the supervisor, will submit the names of the proposed supervisory committee, Field of Study, and initial thesis proposal to the Graduate Executive Committee for approval.

10. Required Examinations

Doctoral Candidacy Examinations

Before formally embarking on the writing of the PhD thesis, all students must pass a General Comprehensive Examination, a Field of Study Written Examination and a Field of Study Oral Examination. Details about the examination format and other candidacy requirements are available at: english.ucalgary.ca/graduate/program/phd-program.

Thesis Examinations (MA thesis-based and Doctor of Philosophy)

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

The thesis examination is open to the public.

11. Research Proposal Requirements

Master of Arts

Thesis-based: By May 1, or no later than eight months after initial registration, each student must submit a thesis proposal to the Graduate Executive Committee. Further details are available from the department.

Course-based: By June 15 students will prepare a topic proposal of two pages plus bibliography for the capstone course and submit it to the Graduate Program Office for approval. Further details are available from the department.

Doctor of Philosophy

As part of candidacy requirements, doctoral students must have their final thesis proposal reviewed and approved by the supervisory committee. Specific requirements for the proposal and the format of the review meeting are available at: english.ucalgary.ca/graduate/program/phd-program.

12. Special Registration Information

Students must register for courses by the end of June. Continuing students and new students who are able to do so should consult the course instructors before they register or as soon as they arrive on campus. Final approval to enter a course is given by the Head or Associate Head of the Department.

Students wishing to enrol in English 693, 694, 695, or 698 must submit a portfolio of their own work for evaluation before consent to register will be given. Details of this procedure are available from the Department of English.

13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships are advised to have their applications to the Department by December 15.

Environmental Design EVDS

Contact Information

Location: Professional Faculties 2182

Program number: 403.220.6601

Fax: 403.284.4399

Email address: evdsinfo@ucalgary.ca and evdsphd@ucalgary.ca

Web page URL: evds.ucalgary.ca

Degrees and Specializations Offered

Course-Based Degrees:

Master of Architecture (MArch)

Master of Landscape Architecture (MLA)

Master of Planning (MPlan) and

Master of Planning/Master of Business Administration (MPlan/MBA) - combined degree offered with the Haskayne School of Business

Thesis-Based Degrees:

Doctor of Philosophy (PhD)

Master of Environmental Design (MEDes)

Specialization:

- Energy and Environmental Systems (Interdisciplinary, MEDes and PhD only. See the Calendar section on Interdisciplinary Specializations for further information)

Graduate Certificates:

- Post-Baccalaureate Certificate in Built and Landscape Heritage
- Post-Baccalaureate Certificate in Designing Smart and Secure Communities
- Post-Baccalaureate Certificate in Sustainable Urban Design

Master of Architecture (MArch)

1. Degree Offered

Master of Architecture (MArch) - course-based

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements for Admission, the program requires:

a) Prospective applicants are advised to use opportunities within their four year recognized university undergraduate degree studies to develop knowledge in design, the humanities, social sciences, arts, engineering, biological and/or physical sciences – including, wherever possible, studio, laboratory and collaborative learning experiences.

b) Applicants must demonstrate successful completion of one or more years of undergraduate-level coursework in four areas: Design, Technology, Graphics, and History/Theory (equivalent to the courses taken in the minor in Architectural Studies, or in the MArch Foundation year). In order to complete these prerequisite requirements, applicants may be admitted to the MArch Foundation or qualifying year. An assessment of these prerequisite requirements will be made by an admissions committee and applicants will be informed in offers of admission which, if any, courses at the Foundation level will be required.

c) Candidates for MArch must provide evidence of original and/or creative work in any field or medium, and provide in writing a brief description of the work. The requirements for digital portfolio submissions are found in the Faculty of Environmental Design website at: evds.ucalgary.ca/content/master-architecture-march-admissions.

d) Three reference letters, of which at least two should be academic.

e) A clear, well-written statement of interest which describes the applicant's interest in architecture and how the applicant's specific educational background and professional or personal experience relates to architecture as a field of study.

f) A current copy of curriculum vitae (CV).

g) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

3. Application Deadline

Application deadline is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/architecture-master-architecture-course-based.

4. Advanced Credit

A student may apply for advanced credit for previous courses that have not been used to satisfy the requirements of any other degree or diploma program. The applicant must make advanced credit requests as part of the admission process. Advanced credit will not be given for courses taken more than five years prior to admission application. Credit will not be given for courses taken to bring the grade point average to a required level for graduate studies admission. Advanced credit may not exceed 12 units (2.0 full-course equivalents) or one third of the program, whichever is less.

Course Exemptions: Students registered in a graduate degree program may receive an exemption from a specific course if they can demonstrate successful completion of an equivalent course. In order to be eligible for an exemption, the student must provide original transcripts, course outlines and samples of course assignments which will be assessed for academic equivalency. Courses for which exemptions are being sought must be from a recognized institution, and they must be graded courses with a minimum grade of "B-". Students granted an exemption from a course may be required to take another, equally-weighted, course to satisfy credit-hour requirements for their program.

Program Transfers: A student at the University of Calgary may request a transfer to another program of equivalent level. Any course taken in the initial program may be transferred to the new program, depending on its applicability to the receiving program.

5. Course Requirements

A student Program of Study (POS) may be required by all students for approval by the Associate Dean (Academic - Architecture).

Successful completion of the MArch must include the following academic requirements:

a) Core required courses:

Foundation Year

Environmental Design Architecture 511 (3 units)

Environmental Design 523 (3 units)

Environmental Design Architecture 523.01 (3 units)

Environmental Design Architecture 523.02 (3 units)

Environmental Design Architecture 541 (3 units)

Environmental Design Architecture 543 (3 units)

Environmental Design Architecture 580 (6 units)

Environmental Design Architecture 582 (6 units)

First (M1) and Second (M2) Year

Environmental Design Architecture 611 (3 units)

Environmental Design Architecture 613 (3 units)

Environmental Design Architecture 615 (3 units)

Environmental Design Architecture 617 (1.5 units)

Environmental Design Architecture 619 (3 units)

Environmental Design Architecture 621 (3 units)

Environmental Design Architecture 661 (3 units)

Environmental Design Architecture 665 (1.5 units)

Environmental Design Architecture 682.02 (6 units)

Environmental Design Architecture 682.04 (6 units)

Environmental Design Architecture 782 A (6 units)

Environmental Design Architecture 782 B (6 units)

b) One of the following block-week courses:

Environmental Design 697.64 Gillmor Theory Seminar

Environmental Design 697.65 Somerville Design Charrette

Environmental Design 697.66 Taylor Workshop

Note: Upon completion of the requirement, any of the courses listed in b) may be taken or repeated for elective credit.

c) One of the following Urban Theory courses:

Environmental Design 671 (3 units)

Environmental Design 675 (3 units)

d) Twelve units (2.0 full-course equivalents) of elective credit, of which at least 9 units (1.5 full-course equivalents) must be from a list approved by the Associate Dean (Academic -Architecture), circulated annually before commencement of the registration year.

6. Additional Requirements

A laptop computer is required for all EVDS course-based degree programs. Further information pertaining to specifications will be sent out to newly-admitted students in the summer term prior to the commencement of their studies.

Attendance at orientation for first year students is expected.

7. Credit for Undergraduate Courses

Only undergraduate courses numbered 500-599 may be considered for graduate-level credit and are subject to approval by the Program Director.

8. Time Limits

Students are expected to enrol on a full-time basis and complete the degree requirements within two registration years (excluding the Foundation year). Maximum completion time is six registration years.

9. Supervisory Assignments

Upon admission, each MArch student will be advised by the office of the Associate Dean regarding Program of Study development.

10. Financial Assistance

Financial assistance may be available to highly qualified students but cannot be guaranteed. For information on admission and academic awards, see the Awards and Financial Assistance section of this calendar, the EVDS website and the Awards Database on the Faculty of Graduate Studies website.

Master of Landscape Architecture (MLA)

1. Degree Offered

Master of Landscape Architecture (MLA) - course-based

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements for Admission, the program requires:

a) A clear, well-written statement of interest which describes the applicant's interest in landscape architecture and how the applicant's specific educational background and professional or personal experience relates to landscape architecture as a field of study (maximum two pages).

b) Candidates for the Master of Landscape Architecture must provide evidence of original and/or creative work in any field or medium. This could include design work, professional work, research, creative ability, or ideas related to their statement of intent or interests in Landscape Architecture. The requirements for digital portfolio submissions are found on the Faculty of Environmental Design website at: evds.ucalgary.ca/admissions/landscape-architecture.

c) A current copy of curriculum vitae (CV).

d) Three reference letters, of which at least two should be academic.

Note: Applicants with previous related design degrees (e.g. a Bachelor of Landscape Architecture) may have some or all of the foundation year courses waived. Applications will be evaluated on a case-by-case basis, this review will require supporting documentation such as course outlines. An assessment of these prerequisite requirements will be made by an admissions committee and applicants will be informed in offers of admission which, if any, courses at the Foundation level will be required.

e) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

3. Application Deadlines

Deadline for submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/landscape-architecture-master-landscape-architecture-course-based.

4. Advanced Credit

A student may apply for advanced credit for previous courses that have not been used to satisfy the requirements of any other degree or diploma program. The applicant must make advanced credit requests as part of the admission process. Advanced credit will not be given for courses taken more than five years prior to admission application. Credit will not be given for courses taken to bring the grade point average to a required level for graduate studies admission. Advanced credit may not exceed 12 units (2.0 full-course equivalents) or one third of the program whichever is less.

Course Exemptions: Students registered in a graduate degree program may receive an exemption from a specific course if they can demonstrate successful completion of an equivalent course. In order to be eligible for an exemption, the student must provide original transcripts, course outlines and samples of course assignments which will be assessed for academic equivalency. Courses for which exemptions are being sought must be from a recognized institution, and they must be graded courses with a minimum grade of "B-". Students granted an exemption from a course may be required to take another, equally-weighted, course to satisfy credit-hour requirements for their program.

Program Transfers: A student at the University of Calgary may request a transfer to another program of equivalent level. Any course taken in the initial program may be transferred to the new program, depending on its applicability to the receiving program.

5. Course Requirements

The Master of Landscape Architecture program is structured around a core studio sequence. Required courses and electives make up the remainder of the program. Successful completion of the MLA must include the following academic requirements:

a) Core required courses:

Foundation Year

Environmental Design Planning 602 (3 units)

Environmental Design Planning 611 (3 units)

Environmental Design 616 (3 units)

Environmental Design Planning 625 (3 units)

Environmental Design Planning 626 (3 units)

Environmental Design Landscape 629 (3 units)

Environmental Design Landscape 645 (3 units)

Environmental Design Landscape 667 (6 units)

First (LA1) Year

Environmental Design 620 (6 units)

Environmental Design 671 (3 units)

Environmental Design Landscape 603 (3 units)

Environmental Design Landscape 605 (3 units)

Environmental Design Landscape 639 (3 units)

Environmental Design Landscape 641 (3 units)

Environmental Design Landscape 668 (6 units)

Second (LA2) Year

Environmental Design Landscape 767 (6 units)

Environmental Design Landscape 643 (3 units)

Environmental Design Landscape 777 (6 units)

b) Nine units (1.5 full-course equivalents) of elective credit at the graduate level that is relevant to the student's area of study.

6. Additional Requirements

A laptop computer is required for all EVDS course-based degree programs. Further information pertaining to specifications will be sent out to newly-admitted students in the summer term prior to the commencement of their studies.

Attendance at orientation for first year students is expected.

7. Credit for Undergraduate Courses

Only undergraduate courses numbered 500-599 may be considered for graduate-level credit and are subject to approval by the Program Director.

8. Time Limits

Students are expected to enrol on a full-time basis and complete the degree requirements within two registration years (excluding the Foundation year). Maximum completion time is six registration years.

9. Supervisory Assignments

Upon admission, each MLA student will be assigned an academic advisor regarding Program of Study development.

10. Financial Assistance

Financial assistance may be available to highly qualified students but cannot be guaranteed. For information on admission and academic awards, see the Awards and Financial Assistance section of this calendar, the EVDS website and the Awards Database on the Faculty of Graduate Studies website.

Master of Planning (MPlan)

Degree Offered

Master of Planning (MPlan) - course-based

Master of Planning/Master of Business Administration (MPlan/MBA) - combined degree offered with the Haskayne School of Business

- MPlan/MBA Specialization: Real Estate Studies

2. Admission Requirements

Admission to the Master of Planning is a competitive process. Applicants must meet minimum Faculty of Graduate Studies requirements for Admission (including a 3.00 GPA). In addition to Faculty of Graduate Studies requirements, the program requires:

a) A clear, well-written statement of interest which describes the applicant's interest in planning and how the applicant's specific educational background and professional or personal experience relates to Planning as a field of study.

b) At least one example of the applicant's previous academic or professional writing, such as a written essay, published research paper, major academic paper, design project or consulting report.

c) A portfolio that includes examples of the applicant's design work or design thinking, including creative work or ideas, community action, planning or design products, or graphics and visual communication.

The requirements for digital portfolio submissions are found in the Faculty of Environmental Design website at: evds.ucalgary.ca/content/master-planning-mplan-admissions.

d) Three reference letters, of which at least two should be academic.

e) A current copy of curriculum vitae (CV).

f) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

Master of Planning/Master of Business Administration (MPlan/MBA)

An applicant to the combined MPlan/MBA program must be admitted to the MPlan program and make separate application for, and be admitted by, the MBA program. The respective Combined Program Committee will review each application.

3. Application Deadlines

Deadline for submission of complete applications is available on the Future Students website:

Master of Planning: ucalgary.ca/future-students/graduate/explore-programs/landscape-architecture-master-landscape-architecture-course-based.

Master of Planning/MBA combined program: A separate application to the MBA program is required. See ucalgary.ca/future-students/graduate/explore-programs/management-master-business-administration-course-based.

4. Advanced Credit

A student may apply for advanced credit for previous courses that have not been used to satisfy the requirements of any other degree or diploma program. The applicant must make advanced credit requests as part of the admission process. Advanced credit will not be given for courses taken more than five years prior to admission application. Credit will not be given for courses taken to bring the grade point average to a required level for graduate studies admission. Advanced credit may not exceed 12 units (2.0 full-course equivalents) or one third of the program whichever is less.

Course Exemptions: Students registered in a graduate degree program may receive an exemption from a specific course if they can demonstrate successful completion of an equivalent course. In order to be eligible for an exemption, the student must provide original transcripts, course outlines and samples of course assignments which will be assessed for academic equivalency. Courses for which exemptions are being sought must be from a recognized institution, and they must be graded courses with a minimum grade of "B-". Students granted an exemption from a course may be required to take another, equally-weighted,

course to satisfy credit-hour requirements for their program.

Program Transfers: A student at the University of Calgary may request a transfer to another program of equivalent level. Any course taken in the initial program may be transferred to the new program, depending on its applicability to the receiving program.

5. Course Requirements

Master of Planning (MPlan)

An individual Program of Study (POS) is required by all students for approval by the MPlan Graduate Program Director by May 31 of their first registration year. The POS must include the following academic requirements, totalling at least 51 units (8.5 full-course equivalents):

a) Core required courses:

Environmental Design Planning 621 (3 units)

Environmental Design Planning 625 (3 units)

Environmental Design Planning 626 (3 units)

Environmental Design Planning 627 (3 units)

Environmental Design Planning 632 (1.5 units)

Environmental Design Planning 634 (1.5 units)

Environmental Design Planning 636 (6 units)

Environmental Design Planning 644 (6 units)

b) One of the following Planning Technology courses (or approved equivalent), the other of which may be taken as elective credit:

Environmental Design Planning 602 (3 units)

Environmental Design Planning 611 (3 units)

c) One of the following Planning Studio courses (or approved equivalent), the other of which may be taken as elective credit:

Environmental Design 640 (6 units)

Environmental Design 620 (6 units)

d) Fifteen units (2.5 full-course equivalents) of elective credit at the graduate level that is relevant to the student's area of study, chosen in consultation with the Associate Dean (Academic - Landscape and Planning). Six of these units must be from the following courses:

Environmental Design 616 (3 units)

Environmental Design 622 (3 units)

Environmental Design 628 (3 units)

Environmental Design 671 (3 units)

Master of Planning/Master of Business Administration (MPlan/MBA) Combined Degree

Students admitted to the MPlan/MBA will focus on courses for the MBA during the first year and on MPlan courses in years two and three. Typically, the Real Estate Studies specialization will be completed in year four. Course requirements include:

a) MBA courses (54 units or 9.0 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And four elective courses (12 units total) in the Real Estate Studies specialization.

b) MPlan courses (45 units or 7.5 full-course equivalents):

- One of Environmental Design Planning 602 or 611;
- One of Environmental Design 620 or 640;
- Environmental Design Planning 621, 625, 626, 627, 632, 634, 636 and 644;
- Two Environmental Design elective courses(6 units), chosen from Environmental Design 616, 622, 624, 628, and 671; and
- One elective course (3 units).

6. Additional Requirements

A laptop computer is required for all EVDS course-based degree programs. Further information pertaining to specifications will be sent out to newly-admitted students in the summer term prior to the commencement of their studies.

Attendance at orientation for first year students is expected.

7. Credit for Undergraduate Courses

Only undergraduate courses numbered 500-599 may be considered for graduate-level credit and are subject to approval by the Program Director.

8. Time Limit

Students registered in the Master of Planning program are expected to enrol on a full-time basis and complete the degree requirements within two registration years. Maximum completion time is six registration years.

9. Supervisory Assignments

Upon admission, each MPlan student will be assigned an academic advisor regarding Program of Study development.

10. Financial Assistance

Financial assistance may be available to highly qualified students but cannot be guaranteed. For information on admission and academic awards, see the Awards and Financial Assistance section of this calendar, the EVDS website and the Awards Database on the Faculty of Graduate Studies website.

Doctor of Philosophy (PhD)

1. Degree Offered

Doctor of Philosophy (PhD) in Environmental Design

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements for Admission, the program requires:

a) An admission grade point average (GPA) above 3.50 on a four-point scale.

b) A research proposal that describes the nature of the thesis research the applicant expects to undertake. This will be used by an admissions committee as an indicator of the applicant's ability to conduct doctoral-level research and to determine if adequate supervisory resources are available. Only if such resources are available will the student be admitted. Please note that this research statement (maximum of 1500 words) must include the following sections: Background, research questions, literature review, research methodology, and broader impacts of the proposed research. The research statement should indicate potential supervisors and/or committee members, and whether they have been contacted by the applicant.

c) A funding plan that demonstrates that financial resources are available for the entire program of study.

d) Three reference letters, of which at least two should be academic.

e) At least one example of the applicant's previous academic or professional work, such as a written essay, published research paper, major academic paper, thesis, or consulting report. Optionally, applicants may submit a portfolio that provides examples of or illustrates the applicant's design work, professional work, research, creative thinking, community action, planning products, or graphics and visual communication.

f) A current copy of curriculum vitae (CV).

g) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

3. Application Deadline

Deadline for submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/environmental-design-doctor-philosophy-thesis-based.

4. Advanced Credit

A student may apply for advanced credit for previous courses that have not been used to satisfy the requirements of any other degree or diploma program. The applicant must make advanced credit requests as part of the admission process. Advanced credit will not be given for courses taken more than five years prior to admission application. Credit will not be given for courses taken to bring the grade point average to a required level for graduate studies admission. Advanced credit may not exceed 12 units (2.0 full-course equivalents) or one third of the program whichever is less.

Course Exemptions: Students registered in a graduate degree program may receive an exemption from a specific course if they can demonstrate successful completion of an equivalent course. In order to be eligible

for an exemption, the student must provide original transcripts, course outlines and samples of course assignments which will be assessed for academic equivalency. Courses for which exemptions are being sought must be from a recognized institution, and they must be graded courses with a minimum grade of "B-". Students granted an exemption from a course may be required to take another, equally-weighted, course to satisfy credit-hour requirements for their program.

Program Transfers: A student at the University of Calgary may request a transfer to another program of equivalent level. Any course taken in the initial program may be transferred to the new program, depending on its applicability to the receiving program.

5. Program Requirements

The PhD must include completion of the following academic requirements:

a) Core required courses: Environmental Design 601 (3 units) and Environmental Design 753 (3 units)

b) A minimum of 6 units (1.0 full-course equivalent) of elective credit at the graduate level that is relevant to the student's area of research, chosen in consultation with their supervisor.

c) Additional course work when recommended by the Graduate Program Director in consultation with the student's supervisor and supervisory committee.

d) A thesis proposal approved by the supervisory committee during a committee meeting.

e) A written thesis.

f) Successful completion of all examinations, as described in section 10.

6. Additional Requirements

Attendance at orientation for first year students is expected.

In addition to Faculty of Graduate Studies thesis submission requirements, all PhD students are required to submit one bound copy (bound in standard orange cloth-covered cases, bearing the author's name, title of work, year and the Environmental Design symbol (rainbow) lettered in white), and one portable document format (.PDF) copy.

7. Credit for Undergraduate Courses

Not given.

8. Time Limit

Students are expected to enrol on a full-time basis and complete the degree requirements within four registration years. Maximum completion time is six registration years.

9. Supervisory Assignments

At the time of admission, each student will be assigned an interim supervisor. The Graduate Program Director must approve a permanent supervisor no later than twelve months after first registration.

Within three months of confirming their supervisor, PhD students must establish, in consultation with their supervisor, a supervisory committee. The supervisory committee must include at least two members in addition to the supervisor and co-supervisor, if applicable. Of these two members, at least one must be from outside of the Faculty of Environmental Design.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements for Candidacy and Thesis Examinations, the Faculty of Environmental Design requires:

Candidacy

Doctoral students are required to pass both a Written and an Oral Field of Study examination. For complete details of the examination format and other candidacy requirements, see EVDS Candidacy Requirements.

Thesis Examination

Final thesis oral examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Thesis Proposal Requirements

Approval of a written thesis proposal by the supervisory committee is required prior to undertaking the Field of Study examinations. For further information about the proposal requirements and approval process, see EVDS Candidacy Requirements.

12. Financial Assistance

Financial assistance may be available to highly qualified students but cannot be guaranteed. For information on admission and academic awards, see the Awards and Financial Assistance section of this calendar, the EVDS website and the Awards Database on the Faculty of Graduate Studies website.

Master of Environmental Design (MEDes)

1. Degree Offered

Master of Environmental Design (MEDes) - thesis-based

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements for Admission, the program requires:

a) A clear, concise and substantive statement of interest (1,000 to 1,500 words), which informs the Admissions Committee of:

- The applicant's reasons for pursuing the MEDes degree
- How the applicant's specific educational background and professional and personal experience relates to their proposed thesis project
- The applicant's thesis research interests and ideas to clarify the applicant's supervisory needs
- Any communication the applicant has had with potential supervisors

b) At least one example of the applicant's previous academic or professional work such as a written essay, published research paper, major academic paper, thesis, or consulting report.

In addition, applicants may submit a portfolio that provides examples of or illustrates the applicant's design work, professional work, research, creative thinking, community action, planning products, or graphics and visual communication.

c) A funding plan that demonstrates that financial resources are available for the entire program of study.

d) Three reference letters, of which at least two should be academic.

e) A current copy of curriculum vitae (CV).

f) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

3. Application Deadline

Deadline for submission of complete applications is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/environmental-design-master-environmental-design-thesis-based.

4. Advanced Credit

A student may apply for advanced credit for previous courses that have not been used to satisfy the requirements of any other degree or diploma program. The applicant must make advanced credit requests as part of the admission process. Advanced credit will not be given for courses taken more than five years prior to admission application. Credit will not be given for courses taken to bring the grade point average to a required level for graduate studies admission. Advanced credit may not exceed 12 units (2.0 full-course equivalents) or one third of the program whichever is less.

Course Exemptions: Students registered in a graduate degree program may receive an exemption from a specific course if they can demonstrate successful completion of an equivalent course. In order to be eligible for an exemption, the student must provide original transcripts, course outlines and samples of course assignments which will be assessed for academic equivalency. Courses for which exemptions are being sought must be from a recognized institution, and they must be graded courses with a minimum grade of "B-". Students granted an exemption from a course may be required to take another, equally-weighted, course to satisfy credit-hour requirements for their program.

Program Transfers: A student at the University of Calgary may request a transfer to another program of equivalent level. Any course taken in the initial program may be

transferred to the new program, depending on its applicability to the receiving program.

5. Program Requirements

The MEDes must include completion of the following academic requirements:

a) Core required courses:

Environmental Design 601 (3 units) and

Environmental Design 753 (3 units)

b) A minimum of 6 units (1.0 full-course equivalent) of elective credit at the graduate level that is relevant to the student's area of research, chosen in consultation with their supervisor.

c) A thesis proposal approved by the supervisory committee.

d) A written thesis.

e) Thesis examination, as described in section 10.

6. Additional Requirements

Attendance at orientation for first year students is expected.

In addition to Faculty of Graduate Studies thesis submission requirements, all PhD students are required to submit one bound copy (bound in standard orange cloth-covered cases, bearing the author's name, title of work, year and the Environmental Design symbol (rainbow) lettered in white), and one portable document format (.PDF) copy.

7. Credit for Undergraduate Courses

Only undergraduate courses numbered 500-599 may be considered for graduate-level credit and are subject to approval by the Program Director.

8. Time Limit

Students must complete all degree requirements within four registration years.

9. Supervisory Assignments

At the time of admission, each MEDes student will be assigned an interim supervisor. The Graduate Program Director must approve a permanent supervisor no later than twelve months after first registration.

Within three months of confirming their supervisor, MEDes students must establish, in consultation with their supervisor, a supervisory committee. The supervisory committee must include at least one other member in addition to the supervisor and co-supervisor, if applicable. This additional member must be from outside of the Faculty of Environmental Design.

10. Required Examinations

Thesis Examination

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Thesis Proposal Requirements

The supervisory committee will approve final thesis proposals. Thesis proposals should clearly describe the project in terms of Title, Objectives, Background, Methodology and Expected Outcomes. Students are encouraged to include an explicit interventionist or problem-solving component.

12. Financial Assistance

Financial assistance may be available to highly qualified students but cannot be guaranteed. For information on admission and academic awards, see the Awards and Financial Assistance section of this calendar, the EVDS website and the Awards Database on the Faculty of Graduate Studies website.

Graduate Certificates

1. Certificates Offered

Post-Baccalaureate Certificate in Built and Landscape Heritage

Post-Baccalaureate Certificate in Designing Smart and Secure Communities

Post-Baccalaureate Certificate in Sustainable Urban Design

2. Admission Requirements

In addition to Faculties of Graduate Studies requirements for Admission, the Certificates require the following:

Post-Baccalaureate Certificate in Built and Landscape Heritage

a) A clear, concise and substantive statement of interest (1,000 words), which informs the Admissions Committee of:

- The applicant's reasons for pursuing the Certificate;
- How the applicant's specific educational background and professional experience relates to heritage conservation.

b) One example of the applicant's previous academic or professional work such as a written essay, published research paper, major academic paper, thesis, design project, or consulting report.

In addition, applicants may submit a portfolio that provides examples of or illustrates the applicant's design work, professional work, research, creative thinking, community action, planning products, or graphics and visual communication. The requirements for digital portfolio submissions are found in the Faculty of Environmental Design web site at: evds.ucalgary.ca/admissions.

c) A current copy of the curriculum vitae/ resume.

d) Three reference letters.

e) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

Post-Baccalaureate Certificate in Designing Smart and Secure Communities

a) Statement of interest.

b) A current copy of the full curriculum vitae demonstrating relevant professional experience.

c) Three reference letters.

d) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

Post-Baccalaureate Certificate in Sustainable Urban Design

a) Evidence of original and/or creative work in any field or medium. This could include design work, professional work, research, creative ability, or ideas related to their statement of interest in Urban Design. The requirements for digital portfolio submissions are found in the Faculty of Environmental Design web site at: evds.ucalgary.ca/content/admissions-faculty-environmental-design.

b) Statement of interest.

c) A current copy of the curriculum vitae/ resume.

d) Three reference letters.

e) For applicants who are required to prove proficiency in English, a TOEFL score of 600 (paper-based); or 105 (Internet-based test); or an IELTS score of 7.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

3. Application Deadlines

Deadlines for submission of complete applications are available on the Future Students website:

Post-Baccalaureate Certificate in Built and Landscape Heritage: ucalgary.ca/future-students/graduate/explore-programs/built-landscape-heritage-certificate-course-based

Post-Baccalaureate Certificate in Designing Smart and Secure Communities: ucalgary.ca/future-students/graduate/explore-programs/designing-smart-secure-communities-certificate-course-based

Post-Baccalaureate Certificate in Sustainable Urban Design: ucalgary.ca/future-students/graduate/explore-programs/sustainable-urban-design-certificate-course-based

4. Advanced Credit

Advanced credit is not given.

5. Course Requirements

Post-Baccalaureate Certificate in Built and Landscape Heritage

Students are expected to successfully complete four block-week courses:

Environmental Design 660 (3 units)

Environmental Design 662 (3 units)

Environmental Design 664 (3 units)

Environmental Design 668 (3 units)

Post-Baccalaureate Certificate in Designing Smart and Secure Communities

The Certificate is structured around four core courses. Successful completion of the Certificate requires successful completion of each of the following academic requirements:

Environmental Design 630 (3 units)

Environmental Design 632 (3 units)

Environmental Design 634 (3 units)

Environmental Design 636 (3 units)

Students are expected to take the courses in this order and, in particular, may not take Environmental Design 636 Integrative Project until they have completed the other three courses in the program.

Post-Baccalaureate Certificate in Sustainable Urban Design

The Certificate is structured around a core studio sequence. Related theory courses make up the remainder of the program. Successful completion of the Certificate must include the following academic requirements:

Environmental Design 650 (3 units)

Environmental Design 652 (6 units)

Environmental Design 654 (3 units)

Environmental Design 656 (6 units)

The courses must be taken in the prescribed order.

6. Credit for Undergraduate Courses

Not given.

7. Time Limit

Students registered in the Post-Baccalaureate Certificate in Built and Landscape Heritage are expected to enrol on a full-time basis and complete the program requirements within one registration year. The maximum completion time is three registration years.

Students registered in the Post-Baccalaureate Certificate in Designing Smart and Secure Communities are expected to complete the Certificate in one year. The maximum completion time is two registration years.

Students registered in the Post-Baccalaureate Certificate in Sustainable Urban Design are expected to complete the Certificate in one year. The maximum completion time is two registration years.

8. Financial Assistance

Financial assistance may be available to highly qualified students but cannot be guaranteed. For information on admission and academic awards, see the Awards and Financial Assistance section of this calendar, the EVDS website and the Awards Database on the Faculty of Graduate Studies website.

French, Italian and Spanish FISL

Admissions to this program are suspended as of July 1, 2018.

Contact Information

Location: Craigie Hall, Room D310

Program number: 403.220.4001

Fax: 403.284.3634

Email address: fisgrad@ucalgary.ca

Web page URL: slllc.ucalgary.ca/graduate

1. Degrees and Specializations Offered

Master of Arts (MA), thesis and course-based routes, with specialization in either French or Spanish

The MA degree may be taken on a full-time or a part-time basis.

Please see section 15 for a list of supported research areas.

The Department also participates actively in interdisciplinary degree programs, such as Canadian Comparative Literature (with English) and Film.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires students:

a) To demonstrate a sufficiently high level of oral and written competence in the French or Spanish language.

b) To have an adequate academic background in the discipline.

c) To submit an example of the applicant's written work: a term paper, research paper or other writing, which the applicant considers representative of their best work. The paper must be in either French or Spanish, depending on the language of study.

d) A 250-word (minimum) statement of research interest including research topic and the reasons for wishing to pursue graduate work in this Department.

e) Two reference letters.

3. Application Deadline

Deadline for the submission of complete applications: February 1.

Applications received later than the deadline will be considered for admission and for departmental funding, but chances of financial support are greatly reduced.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be granted for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

Note: Normally no more than 3 units (0.5 full-course equivalent) of Directed Reading may be taken for credit.

In addition to Faculty of Arts requirements, the Department normally requires:

Master of Arts (thesis-based)

Eighteen units (3.0 full-course equivalents), including French 605 or Spanish 601, depending on the language of study.

Master of Arts (course-based)

Thirty units (5.0 full-course equivalents), including French 605 or Spanish 601, depending on the language of study.

Applicants lacking the requisite background in language or literature may be admitted as qualifying students. In this case, extra course work is normally required. A qualifying oral examination based on set texts may be required before the students attain regular Master of Arts status. Courses taken as a qualifying student do not normally count as part of the student's course requirements.

Copyediting

The department prohibits copyediting in students' thesis for the MA or PhD degrees.

6. Additional Requirements

All students must attend the departmental graduate orientation session in September. Attendance at the UofC Graduate Orientation is highly recommended.

a) Both options have a knowledge areas requirement that must be satisfied by the first month of the second year in program, or, as appropriate, one month after the completion of course work, whichever occurs first. Upon admission students will be advised of any specific course or other work needed to fulfill this requirement.

b) Before the end of their second year of study, MA Thesis students are required to make a departmental or external presentation relating to their research.

c) Students in the thesis-based and course-based programs are also expected to demonstrate their participation in university-wide research activities by attending at least five departmental or external scholarly presentations every year in their programs.

7. Credit for Undergraduate Courses

Only in exceptional circumstances and where appropriate to a student's program may graduate credit be received for courses numbered 500-599. No more than 6 units (1.0 full-course equivalent) can be at the 500 level.

8. Time Limit

Expected completion time for full-time students is two years for a thesis program and three years for a course-based program. Maximum completion time is four years for a thesis program and six years for a course-based program.

9. Supervisory Assignments

Newly admitted students begin their programs under the supervision of the departmental Graduate Director. Students are

expected to choose a permanent supervisor by the end of the second regular academic session after first registration (April 30 for September registrants and December 15 for January registrants). Selection of a supervisor should be by mutual agreement between the student and the staff member concerned, approved by the Graduate Director.

10. Required Examinations

Comprehensive examination (course-based)

The course-based program requires a comprehensive examination with a written and an oral component, taken after the completion of all course work and any other requirement such as the knowledge areas requirement. Students are required, as early as possible and, in any case, at least before registering for an eleventh semester to file the reading list on their chosen area of specialization with the Department's Graduate Committee. The list should be drafted after consultation with the student's supervisor and approved by that faculty member.

Final oral thesis examinations are open.

11. Research Proposal Requirements

Thesis students are required to submit a written thesis proposal thirteen months after initial registration (for September registrants: 1st draft to the supervisor is due by September 1 and the thesis proposal to the Graduate Committee is due by September 30; for January registrants: 1st draft to the supervisor is due by January 2 and the thesis proposal to the Graduate Committee is due by February 1).

This proposal should be approximately 1200 words in length and be accompanied by an abstract and an appropriately detailed preliminary bibliography. It should be drafted after consultation with the student's supervisor and have their preliminary approval. These documents will be circulated to the departmental Graduate Committee for approval. Abstracts of proposals may be reproduced for information purposes.

12. Special Registration Information

None.

13. Financial Assistance

Funding is available to qualified thesis-based students in the form of scholarships awards and/or teaching assistantships. Master of Arts students can expect to receive funding for a maximum of 20 months. Students applying for departmental funding for the following academic year must submit their applications to the Department by February 1. All students are strongly encouraged to seek external financial assistance throughout their program. For information on other funding opportunities, see the Awards and Financial Assistance section of this Calendar and the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Geography GEOG

Contact Information

Location: Earth Sciences Building, Room 356

Program number: 403.220.5584

Fax: 403.282.6561

Email address: geograd@ucalgary.ca

Web page URL: geog.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

Master of Science (MSc), thesis-based

Master of Geographic Information Systems (MGIS), course-based with research component

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department of Geography requires all MA/MSc and PhD applicants to submit:

a) A proposal describing applicant's intended research area.

b) A current curriculum vitae or résumé.

c) Two reference letters.

For MGIS applicants the Department requires:

a) A statement of interest outlining the applicant's goals, motivation for applying to the program, and research area of interest.

b) A current curriculum vitae or résumé.

c) Two reference letters.

For the academic background requirements for the MGIS program, the Department will accept a four-year BA or BSc degree in Geography or in any related field that makes use of spatial data. Examples include, but are not limited to: Anthropology, Archaeology, Biological Sciences, Computer Science, Ecology, Environmental Science, Geology/Geophysics, Geomatics Engineering, History, Management, Mathematics, Political Science, Psychology, Tourism, Transportation Studies or Engineering, and Urban Studies.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/geography-master-arts-thesis-based.

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/geography-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/geography-doctor-philosophy-thesis-based.

MGIS: ucalgary.ca/future-students/graduate/explore-programs/geography-master-geographic-information-systems-course-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires the following:

Master of Geographic Information Systems

Thirty units (5.0 full-course equivalents) must be completed while in the program. At least 24 units (4.0 full-course equivalents) of these must be at the 600 level or higher; the remaining 6 units (1.0 full-course equivalent) may be at the 500 level. These will include:

a) Three core courses in Geographic Information Sciences in the areas of Remote Sensing, Spatial Analysis and Geographic Information Systems:

Geography 633 Research and Applications in Remote Sensing

Geography 639 Advanced Spatial Analysis and Modelling

Geography 647 Advanced Research and Applications in Geographic Information Systems

Each course assumes that the student has two undergraduate courses in the areas of Remote Sensing, analytical methods in Geography (or inferential statistics) and Geographic Information Systems, respectively.

b) Two research-based courses related to the area of Geographic Information Science:

Geography 681 GIS Project: Theoretical Issues

Geography 683 GIS Project: Application

These courses will be on a topic mutually agreed upon between the student and the supervisor. The first course will be concerned with gathering information and literature on the research topic and will provide a critical assessment of this literature. This will be written up as a course paper that will equate to the literature review chapter of a traditional thesis. The second research course will be concerned with carrying out a program of analysis in the chosen research area using the Geographic Information Science tools discussed in the core courses. The final paper produced for this course will equate to the analysis and discussion chapters of a traditional thesis.

c) Fifteen units (2.5 full-course equivalents) of additional courses chosen by mutual agreement between the student and the supervisor. These courses will support the student's chosen research project and understanding of the Geographic Information Sciences.

The MGIS program may be completed on a full-time or a part-time basis.

Master of Arts, Master of Science

a) Twelve units (2.0 full-course equivalents) in a two-year period, including History and Philosophy of Physical or Human Geography, and at least one graduate-level methods course in Geography.

b) Four semesters of Geography 601 (Graduate Research Seminars). Students may be exempted from a portion of this requirement by the Graduate Program Director.

c) An approved thesis proposal completed within the first year of the program.

For detailed information on courses and program requirements please refer to: geog.ucalgary.ca.

Full-time status is expected. In some situations thesis programs may be completed on a part-time basis with approval from the Graduate Program Director.

Doctor of Philosophy

a) Six units (1.0 full-course equivalent) during the first two years in program, including History and Philosophy of Physical or Human Geography.

b) Four semesters of Geography 601 (Graduate Research Seminars). Students may be exempted from a portion of this requirement by the Graduate Program Director.

c) An approved thesis proposal completed within the first 20 months of the program.

d) A candidacy exam completed within the first 24 months of the program.

For detailed information on courses and program requirements please refer to: geog.ucalgary.ca.

Full-time status is expected. In some situations thesis programs may be completed on a part-time basis with approval from the Graduate Program Director.

6. Additional Requirements

For thesis programs: participation in the graduate research seminar series and the annual Department Conference.

For MGIS students: participation in the annual graduate student Department conference (oral presentation or development of an academic poster of their project work for presentation/display).

Departures from regular departmental program/course requirements may be recommended on an individual basis by the interim advisor or supervisor with approval from the Graduate Program Director.

7. Credit for Undergraduate Courses

No more than one half of a regular thesis graduate student's coursework can be at the undergraduate level. Programs requiring a larger ratio of undergraduate courses must receive approval of the Dean of Graduate Studies at the time of admission. MGIS students are allowed a maximum of 6 units (1.0 full-course equivalent) credit at the 500 level.

8. Time Limit

Expected completion time is two years in MA/MSc programs and four years in the PhD program. Maximum completion time is four years for MA/MSc programs and six years for the PhD program. For the MGIS Program, minimum completion time is one year and maximum completion time is six years.

9. Supervisory Assignments

Each graduate student has a supervisor appointed within the first term in program. For PhD students, a supervisory committee should be appointed within three months of the appointment of supervisor.

10. Required Examinations

The following program-specific requirements supplement the Faculty of Graduate Studies requirements:

Comprehensive Examination

MGIS oral comprehensive examinations will be based on project and course work. MGIS students will be examined on their comprehensive understanding of course material and their integrated professional knowledge/conception of geographic information science. The examination committee will consist of at least three examiners, including the graduate student advisor, but with no requirement for an external examiner.

Candidacy

PhD candidacy requirements include a written and an oral Field of Study examination. Specific details of the examination format and other candidacy requirements can be found on the Geography website at geog.ucalgary.ca/graduate/regulations.

Thesis Examination

Thesis examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Normally, the review of the research by the Supervisory Committee will be by presentation and discussion of the student's thesis research at a Supervisory Committee Meeting supported by a relevant written sample of the materials related to the thesis. For master's students that do not have a Supervisory Committee, the Supervisor will review the research.

Composition of the Committee

The Internal Examiner must be external to the home program.

11. Research Proposal Requirements

See Program/Course Requirements.

12. Financial Assistance

Department funding is available to highly ranked thesis students. Financial assistance may be available to qualified thesis students. For information on awards, see the Awards and Financial Assistance section of this Calendar or check the Graduate Awards Database: grad.ucalgary.ca/awards.

Unless otherwise stated, awards are made only to full-time students in thesis programs.

Geoscience GEOS

Contact Information

Location: Earth Sciences Building, Room 118

Program number: 403.220.3254

Fax: 403.284.0074

Email address: geosciencegrad@ucalgary.ca

Web page URL: geoscience.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based or course-based (may be taken on a full- or part-time basis)

Within the course-based Master of Science degree, an Interdisciplinary Specialization in Reservoir Characterization is offered. Details can be found in the calendar under Interdisciplinary Specializations.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Science requirements, the Department requires:

Master of Science

a) Normally, a four-year Bachelor of Science degree or equivalent. An Honours degree in geology or geophysics, or a field related to geophysics, such as physics or mathematics, is preferred.

b) A concise statement outlining the applicant's research interests and reasons for wishing to attend the University of Calgary.

c) For those students required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based) or 97 (Internet-based test), an IELTS score of 7.0, a MELAB score of 83, or a PTE score of 68. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

d) Two reference letters.

Doctor of Philosophy

a) Normally, a Master of Science degree or equivalent in geology or geophysics or a field related to geophysics, such as physics or mathematics.

b) A concise statement outlining the applicant's research interests and reasons for wishing to attend the University of Calgary.

c) For those students required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based) or 97 (Internet-based test), an IELTS score of 7.0, a MELAB score of 83, or a PTE score of 68. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

d) Two reference letters.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

Master of Science (course-based): ucalgary.ca/future-students/graduate/explore-programs/geoscience-master-science-course-based.

Master of Science (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/geoscience-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/geoscience-doctor-philosophy-thesis-based.

4. Advanced Credit

Application for credit should be made to the graduate program at the time of admission, so that the previous work can be taken into account when specifying a student's program.

The total of advanced credit and transfer credit in course-based Master's programs will generally not exceed either one-third of the program or 12 units (2.0 full-course equivalents), whichever is less.

Advanced credit is not guaranteed and will be determined by the Graduate Program Director or Department Head with consideration of the recommendation of the Interim Supervisor.

Courses for which advanced credit is being sought must be from a recognized institution and not have been used for any degree or diploma accreditation. They must be graded, graduate-level courses, and the graded level of performance must be equivalent to a "B" grade or higher standing at the University of Calgary. Advanced credit is not normally given for courses taken more than five years before admission to the current graduate degree program or for courses taken for the purposes of qualifying for admission.

5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Science requirements, the Department requires:

Master of Science (course-based)

a) Twenty-seven units (4.5 full-course equivalents), 15 (2.5 full-course equivalents) of which must be at the 600 level or higher (includes Geology 701 or Geophysics 701 research project).

b) Completion of a Research Project (Geology 701 or Geophysics 701). The student is required to present and defend the project in a one-hour defence once the written research report is submitted. The supervisor and two other members of the department assess the project. If an industrial partner is involved, the industrial research supervisor may also assess the project.

c) Completion of at least 18 units (3.0 full-course equivalents) in the first year of study by full-time students, and at least 3 units (0.5 full-course equivalent) in the first academic session by part-time students. Following is a list of required courses for the two concentration areas that are offered.

Geology Course-based Concentration

a) Geology 707.

b) At least 21 units (3.5 full-course equivalents) in geology or geophysics courses at the 500 or 600 level. At a minimum, 18 units (3.0 full-course equivalents) must be at 600 level. Up to four appropriate courses (12 units, 2.0 full-course equivalents) from another department may be substituted for a 500-level geology or geophysics course subject to program approval. Course-based students may receive credit for both Geology 703 and 701. Courses are selected in consultation with the supervisor and with the approval of the Graduate Program Director.

c) Geology 701. This course constitutes the research component of the degree and cannot be submitted and defended until after all other courses are completed.

d) Students with deficiencies may be required to take more than 27 units (4.5 full-course equivalents) upon the advice of their supervisor.

Geophysics Course-based Concentration

a) Four of the following: Geology 707, Geophysics 547, 551, 557, 657, 671, 673.

b) At least 12 units (2.0 full-course equivalents) in other Geophysics courses at the 500, 600 or 700 level. At least four of the eight required courses must be at the 600 or 700 level. One or two appropriate courses from another department may be substituted for a 500-level geology or geophysics course subject to program approval. Course-based students may receive credit for both Geophysics 703 and 701. Courses are selected in consultation with the supervisor and with the approval of the Graduate Program Director.

c) Geophysics 701. This course constitutes the research component of the degree and cannot be submitted and defended until after all other courses are completed.

d) Students with deficiencies may be required to take more than 27 units (4.5 full-course equivalents) upon advice of their supervisor.

Master of Science (thesis-based)

a) Completion of a minimum of 12 units (2.0 full-course equivalents) in the first year of program.

b) Students with deficiencies may be required to take more than 12 units (2.0 full-course equivalents) upon advice of their supervisor.

c) An oral public presentation and defence of thesis.

Doctor of Philosophy

a) Completion of 12 units (2.0 full-course equivalents) in the first year of program.

b) Subject to supervisor and Graduate Program Director approval, some credit may be granted for courses taken during a master's program, to reduce the course requirement. Course requirements may be waived for a maximum of 9 units (1.5 full-course equivalents) for students with Master of Science degree from the Department of Geoscience at the University of Calgary, and 6 units (1.0 full-course equivalent) for students with Master of Science degrees from other programs or institutions.

c) Students with deficiencies may be required to take more than 12 units (2.0 full-course equivalents) upon advice of their supervisor.

d) Students with a Bachelor of Science degree, but no master's degree, to complete a minimum of 15 units (2.5 full-course equivalents), with four in the first year of program.

e) Students in Geology to take Geology 707 during the first academic year in program.

f) Students take either Geology or Geophysics 701 or 703.

g) An oral public presentation and defence of thesis.

6. Additional Requirements

Master of Science (course-based)

Full-time students are normally expected to provide their own financial support and pay tuition and fees as outlined in the graduate student calendar since the department does not normally offer financial support to course-based Master of Science students.

Part-time students may be working in the field of Geology and/or Geophysics. An industrial supervisor can agree to work with the academic supervisor in the Department to supervise and evaluate the student's research project.

7. Credit for Undergraduate Courses

The Department does not give graduate credit for courses taken below the 500-level.

8. Time Limit

Expected completion time is two years for students in thesis-based master's degree programs, two years for full-time students in a course-based master's program, and three or four years for doctoral students. Maximum completion time is four years for students in a thesis-based master's program, and six years for students in a course-based master's program and doctoral students.

9. Supervisory Assignments

Upon admission, a student is assigned an interim supervisor by the Graduate Program Director, either based on prior communication between the student and a prospective supervisor, or chosen from the research field the student has specified. A permanent supervisor (usually the interim supervisor) is appointed within two months. Supervisory committees for doctoral students are selected by consultation between the permanent supervisor and the student.

10. Required Examinations

Candidacy

Doctoral students have a two-hour Field of Study (FOS) oral candidacy examination that must be completed by the twenty-eighth month of the program. The FOS oral examination cannot be attempted until the written thesis research proposal has been passed by the Supervisory Committee.

Questions on the research proposal may be included in the FOS oral candidacy examination. Details of the Department of Geoscience's Doctoral Candidacy Requirements can be found at ucalgary.ca/geoscience/graduate/current_students/form_policies.

Thesis Examination

Master of Science thesis-based and doctoral students have final thesis oral examinations that are open to the public, with a public presentation on the same day.

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Master of Science thesis-based students must file a thesis proposal by March 1 of the second session of study for September registrants and July 1 for January registrants. The thesis proposal must not be more than five pages of text long and include an abstract and a list of references cited in the text. The supervisor will assess the proposal in detail.

PhD students will submit a more substantial thesis research proposal within 18 months of registration. The thesis proposal will be judged a pass or fail by the Supervisory Committee. The thesis research proposal must be passed before the FOS oral examination can be scheduled. Details about the thesis research proposal and the Department of Geoscience's Doctoral Candidacy Requirements can be found at geoscience.ucalgary.ca/graduate/current_students/form_policies.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this calendar.

Students applying for scholarships must have complete applications submitted to the Department by January 15.

No financial support will be given to students enrolled in the course-based master's program.

14. Other Information

The department requires all graduate students complete an Annual Progress Report in May of each year.

No office space will be provided to students enrolled in the course-based master's program.

German GSEA

Admissions to this program are suspended as of July 1, 2018

Contact Information

Location: Craigie Hall, C Block, Room 205

Program number: 403.220.5293

Fax: 403.284.3810

Email address: llc@ucalgary.ca

Web page URL: slllc.ucalgary.ca

1. Degrees and Specializations Offered

Master of Arts degree (thesis-based)

The Department particularly solicits applications from students interested in pursuing a cross-disciplinary degree involving another department at the University of Calgary (e.g., English; History; Philosophy; French, Italian and Spanish).

The Department does not formally offer a part-time option – all students will be considered full-time.

2. Admission Requirements

In addition to the requirements of the Faculties of Graduate Studies and Arts, the Department of Germanic, Slavic and East Asian Studies requires:

a) A letter of intent outlining background, research interests, and goals for the program.

b) An academic writing sample (of approximately 8-15 pages) in English or German.

c) Two reference letters.

3. Application Deadline

Deadlines for the submission of complete applications:

February 1 for September admission

September 1 for January admission (discuss January admission with Department)

Late applications may be accepted but reduce the applicant's chances of receiving funding.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculty requirements, the Department requires:

a) Normally, 18 units (3.0 full-course equivalents) for students who hold a baccalaureate degree.

b) For some students, depending upon background preparation, a course in bibliography and methodology.

c) Sufficient German language skills for the proposed program.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

No more than one-half of a regular graduate student's required program of course work can be at the undergraduate level. Undergraduate courses may be taken for credit only with departmental approval. Programs requiring a larger ratio of undergraduate courses must receive the approval of the Dean of Graduate Studies at the time of admission.

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

8. Time Limit

Expected completion time is two years for the Master of Arts and four years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Arts and six years for the Doctor of Philosophy.

9. Supervisory Assignments

The Graduate Program Director is normally the interim supervisor for students entering the program, and will assist them in finding a supervisor within the first year. In the case of cross-disciplinary degrees, the choice of supervisor must be established upon application to the program.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements, the program requires:

Candidacy

Questions on the research proposal will not be included in the oral candidacy examination of special case doctoral degree students.

Thesis Examination

Final thesis oral examinations are open to the public. In addition to the Faculty of Graduate Studies requirements, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

The department requires all graduate students to submit a written thesis proposal by the sixteenth month of the program. The required form is available on the department website. The proposal should be drafted after the student consults with the supervisor and has preliminary approval.

12. Special Registration Information

None.

13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the Department by February 1.

14. Other Information

As part of the graduate program in German, students may participate in a one-semester exchange with Justus-Liebig-Universität Gießen.

Greek and Roman Studies GRST

Contact Information

Location: Social Sciences Building, Room 558

Program number: 403.220.4831

Fax: 403.210.9191

Email address: grstgrad@ucalgary.ca

Web page URL: clare.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA) degree, thesis or course-based

The MA degree may be completed on a full-time or a part-time basis.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) Normally at least 66 units (11 full-course equivalents) of relevant undergraduate course work are expected for admission to the MA program, with some concentration in the proposed research area.

b) All research areas require proficiency in reading Latin and/or Greek.

c) Competence in reading French, German or Italian must be acquired either before or during the program.

d) For the PhD, an MA is required.

e) Two letters of reference.

3. Application Deadline

Deadline for submission of complete application is available on the Future Students website.

Master of Arts (course-based): ucalgary.ca/future-students/graduate/explore-programs/greek-roman-studies-master-arts-course-based.

Master of Arts (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/greek-roman-studies-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/greek-roman-studies-doctor-philosophy-thesis-based.

4. Advanced Credit

Contact department for information.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts (thesis-based)

a) Greek and Roman Studies 603, first-year course on research and professional training.

b) Twelve units (2.0 full-course equivalents) of other seminar courses, normally taken in the first year of the program; these may include up to 6 units (1.0 full-course equivalent) outside the department if appropriate to the area of specialization.

c) Four directed studies in Greek and Latin texts (Greek or Latin 607), normally taken in Fall and Winter Terms of the first and second year (worth 1.5 units or 0.25 full-course equivalent each). Greek or Latin 607 may be replaced with Greek or Latin 602 and/or 604.

d) Reading knowledge of French or German or Italian into English.

e) A thesis of approximately 20,000 words, with oral examination.

Master of Arts (course-based)

a) Greek and Roman Studies 603, first-year course on research and professional training.

b) Twenty-four units (4.0 full-course equivalents) of other seminar courses; these may include up to 6 units (1.0 full-course equivalent) outside the department if relevant to the student's particular interests in the field.

c) Four courses of directed studies in Greek and Latin texts (Greek or Latin 607), normally taken in Fall and Winter Terms of the first and second year (worth 1.5 units or 0.25 full-course equivalent each). Greek or Latin 607 may be replaced with Greek or Latin 602 and/or 604.

d) Reading knowledge of French or German or Italian.

Doctor of Philosophy

a) Greek and Roman Studies 603, first-year course on research and professional training unless already taken at the Master's level.

b) A minimum of 12 units (2.0 full-course equivalents) of other graduate seminar courses; these may include up to 6 units (1.0 full-course equivalent) outside the department if appropriate to the area of specialization.

c) Four courses of directed studies in Greek and Latin texts (Greek or Latin 607, worth 1.5 units or 0.25 full-course equivalent each). Greek or Latin 607 may be replaced with Greek or Latin 602 and/or 604.

d) Reading knowledge of two of the three following modern languages into English, French, German or Italian.

e) Examination of the Core Reading and Dissertation Reading List (contact the department for further information).

f) A twenty-page dissertation proposal.

g) A Candidacy Exam, which must be passed before 28 months of tenure.

h) A thesis of about 75,000 words, followed by an oral examination.

6. Additional Requirements

The department may require up to two additional courses (6 units or 1.0 full-course equivalent) in order to ensure sufficient preparation in relevant areas for the MA, or four additional courses (12 units or 2.0 full-course equivalents) in order to ensure sufficient preparation in relevant areas for the PhD. Students are advised of any such requirements upon entry into the program.

7. Credit for Undergraduate Courses

Not more than two of the courses (6 units or 1.0 full-course equivalent) required in the thesis-based MA program, and not more than four courses (12 units or 2.0 full-course equivalents) in the course-based program, may be taken at the 500 level.

8. Time Limit

Students studying on a full-time basis are expected to complete the Master's program in two years. Students in thesis-based master's programs must complete their degrees within four years. Students in course-based master's programs must complete their degrees within six years. For the PhD program, students are expected to complete their degrees within six years.

9. Supervisory Assignments

The Graduate Program Director is normally the interim supervisor for a master's student entering the program, and will assist the student to find a supervisor within eight months of entering the program. Doctoral students are expected to have a supervisor upon entry. The appointment of a supervisor is subject to approval by the Department Head.

10. Required Examinations

Candidacy

Doctoral students must complete the following requirements: all required coursework, modern language examinations, written examinations on the core reading list, written and oral Field of Study examinations, and a written thesis proposal. For complete details of the candidacy requirements, see clare.ucalgary.ca/graduate/phd-candidacy-policies.

Thesis Examination

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

Thesis examinations are open.

11. Financial Assistance

The department offers full or partial support through teaching assistantships and Faculty of Graduate Studies Support to selected applicants. The Faculty of Graduate Studies offers numerous awards (e.g., Open Scholarships) in a university-wide competition. See Awards and Financial Assistance.

Various awards are available from other agencies (federal and provincial governments, private foundations, etc.).

Applicants are encouraged to seek funding vigorously. The department can offer advice on identifying sources.

Note: Faculty of Graduate Studies Support and university scholarships are normally

awarded only to students in the thesis-based program.

Haskayne School of Business: Management MGMT

Contact Information

Location:

MBA Program: Scurfield Hall, Room 302

PhD Program: Scurfield Hall, Room 424

DBA Program: Scurfield Hall, Room 333

Phone:

MBA Program: 403.220.3808

PhD Program: 403.220.6073

DBA Program: 403.220.8442

Fax: 403.282.0095

Email address:

mbarequest@haskayne.ucalgary.ca

phdrequest@haskayne.ucalgary.ca

dbarequest@haskayne.ucalgary.ca

Web page URL: haskayne.ucalgary.ca

Degrees Offered

Course-based degrees:

Master of Business Administration (course-based)

Executive MBA (EMBA)

Executive MBA - Global Energy (GEMBA)

Combined MBA programs, offered with other faculties (course-based):

Juris Doctor/Master of Business Administration (JD/MBA)

Master of Biomedical Technology/Master of Business Administration (MBT/MBA)

Master of Business Administration/Master of Public Policy (MBA/MPP)

Master of Nursing/Master of Business Administration (MN/MBA)

Master of Planning/Master of Business Administration (MPlan/MBA)

Master of Social Work/Master of Business Administration (MSW/MBA) - admissions to this program are suspended as of September 1, 2018.

Doctor of Medicine/Master of Business Administration (MD/MBA) ("Leaders in Medicine" Program)

Thesis-based degrees:

Master of Business Administration (thesis-based)

Doctor of Philosophy (PhD)

Doctor of Business Administration (DBA)

MBA (Course-Based), Executive MBA, Executive MBA - Global Energy

1. Degrees and Specializations Offered

Master of Business Administration (MBA) - course-based

Students can complete the Haskayne MBA through full-time study either through the daytime or the evening.

Students in the day option can choose one of two streams: (1) registration over an 8-month (Fall and Winter) period; or (2) registration over a 12-month period. Faculty of Graduate Studies General Fees assessment will align with the selected option (see General Fees Assessed on A Per Term Basis).

MBA Specializations:

- Entrepreneurship and Innovation
- Finance
- Global Energy Management and Sustainable Development
- Global Energy (Executive MBA only)
- Marketing
- Project Management
- Real Estate Studies

Executive MBA (EMBA)

The Executive MBA is offered jointly by the University of Calgary and the University of Alberta on alternate weekends and periodic intensive weeks. Students in the Executive MBA program may choose a specialization in Finance or may elect not to have an area of specialization.

Executive MBA – Specializing in Global Energy (GEMBA)

The material is delivered through six distinct learning modules, each conducted over a period of three to five months. These modules feature intensive two-week residencies providing real-world experiences in international energy centres.

All graduates of the Global Energy Executive MBA receive a specialization in Global Energy.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements for Admission, the MBA program requires:

a) A current résumé.

b) A 250-word response to each of the following questions: "How, considering your career progress to date, does an MBA fit in with your future career goals?" and "When thinking of your own personal successes, were they a result of your own personal skills or your ability to work with others? Please describe".

c) For applicants required to prove proficiency in English, a minimum TOEFL score of 580 (paper-based test), or 97 with no section less than 20 (Internet-based test), or an IELTS score of 7.0 with no section less than 6.0. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

d) Completion of the Graduate Management Admission Test (GMAT*) with a recommended minimum score of 550 or an equivalent Graduate Record Examination (GRE) for the Haskayne MBA with high scores on both verbal and quantitative subcomponents. It is recommended that applicants should place above the 70th percentile on overall test scores. A minimum GMAT score of 600 or an equivalent GRE is required for the thesis program.

For the course-based Day and Evening MBA programs only, applicants with a four-year BComm degree (or equivalent) from a recognized university with a GPA of 3.20 or higher on a four-point scale may apply to have the GMAT requirement waived.

e) Two reference letters.

f) For the course-based Day and Evening MBA program only, the equivalent of at least 2 years of appropriate work experience.

g) For applicants to the Executive MBA (EMBA) delivery formats, the equivalent of at least seven years of work experience, a number of years of which must have carried management or professional responsibility.

h) Applicants to the EMBA specializing in Global Energy must be eligible to travel internationally.

i) Applicants may be interviewed by a member of the Admissions Committee as part of the application screening process.

Note: An applicant who has completed a bachelor's degree with an admission grade point average (GPA) from 2.50 to 2.99 may be admitted to an MBA course-based program as a regular student on the basis of the following equivalent achievement score: [(GPA x 200) + GMAT] >/= 1150.*

**Consult the Haskayne School of Business about the Graduate Management Admission Test.*

Admission Deposit

Successful applicants will be required to confirm their acceptance of an offer of admission into the MBA program with an online non-refundable deposit:

- MBA: $1,500
- Executive MBA: $3,000
- Executive MBA – Global Energy: $5,000

The deposit will be credited toward tuition fees upon registration.

3. Application Deadline

Deadlines are available on the Future Students website:

MBA (course-based): ucalgary.ca/future-students/graduate/explore-programs/management-master-business-administration-course-based.

EMBA: ucalgary.ca/future-students/graduate/explore-programs/management-executive-master-business-administration-course-based.

GEMBA: ucalgary.ca/future-students/graduate/explore-programs/management-global-

energy-master-business-administration-course-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process to the MBA program. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program Requirements

In addition to the requirements of the Faculty of Graduate Studies, the Haskayne School of Business requires:

MBA (course-based)

The MBA degree normally consists of 60 units (10 full-course equivalents). Students may be granted exemption from required courses based upon prior academic preparation and with the approval of the Associate Dean (MBA Program). Students must complete a minimum of 45 units (7.5 full-course equivalents), of which a maximum of 15 units (2.5 full-course equivalents) may be transfer credit from another recognized graduate program, for the MBA degree. Students who have completed a recognized/accredited four-year BComm degree within the last 10 years may be granted exemption from 27 units (4.5 full-course equivalents) and may be required to complete a minimum of 33 units (5.5 full-course equivalents) for the MBA degree, of which zero units may be transfer credit from another recognized graduate program.

Required Courses

- Accounting 601
- Accounting 603
- Business and Environment 777
- Business Technology Management 601
- Entrepreneurship and Innovation 601
- Finance 601
- Management Studies 611
- Management Studies 613
- Management Studies 715
- Marketing 601
- Operations Management 601
- Organizational Behaviour and Human Resources 601
- Organizational Behaviour and Human Resources 721
- Strategy and Global Management 601

For students approved for a BComm exemption, requirements normally will be:

- Entrepreneurship and Innovation 601
- Management Studies 715
- Organizational Behaviour and Human Resources 721
- And 24 units (4 full-course equivalents) elective courses

Specializations

Students must complete 18 units (3 full-course equivalents) elective courses beyond the required courses. Students may select an area of specialization normally consisting of 12 units (2.0 full-course equivalents). Students wishing to specialize may choose from the following areas:

- Entrepreneurship and Innovation
- Finance
- Global Energy Management and Sustainable Development
- Marketing
- Project Management
- Real Estate Studies

Students who elect not to choose an area of specialization may choose instead from various graduate courses offered by the Haskayne School of Business. Subject to the approval of the Associate Dean (MBA Program) and the Faculty of Graduate Studies, graduate courses offered at the University of Calgary outside the Haskayne School of Business may also be taken.

Executive MBA

The delivery format of the program is different from the Haskayne MBA program and requires more integrative types of sessions and activities. However, the program requires many of the same courses as are required in the Haskayne MBA program. The Executive MBA has 42 units of required courses (7 full-course equivalents) with 18 units (3 full-course equivalents) of additional courses for a total of 60 units.

In general, students in this program are expected to follow a general curriculum rather than electing an area-specific specialization. However, there is the opportunity to elect a specialization in Finance.

Required Courses

- Accounting 601
- Accounting 603
- Business Technology Management 601
- Entrepreneurship and Innovation 601
- Finance 601
- Management Studies 611
- Management Studies 613
- Marketing 601
- Operations Management 601
- Organizational Behaviour and Human Resources 601
- Organizational Behaviour and Human Resources 721
- Strategy and Global Management 601
- Management Studies 715
- Business and Environment 777

Finance Specialization

Students taking the Finance specialization will complete 12 units in the area of Finance: Finance 751 (3 units) plus 9 units of 700-level Finance courses.

Executive MBA– Specializing in Global Energy

The delivery format of the program is different from the Haskayne MBA and Calgary-based Executive MBA programs. Course delivery will include more integrative types of sessions and activities, offered in modules in a variety of locations. The course content of the MBA required courses above, will be completed through the alternative delivery format with the added benefits of the networking and alternative scheduling for business career professionals and a real-world global experience with international travel. It is expected that all participants entering the program in a given year will complete the program requirements at the same pace, completing all of them over the same 19-month time frame. The Executive MBA Specializing in Global Energy has the same 42 units of required courses (7 full-course equivalents) with 18 units of additional courses (3 full-course equivalents) for a total of 60 units (10 full-course equivalents) as the other MBA programs. A complete course overview can be found on the Haskayne website.

6. Time Limits

MBA: The day MBA option normally takes 20 months to complete (from first registration, whether in an 8- or 12-month stream), while the evening option normally takes three years. Maximum time limit: six years.

Executive MBA: Participants enter the program as a cohort and are expected to complete the program requirements at the same pace, over the same 20-month time frame.

7. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

All admitted full-time MBA students will be automatically considered for Business scholarships.

Combined MBA Programs

1. Degrees Offered

- Juris Doctor/Master of Business Administration (JD/MBA)
- Master of Biomedical Technology/Master of Business Administration (MBT/MBA)
- Master of Business Administration/Master of Public Policy (MBA/MPP)
- Master of Nursing/Master of Business Administration (MN/MBA)
- Master of Planning/Master of Business Administration (MPlan/MBA)
- Master of Social Work/Master of Business Administration (MSW/MBA) - admissions to this program are suspended as of September 1, 2018.
- Doctor of Medicine/Master of Business Administration (MD/MBA) (“Leaders in Medicine” Program)

Combined degree programs are course-based.

Normally, combined degree programs must be completed full-time during the day.

2. Admission Requirements

An applicant to a combined MBA program must meet the admission requirements of the MBA program, and make a separate application for admission to the other program.

The respective Combined Program Committee will review each application.

Please note that receiving admission to both individual programs does not guarantee admission to the combined program.

For MBA admission requirements, see MBA (Course-Based).

3. Application Deadlines

Application deadlines are available on the Future Students website:

MBA (course-based): ucalgary.ca/future-students/graduate/explore-programs/management-master-business-administration-course-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process to the MBA program. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program Requirements

Attendance at an orientation session is mandatory for all incoming students in all MBA program options.

Combined JD/MBA

A student admitted to the combined JD/MBA program spends the first year doing core studies in one program and the second year doing core studies in the other program. The remaining years in the program combine Law and Business courses in a way that will allow the achievement of both degrees in four rather than five years. Course requirements include:

a) MBA courses (45 units or 7.5 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And one elective course (3 units) in the student's area of interest.

b) Law courses (83 units):

- Law 400, 402, 403, 404, 406, 407, 408, 410, 503, 505, 507, 508, 509, 510 and 602;
- And a minimum of eight 3-unit electives.

Combined MBT/MBA

Course requirements include:

a) MBA courses (54 units or 9 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And four elective courses (3 units each) in the student's area of interest.

b) MBT courses (33 units or 5.5 full-course equivalents):

- Medical Graduate Education 601, 602, 603, 604, 605, 606, 607, 608 and 609
- Medical Science 670, 673, 674.01, 674.02 and 678.

Combined MD/MBA

A student admitted to the MD/MBA program spends the first year in the MBA program, completing a minimum of 36 units (6.0 full-course equivalents).A program will be developed for each student under the guidelines of the Leaders in Medicine program. Course requirements include:

a) MBA courses (45 units or 7.5 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And one elective course (3 units) in the student's area of interest.

b) MD Courses: Please consult the Leaders in Medicine program.

Combined MPP/MBA

Course requirements include:

a) MBA courses (51 units or 8.5 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And three elective courses (3 units each) in the student's area of interest.

b) MPP courses:

- Foundation courses: Public Policy 601 and 603 (may be waived if student has an adequate economics, quantitative and statistics background).
- Core courses: Public Policy 607, 609, 613, 615, 617, 619, 621 and 623.
- One elective course chosen from one of the Public Policy 611 decimalized courses or another non-MBA approved elective.

Combined MSW/MBA

(admissions to this program are suspended as of September 1, 2018)

Course requirements include:

a) MBA courses (48 units or 8 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And two elective courses (3 units each) in the student's area of interest.

b) MSW Courses: See Social Work program description for course requirements.

Combined MN/MBA

Students admitted to the MN/MBA will focus on courses for the MBA during the first year and on MN courses in year two. Typically, the remaining courses required will be completed in year three. Course requirements include:

a) MBA courses (51 units or 8.5 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And three elective courses (3 units each) in the student's area of interest.

b) MN courses (27 units or 4.5 full-course equivalents):

- Nursing 605, 609, 611, 621, 627, 629, 633, 634 and 683.

Combined MPlan/MBA

Students admitted to the MPlan/MBA will focus on courses for the MBA during the first year and on MPlan courses in years two and three. Typically, the Real Estate Studies specialization will be completed in year four. Course requirements include:

a) MBA courses (54 units or 9.0 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And four elective courses (12 units total) in the Real Estate Studies specialization.

b) MPlan courses (45 units or 7.5 full-course equivalents):

- One of Environmental Design Planning 602 or 611;
- One of Environmental Design 620 or 640;
- Environmental Design Planning 621, 625, 626, 627,632, 634, 636 and 644;
- Two Environmental Design elective courses (6 units), chosen from Environmental Design 616, 622, 624, 628, and 671; and
- One elective course (3 units).

6. Time Limits

MBA: six years

MSW/MBA: seven years

7. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

All admitted full-time MBA students will be automatically considered for Business scholarships.

MBA (Thesis-Based)

1. Degree Offered

Master of Business Administration (MBA) - thesis-based

MBA Specializations:

- Entrepreneurship and Innovation
- Finance
- Global Energy Management and Sustainable Development
- Marketing
- Project Management
- Real Estate Studies

Interdisciplinary Specialization:

- Energy and Environmental Systems (See the Calendar section on Interdisciplinary Specializations for further information)

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements for Admission, the program requires:

a) A Bachelor of Commerce with a minimum grade point average of 3.30 on a four-point scale.

b) For applicants required to prove proficiency in English, a minimum TOEFL score of 580 (paper-based test), or 97 with no section less than 20 (Internet-based test), or an IELTS score of 7.0 with no section less than 6.0. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

c) A current résumé.

d) A 250-word response to each of the following questions: “How, considering your career progress to date, does an MBA fit in with your future career goals?” and “When thinking of your own personal successes, were they a result of your own personal skills or your ability to work with others? Please describe”.

e) Completion of the Graduate Management Admission Test (GMAT*) with a recommended minimum score of 550 or an equivalent Graduate Record Examination (GRE) for the Haskayne MBA with high scores on both verbal and quantitative subcomponents. It is recommended that applicants should place above the 70th percentile on overall test scores. A minimum GMAT score of 600 or an equivalent GRE is required for the thesis program.

f) Two reference letters.

g) Applicants may be interviewed by a member of the Admissions Committee as part of the application screening process.

**Consult the Haskayne School of Business about the Graduate Management Admission Test.*

3. Application Deadline

See the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/management-master-business-administration-thesis-based.

4. Advanced Credit

See Advanced Credit section in this Calendar.

5. Course Requirements

a) A minimum of 24 units (4.0 full-course equivalents selected by the student in consultation with their supervisor. Among these 24 units (4.0 full-course equivalents), a course in research methods (Management Studies 773), Business and Environment 777 and Strategy and Global Management 601, or 795 are required. MBA Thesis students are also invited and encouraged to take one or more doctoral-level courses as part of their programs.

b) Approval of each individual’s program by the Director, MBA (thesis-based) Program.

Students who lack courses in one or more of the functional disciplines in management (i.e., accounting, business technology management, finance, organizational behaviour and human resources, operations management, marketing) may be required to take courses in those areas in partial fulfillment of their program either as part of, or in addition to, the normal 24 units (4.0 full-course equivalents) requirement.

6. Additional Requirements

Attendance at an orientation session is mandatory for all incoming students in all MBA program options.

7. Credit for Undergraduate Courses

Credit for undergraduate courses taken prior to admission may be granted based on the approval of the Associate Dean (MBA Program).

8. Time Limit

Five years.

9. Supervisory Assignments

MBA (thesis-based) students are required to have secured a permanent supervisor within the first twelve months of their program.

10. Required Examinations

Thesis Examination

MBA thesis students will complete an oral thesis examination at the end of their programs. The student presentation portion of the thesis examination is public. In addition to Faculty of Graduate Studies regulations for Thesis Examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student’s research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the Haskayne School of Business and from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection. MBA (Thesis) students must secure approval from the supervisor before beginning thesis research.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

MBA Thesis students applying for scholarships must submit their applications to the Program Director by January 15.

All admitted full-time MBA students will be automatically considered for Business scholarships.

Doctor of Philosophy (PhD)

1. Degree and Specializations Offered

Doctor of Philosophy (PhD) in Management

Specializations:

- Accounting
- Business Technology Management
- Entrepreneurship and Innovation

- Environmental Management/Sustainable Development
- Finance
- Marketing
- Organizational Behaviour and Human Resources
- Operations and Supply Chain Management
- Risk Management and Insurance
- Strategy and Global Management

The program requires full-time attendance.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements for Admission, the Haskayne School of Business requires:

a) An MBA degree or equivalent from a recognized institution with a recommended minimum admission grade point average of 3.50 on a four-point scale. Students with an undergraduate or master's degree in an area other than business may be required to complete a qualifying period to gain a general business background before beginning the normal doctoral course requirements.

It is possible to enter the PhD program without an MBA or other master's degree. Consult the Director of the PhD Program for further information.

b) Completion of the Graduate Management Admission Test (GMAT*) with a recommended minimum score of 650, with high scores on both verbal and quantitative subcomponents. (Many successful applicants have earned scores of 700 and above). As an alternative to a GMAT score, results on the Graduate Record Exam (GRE) will be considered. Overall GRE test score in the 85th percentile is the recommended minimum.

c) For those students required to prove proficiency in English, a minimum TOEFL score of 580 (paper-based test), or 97 with no section less than 20 (Internet-based test), or an IELTS score of 7.0 with no section less than 6.0, or a MELAB score of 83, or a PTE score of 68. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

d) Current CV.

e) Two reference letters.

f) A personal statement outlining objectives, intent and commitment to a research program.

g) Availability of a research-active supervisor and resources for the area in which the student wishes to study.

Work experience in business or public organizations will be considered.

**Consult the Haskayne School of Business about the Graduate Management Admission Test.*

3. Application Deadline

See the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/management-doctor-philosophy-thesis-based.

4. Advanced Credit

Course requirements for doctoral students will be based on the student's background and program needs. Credit for previous courses will be provided as appropriate.

5. Course Requirements

The program consists of a minimum of 36 units (6.0 full-course equivalents). Two of these are core courses required of all students. In addition, students choose at least five courses in their chosen area(s) of study and five research methods courses.

a) Two core courses – Management Studies 794 and 795. Students should take Management Studies 795 during the Spring/Summer Sessions between their first and second years.

b) Courses in the area(s) of study: Students will take a minimum of 15 units (2.5 full-course equivalents) in their area(s) of study. Students can choose a major area and a minor area. The major area must be chosen from those offered within the Haskayne School of Business, which represents the student's specialization:

- Accounting
- Business Technology Management
- Entrepreneurship and Innovation
- Environmental Management/Sustainable Development
- Finance
- Marketing
- Operations and Supply Chain Management
- Organizational Behaviour and Human Resources
- Risk Management and Insurance
- Strategy and Global Management

Students will be required to take a minimum of 9 units (1.5 full-course equivalents) from the major area.

c) Minor Area – The minor area of study must complement the major area. It may be chosen from those areas offered within the Haskayne School of Business or from those offered from other faculties. Students will be required to take a minimum of 3 units (0.5 full-course equivalent) in their minor area.

d) Research Methods and Statistics: Students are required to choose either Stream A or Stream B and to take at least two courses in their selected Stream from the following lists:

Stream A: Economics 615/495; Economics 715/497; plus one other course (e.g., Operations Management 799.03)

Stream B: Management Studies 773; 783; plus a qualitative research methods course (e.g., Strategy and Global Management 796)

Nine units (1.5 full-course equivalents) additional courses in research methods and statistics (a total of fifteen units) are required, offered within the Haskayne School of Business or by other faculties.

The typical student will take 36 units (6.0 full-course equivalents) over the first 20 months of the program. The number of courses may vary according to the student's particular program and background. Students work closely with their research-active supervisors who help guide them to the appropriate courses within and outside the School. There is also a requirement to complete courses/workshops at the Teaching and Learning Centre to develop necessary teaching skills.

6. Additional Requirements

Attendance at an orientation session is mandatory for all incoming doctoral students. Regular attendance at seminars offered by the PhD program, their disciplinary Areas, and the School is also required of all doctoral students.

7. Time Limit

Six years.

8. Supervisory Assignments

Doctoral students are required to have secured a permanent supervisor within the first twelve months of their program. A supervisory committee reflective of the student's research interests is required within three months after the permanent supervisor has been approved.

9. Required Examinations

Candidacy Examinations

Doctoral students must pass oral and written Field of Study examinations. For complete details of the examination format and other candidacy requirements, see HSB Candidacy Requirements.

Thesis Examination

Doctoral students will complete an oral thesis examination at the end of their programs. The student presentation portion of the thesis examination is public. In addition to Faculty of Graduate Studies requirements for Thesis Examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

10. Research Proposal Requirements

Students must complete a written thesis proposal, which will be evaluated by the supervisory committee in a meeting. See HSB Candidacy Requirements for further information about the proposal requirements and approval process.

Students whose research involves human subjects must receive approval from the Haskayne School of Business and from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

PhD students applying for scholarships must submit their applications to the Program Director by January 15.

The Haskayne School of Business provides assistance for PhD students in the form of Graduate Assistantships, Faculty of Graduate Studies Scholarships, the Robert Willson Scholarship, and the Marion Janet and Ian Stormont Forbes Graduate Scholarship. Students should also enquire about scholarships available from the Faculty of Graduate Studies.

Doctor of Business Administration (DBA)

1. Degree Offered

Doctor of Business Administration (DBA) - thesis-based

The DBA degree is offered in block format, requiring attendance at two weekend or week-long sessions per semester, such that candidates can continue to work while pursuing their studies.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements for Admission, the program requires:

a) At least 10 years of management experience, including seven years at the senior management or executive level, or at least five years' experience as lecturer/instructor in a relevant field in a college or university program.

b) A post-baccalaureate degree (e.g., MBA or relevant business-focused Master's degree) from a recognized institution with a minimum grade point average of 3.50 on a four-point scale. Students presenting credentials in an area other than business may be required to complete a qualifying period to gain a general business background before beginning the regular doctoral course requirements.

c) Students who do not present an MBA or other master's degree from a recognized postsecondary institution may be considered for admission. Exceptional candidates with a four-year bachelor's degree (i.e, a GPA of 3.50 or higher) who have substantial managerial experience will also be considered. Consult the DBA Program Director for further information.

d) For those students required to prove proficiency in English, a minimum Test of English as a Foreign Language (TOEFL) score of 600 (paper-based test), or 105 (Internet-based test), or an International English Language Testing System (IELTS, academic version) score of 7.5, or a Michigan English Language Battery (MELAB) score of 86, or a Pearson Test of English (PTE) score of 75. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

e) Current CV.

f) Three reference letters from professionals or academics who are knowledgeable about the applicant's career. References from personal friends or relatives will not be accepted.

g) A personal statement outlining objectives, intent and commitment to a research program (2 pages).

h) Availability of a research-active supervisor and resources for the area in which the student wishes to study.

3. Application Deadline

See the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/management-doctorate-business-administration-thesis-based.

4. Advanced Credit

Course requirements for doctoral students will be based on the student's background and program needs. Credit for previous courses will be provided as appropriate.

5. Course Requirements

The program consists of a minimum of 24 units (4.0 full-course equivalents). Eighteen of these are from six core courses required of all students. In addition, students fulfill 6 units from two elective courses.

a) Six core courses (total 18 units):

- Management Studies 703 Philosophy of Science for Business Administration
- Management Studies 705 Critical Research Assessment
- Management Studies 709 Qualitative Research Methods
- Management Studies 711 Quantitative Design and Analysis
- Strategy and Global Management 707 Advanced Strategic Management Tools
- Management Studies 713 Seminars in Advanced Business Management

b) Two of six elective courses (total 6 units):

- Organizational Behaviour and Human Resources 733 Leadership for Change
- Entrepreneurship and Innovation 735 Cultivating Entrepreneurship and Innovation
- Finance 737 Finance and Governance for Managers
- Operations Management 731 Decision-Making for Outcome Optimization
- Management Studies 745 Knowledge Dissemination to Enhance Managerial Practice
- Management Studies 747 Business Economics in the Global Context

6. Additional Requirements

Attendance at an orientation session is mandatory for all incoming DBA students.

7. Supervisory Assignments

Doctoral students are required to have secured a permanent supervisor within the first twelve months of their program. A supervisory committee reflective of the student's research interests is required within three months after the permanent supervisor has been approved.

8. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the Haskayne School of Business and from the University of Calgary Conjoint Faculties Research Ethics Board before beginning data collection.

9. Required Examinations

Candidacy

The candidacy exam will involve the development of an integrative paper which describes the analysis, synthesis and evaluation of research on a well-defined content area and includes the writer's original thoughts and ideas on the topic, based on the available evidence. Adjudication of the soundness of the integrative paper will be conducted by a review of the material by the student's supervisor and two external readers, with an oral exam.

Thesis Examination

Students will complete an oral thesis examination at the end of their program. The student presentation portion of the thesis examination is public. In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

10. Time Limit

All degree requirements must be completed within six registration years.

History HIST

Contact Information

Location: Social Sciences Building, Room 656

Program number: 403.220.3839

Fax: 403.289.8566

Email address: histgrad@ucalgary.ca

Web page URL: hist.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), one-year course-based and two-year thesis-based. Both the one-year and two-year MA programs include significant independent research. The one-year course-based MA program is SSHRC-

eligible and is appropriate for students who intend to proceed to doctoral studies.

Specializations:

- History and Philosophy of Science (MA, thesis-based only)*

**This specialization is offered in co-operation with the Departments of Philosophy.*

2. Admission Requirements

In addition to the requirements of the Faculties of Graduate Studies and Arts, the Department requires:

Master of Arts

a) Normally, a four-year undergraduate program with honours or a major in history. Usually this entails at least 42 units (7.0 seven full-course equivalents) of History courses. Credit may be given for up to 6 units (1.0 full-course equivalent) in other disciplines, if appropriate for the proposed area of study.

b) A minimum admission grade point average of 3.40 on a four-point scale over the final 60 units (10 full-course equivalents) of the undergraduate degree.

c) A copy of a historical research paper, preferably graded, normally at the senior undergraduate level.

d) A 250-word (minimum) statement of research interest including research topics in the major field and the reasons for pursuing a postgraduate degree in history. See hist.ucalgary.ca/research for faculty research areas.

e) Two reference letters.

Doctor of Philosophy

a) Normally, a completed four-year undergraduate program with honours or a major in history and a completed master's degree or the equivalent in history or in a related discipline.

b) A grade point average of 3.70 on a four-point scale in history at the graduate level.

c) A detailed statement of research interests, career goals, and ideas for the thesis topic.

d) A sample of written work, normally a master's thesis chapter or a major research paper completed at the master's level.

e) Two reference letters.

3. Application Deadline

Deadlines for the submission of complete applications are available on the Future Students website:

Master of Arts (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/history-master-arts-thesis-based.

Master of Arts (course-based): ucalgary.ca/future-students/graduate/explore-programs/history-master-arts-course-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/history-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts (thesis-based)

a) A minimum of one year of full-time study at the University of Calgary. Normally, students complete the program in two calendar years.

b) Fifteen units (2.5 full-course equivalents) (including History 690) in two semesters of course work. Master's students will complete their coursework through regularly offered History seminars. See hist.ucalgary.ca/research for faculty research areas.

Students in the History and Philosophy of Science specialization are required to take courses in the relevant departments. Candidates enrolled in the Department of History are expected to work with more than one instructor in History.

Students must take one seminar course (3 units or 0.5 full-course equivalent) in a field unrelated to the student's research interests. In instances where there are no seminars being offered in the student's research field, students may, with permission of the chair of graduate studies, take one 500-level undergraduate seminar but on the understanding that extra course work will be required.

c) A thesis of 80 to 150 pages, including notes, charts, tables and appendices, but excluding bibliography. Students begin thesis preparation as they undertake their course work and may fulfill the requirements for their Master of Arts degree in twelve months.

d) A demonstration of reading knowledge of a second language related to the major field of study prior to the oral thesis defence.

Master of Arts (course-based)

a) Normally, students complete the program in one year of full-time study at the University of Calgary. Students enrolling on a part-time basis are expected to complete the requirements by the end of the Winter Term of their fourth year in the program.

b) A minimum of 18 units (3.0 full-course equivalents), including History 690, in regularly offered History graduate seminars in the Fall and Winter terms; 3 units (0.5 full-course equivalents) may be senior undergraduate courses at the 500 level (but on the understanding that extra course work will be required).

c) Completion of History 651 in the Spring Term as preparation for the Major Research Essay (MRE).

d) Completion of History 653 in the Summer Term, in which a 30- to 40-page MRE is written, modelled on a scholarly research article. The MRE is marked by the student's advisor and an additional faculty member.

e) A demonstration of reading knowledge of a second language related to the student's research interests before the MRE can be accepted.

f) Students enrolled on a part-time basis must complete at least 3 units (0.5 full-course equivalent) per semester in the Fall and Winter terms.

Doctor of Philosophy

a) A minimum of two years of full-time study at the University of Calgary.

b) Twelve units (2.0 full-course equivalents) at the graduate level, including courses in the primary and secondary areas. These courses include:

- Three units (0.5 full-course equivalent) in the primary area as a History 791 reading course;
- Three units (0.5 full-course equivalent) in the secondary area as a History 791 reading course;
- Six additional units (1.0 full-course equivalent) including History 690 (3 units), if not completed in your MA program. Among these, the student may also choose 3 units (0.5 full-course equivalent) outside the Department (requiring the supervisor's approval).

The areas will be defined in detail by the supervisor and the student in consultation with the Supervisory Committee and must be approved by the Department Graduate Studies Committee. The availability of secondary areas and thematic courses will depend on faculty members' expertise. Each of a student's areas must be taught by a different faculty member or as defined by the committee. During the candidacy examination, the student will demonstrate a comprehensive understanding of the primary and secondary areas as well as their particular field of research. The secondary area will be selected from an area of history outside of the primary area.

Primary Areas: Canada; History of Science and Medicine; Latin America; Medieval and Early Modern Europe; Military/Diplomatic; Modern Europe and Britain; United States; Africa; World.

Secondary Areas (to be chosen from outside of Primary Area): Canada; History of Science and Medicine; Latin America; Medieval and Early Modern Europe; Military/Diplomatic; Modern Europe and Britain; United States; Africa; World.

c) A thesis normally of 400 pages, including notes, charts and tables, but excluding bibliography and appendices.

d) A demonstration of reading knowledge of a second language relevant to the student's research prior to the candidacy examination.

e) Written and oral candidacy examinations in primary and secondary areas. The Supervisory Committee consists of a primary area supervisor and a secondary area specialist with the third member being a faculty member normally outside the department whose area of expertise is in the field of study for the student. The History Department urges candidates to take candidacy examinations within 16 months of first registration.

Examinations must be completed within 20 months of first registration.

The doctoral program consists of two terms of coursework relevant to the primary and secondary areas. During the third and fourth terms, students read for the candidacy examinations. Four to five terms of thesis preparation will normally follow.

Copyediting

The graduate program in the Department of History does not permit the use of third-party editors in the preparation of papers and theses.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Students enrolled in the Master of Arts thesis or course-based program may apply for no more than one 500-level course for graduate credit, subject to the approval of the Department. Graduate students taking a 500-level course for graduate credit will be required to complete additional assignments.

8. Time Limit

Expected completion time is 12 to 20 months for the Master of Arts thesis program, 12 months for the Master of Arts course-based program, and four years for the doctoral program.

Maximum completion time is four years for both the Master of Arts thesis program and course-based program, and six years for the doctoral program.

9. Supervisory Assignments

Upon acceptance into the program, students are assigned an interim supervisor. Each student should select a permanent supervisor, subject to the consent of the faculty member, within three months of entering program. Admission to the master's and the doctoral programs is dependent upon the agreement of a faculty member to supervise in an interim capacity.

The supervisor establishes a doctoral supervisory committee in consultation with the student. The Supervisory Committee consists of the primary area supervisor and a secondary area specialist with the third member being a faculty member, normally outside the department, whose area of expertise is in the field of study for the student. The supervisory committee must be selected within three months of the supervisor's appointment (no later than March of the first year of a program).

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements, the Department requires:

Candidacy

Doctoral students must pass oral and written candidacy examinations in their primary and secondary areas. For complete details of candidacy requirements and the examination format, see hist.ucalgary.ca/graduate.

Thesis Examinations

Final thesis oral examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

A doctoral student's supervisory committee must approve a student's Dissertation Proposal after successfully passing their oral candidacy examination. For complete details of the Dissertation Proposal, see hist.ucalgary.ca/graduate.

12. Special Registration Information

Students should plan their courses in consultation with their supervisors, complete the Course Registration Form supplied by the department, obtain the supervisor's signature, and bring their course program to the Graduate Program Director for approval before registration.

13. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their online applications to the Department by February 1.

Interdisciplinary Graduate Program IGP

Contact Information

Note: Admission to this program has been suspended.

Program number: 403.220.6501

Email address: ikubicek@ucalgary.ca

Web page URL: ucalgary.ca/igp

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

Master of Science (MSc), thesis-based

Please note that specializations are determined by the Supervisory Committee in consultation with the Director of the Interdisciplinary Graduate Program. Students are encouraged to select specializations as early as possible, preferably before beginning their programs of study.

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, the Interdisciplinary Graduate Program requires:

a) A statement identifying at least two academic disciplines or interdisciplinary degrees that will be integrated in the MA, MSc or PhD degree.

b) For MA and MSc admission an undergraduate degree in one of the academic disciplines or interdisciplinary degrees that will be integrated in the master's degree. For PhD admission the master's degree must be thesis (research)-based (or equivalent) and in one of the academic disciplines or interdisciplinary degrees that will be integrated in the PhD degree. Please note that applicants who hold non-thesis-based master's degrees must present clear evidence of research experience (e.g., peer-reviewed papers in the research literature) that is equivalent to a thesis (research)-based degree.

c) A grade point average of 3.50 or higher (on the University of Calgary four-point system). For MA and MSc admission this is based on the last two years of the undergraduate degree (minimum of 60 units or 10 full-course equivalents). For PhD admission the overall GPA from the master's degree will be considered.

d) Applicants required to prove proficiency in English must fulfill this requirement in one of the following three ways:

- A TOEFL score of 600 (paper-based test) including at least 5.0 on the Test of Written English (TWE), and a score of at least 50 on the Test of Spoken English (TSE)
- A TOEFL score of 100 on the Internet-based test
- An IELTS score of 7.5

e) Three reference letters on the Interdisciplinary Graduate Program's reference letter forms.

f) An up-to-date curriculum vitae. Please separate refereed and non-refereed research contributions.

g) A concise statement of reasons for applying to the Interdisciplinary Graduate Program, including its fit with career objectives.

h) A research statement (maximum of 1500 words (5 pages)). Please note that this research statement must include the following sections: Background, research questions, literature review, research methodology, intellectual merit of the proposed research, and broader impacts of the proposed research. The research statement should also indicate if ethics approval is required to carry out the proposed research.

i) A statement of interdisciplinarity that:

- Sets out what makes the proposed program of study interdisciplinary
- Specifies how each academic discipline or interdisciplinary degree will inform the research and why each is essential to answering the proposed research questions
- Provides clear evidence that the proposed program of study cannot be undertaken in any other disciplinary or interdisciplinary degree at the University of Calgary

Please note that insufficient academic preparedness for another disciplinary or interdisciplinary degree and absence of an MA, MSc, or PhD program at the University of Calgary in an established disciplinary or interdisciplinary degree are not adequate reasons for pursuing a degree in IGP.

j) Proposed coursework as set out below in Program/Course Requirements.

k) A proposed Supervisory Committee. For MA and MSc admission the Supervisory Committee must consist of at least two people (Supervisor plus one person), one from each identified academic discipline or interdisciplinary degree (maximum of three members). For PhD admission the Supervisory Committee must consist of at least three people (Supervisor plus two people), at least one from each identified academic discipline or interdisciplinary degree (maximum of four members).

l) The proposed Supervisor must provide a letter that:

- Confirms their willingness to supervise the applicant through to completion of the degree
- Supports the proposed research and statement of interdisciplinarity
- Confirms that the proposed research cannot be carried out in their program
- Sets out how the proposed courses and research project will ensure sufficient disciplinary rigor within the program of study
- Explains how the selection of other members of the Supervisory Committee will ensure a balance of interdisciplinary and disciplinarity
- Confirms department/program approval for their role on the Supervisory Committee for this student
- Includes a curriculum vitae that provides evidence of their expertise and experience relevant to the proposed research

m) Each proposed Supervisory Committee Member must provide a letter that:

- Confirms their willingness to serve on the Supervisory Committee through to completion of the degree
- Supports the proposed research and statement of interdisciplinarity
- Confirms that the proposed research cannot be carried out in their program
- Sets out how the proposed courses and research project will ensure sufficient disciplinary rigor within the program of study
- Includes a curriculum vitae that provides evidence of their expertise and experience relevant to the proposed research

n) A proposed completion schedule. The Interdisciplinary Graduate Program does not offer a part-time registration status option. Expected completion time is two years for the MA degree and the MSc degree and four years for the PhD degree. Maximum completion time is four years for the MA degree and the MSc degree and six years for the PhD degree.

o) A funding plan that provides evidence of sufficient financial resources to carry out the program of study. For MA and MSc admission a two-year funding plan is required. For PhD admission a four-year funding plan is required. Applicants must be eligible to hold awards administered by the Faculty of Graduate Studies and the Interdisciplinary Graduate Program. Please note that statements signalling an intention to apply for funding are not sufficient.

p) A statement of availability of, and access to, all resources that are required to carry out the proposed research (e.g., equipment, data, access to respondents, funding for field work).

3. Application Deadline

The Interdisciplinary Graduate Program admits students for a September start through a four-step admissions process. Each step requires specific documentation by a specified date. The decision not to recommend admission can be made at each step in the process. Successful applicants at each step will move to the next step. Unsuccessful applicants at each step will receive a letter informing them that they will not be recommended for admission to the Interdisciplinary Graduate Program.

Step 1 Assessment of eligibility.

Deadline for submission of required documentation: 4:00 pm (MST) January 15

Required documentation:

- Online application
- Application fee
- Academic transcripts for all previous programs of study
- TOEFL or IELTS score (where required)
- Up-to-date curriculum vitae
- Specification of two academic disciplines or interdisciplinary degrees that will be integrated in the Interdisciplinary Graduate Program
- A statement confirming that at time of first registration you are eligible to hold graduate awards administered by the Faculty of Graduate Studies and the Interdisciplinary Graduate Program

Step 2 Assessment of proposed program of study, supervision and funding plan.

Deadline for submission of required documentation 4:00 pm (MST) March 1

Required documentation:

- Statement of career goals and fit with proposed program of study
- Research statement
- Statement of interdisciplinarity
- Proposed coursework
- Proposed completion schedule
- Funding plan
- Statement of availability of, and access to, resources necessary to carry out proposed research
- Three reference letters
- Supervisory Committee package (letters of support from the supervisor and members of Supervisory Committee; curriculum vitae of supervisor and each member of the Supervisory Committee)

Step 3 Admissions Seminar held within three weeks of assessment of proposed program of study, supervision and funding plan.

Step 4 Recommendation to the Faculty of Graduate Studies.

4. Advanced Credit

Requests for advanced credit must be made as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Advanced credit requests may not exceed one-third of the course load identified at the Admission Seminar. PhD applicants may not receive credit for undergraduate courses.

5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements, the Program requires:

For the MA degree and the MSc degree:

- A minimum of four graded courses (12 units or 2.0 full-course equivalents), two per academic discipline or interdisciplinary degree integrated in the program of study
- Additional courses in methodology and statistics as needed
- A maximum of one directed reading course
- At least 75 per cent of the coursework must be at the graduate level

For the PhD degree:

- A minimum of four graded graduate-level courses (12 units or 2.0 full-course equivalents), two per academic discipline or interdisciplinary degree integrated in the program of study
- Additional courses in methodology and statistics as needed
- A maximum of one directed reading course (3 units or 0.5 full-course equivalent)

Copyediting of students' theses is not allowed.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

None.

8. Time Limit

Maximum completion time is four years for a master's program and six years for a doctoral program.

9. Supervisory Assignments

All students must have an approved supervisory committee at the time of admission.

10. Required Examinations

The doctoral candidacy examination has a written component and an oral component. The written component consists of three questions set by the Supervisory Committee. The student has three weeks to complete the written component. The oral component of the candidacy examination will take place one week after the submission of the answers.

Questions on the thesis research proposal will not be included in the oral candidacy examination.

Final thesis examinations are open.

11. Research Proposal Requirements

All students must have a thesis research proposal approved by their Supervisory Committees. For PhD students the thesis research proposal must be approved before the candidacy examination.

12. Special Registration Information

Course registration must be completed manually by completing the Faculty of Graduate Studies Change of Registration form.

13. Financial Assistance

Applicants will not be admitted to the MA degree or the MSc degree without an approved two-year funding plan. Applicants will not be admitted to the PhD degree without an approved four-year funding plan.

Students are required to apply for external and internal awards for which they are eligible. For information on awards and application deadlines, see the Faculty of Graduate Studies website. Students should also check with the Interdisciplinary Graduate Program for internal deadlines.

Applicants: Please note that award deadlines may fall before the application deadline for admission.

Financial assistance may be available from the Interdisciplinary Graduate Program. Priority will be given to students in the first two years of a master's degree or the first four years of a PhD degree. This funding may include an Interdisciplinary Graduate Program Scholarship, a Graduate Teaching Assistantship and/or a Graduate Teaching Fellowship.

Eligibility:

- May not hold or accept full-time employment
- May not hold or accept paid employment that entails 600 or more hours per year

Application:

MA students and MSc students

- Apply directly to the Interdisciplinary Graduate Program on its Awards Competition form
- Deadline: 4:00 pm (MST) January 15

PhD students

- Apply to the Faculty of Graduate Studies – Graduate Award Competition
- Deadline: 4:00 pm (MST) January 15

Kinesiology KNES

Contact Information

Location: Kinesiology B, Room 139B

Program number: 403.220.5183

Email address: knesgrad@ucalgary.ca

Web page URL: ucalgary.ca/knes/future-students/prospective-grad-students

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Specializations (offered only to PhD, MSc students):

- Biomechanics
- Exercise and Health Physiology
- Health, Exercise and Sport Psychology
- Innovation in Pedagogy and Sport Performance
- Neuro-Motor Psychology and Motor Learning
- Nutrition, Metabolism and Genetics
- Rehabilitation
- Sport History
- Sport Medicine

Master of Kinesiology:

Specialization:

- Applied Exercise Physiology

The Master of Kinesiology (MKin) is a full-time course-based program specializing in Applied Exercise Physiology.

Students are normally registered as full-time students however in very exceptional circumstances, registration as part-time students may be recommended by the Faculty of Kinesiology, Associate Dean (Graduate) for subsequent approval by the Dean, Faculty of Graduate Studies or designate.

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Kinesiology requires the following:

Doctor of Philosophy

a) Consent for supervision from an approved Faculty Member in Kinesiology.

b) An appropriate academic background for the area of specialization.

c) A minimum grade point average (GPA) of 3.00 or higher on a four-point scale over the last 60 units (10 full-course equivalents) and/or last two years of study.

d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 86 (Internet-based, with no section less than 20), or 560 (paper-based), or an IELTS score of 6.5 (Academic version, with no section less than 6.0), or a MELAB score of 80, or a PTE score of 59. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "C" on Reading Comprehension & Proficiency III, and "C" on Listening Comprehension & Oral Fluency III.

e) Two reference letters.

f) Written confirmation of external funding in accordance with policies of the Faculty of Kinesiology Graduate Program.

g) A student may request a transfer from the Master of Science degree program to the doctoral degree program, upon the recommendation of the supervisory committee and subsequent approval of the Associate Dean (Graduate) and Dean, Faculty of Graduate Studies.

Master of Science

a) Consent for supervision from an approved Faculty Member in Kinesiology.

b) An appropriate academic background for the area of specialization.

c) A minimum GPA of 3.00 or higher on a four-point scale over the last 60 units (10 full-course equivalents) and/or last two years of study.

d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 86 (Internet-based, with no section less than 20), or 560 (paper-based), or an IELTS score of 6.5 (Academic version, with no section less than 6.0), or a MELAB score of 80, or a PTE score of 59. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "C" on Reading Comprehension & Proficiency III, and "C" on Listening Comprehension & Oral Fluency III.

e) Two reference letters.

Master of Kinesiology

The following are the minimum requirements for applying to the program. Please note, normally applicants with higher GPAs are selected for admission to the program.

a) A minimum grade of "B" or 3.00 in each of the following undergraduate prerequisite courses or equivalents: Anatomy, Exercise Physiology, Biomechanics, Exercise and Sport Psychology and Statistics.

b) A minimum admission GPA of 3.00 or higher on a four-point scale over the last 60 units (10 full-course equivalents) and/or two years of study in Kinesiology or an appropriate academic background for the area of specialization.

c) A demonstrated ability to be self-motivated and capable of independent study as shown in undergraduate studies, volunteer work and/or work experience in exercise science areas will be considered.

d) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 86 (Internet-based, with no section less than 20), or 560 (paper-based), or an IELTS score of 6.5 (Academic version, with no section less than 6.0), or a MELAB score of 80, or a PTE score of 59. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "C" on Reading Comprehension & Proficiency III, and "C" on Listening Comprehension & Oral Fluency III.

e) Two reference letters.

3. Application Deadline

Application deadlines are available on the Future Students web pages:

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/kinesiology-doctor-philosophy-thesis-based.

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/kinesiology-master-science-thesis-based.

Master of Kinesiology: ucalgary.ca/future-students/graduate/explore-programs/kinesiology-master-kinesiology-course-based.

4. Advanced Credit

Advanced credit will be limited to 12 units (2.0 full-course equivalents) with a grade of "B" or higher for students admitted to the Master of Kinesiology program. The student must request advanced credit in writing at the time of application for admission to the Faculty of Kinesiology.

5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Kinesiology requires:

Doctor of Philosophy

A minimum of 9 units (1.5 full-course equivalents) at the graduate level selected according to the student's background research focus and will be approved by the graduate supervisor and supervisory committee.

Master of Science

a) One graduate-level course (3 units or 0.5 full-course equivalent) in statistics.

b) One graduate-level course (3 units or 0.5 full-course equivalent) in research design.

Master of Kinesiology

a) A total of 33 units (5.5 full-course equivalents) at the graduate level.

Core Courses (Required of all students): Kinesiology 605, 606, 615, 617, 673, 691, 692, 697, 715, 717, 773, 775 and 785.

b) A final oral presentation is considered the capstone event. This will be undertaken in conjunction with Kinesiology 715.

6. Credit for Undergraduate Courses

Graduate credit may be granted for courses offered at the 500 level at the discretion of the Associate Dean (Graduate).

7. Time Limit

Doctor of Philosophy

Expected completion time is four years.

Maximum completion time is six years.

Master of Science

Expected completion time is two years.

Maximum completion time is four years.

Master of Kinesiology

Expected completion time is 20 months commencing in September.

Maximum completion time is six years.

8. Supervisory Assignments

Doctor of Philosophy

Master of Science

Supervisor(s) must be identified at the time of admission for thesis-based programs. Within six months of admission, the student and supervisor(s) must select a supervisory committee according to the Faculty of Graduate Studies' procedures. The composition of the supervisory committee must be approved by the Associate Dean (Graduate).

Master of Kinesiology

Not applicable.

9. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the University of Calgary Conjoint Health Research Ethics Board before beginning data collection. Research with animals must receive approval from a University Animal Care Committee.

Doctor of Philosophy

Doctoral students are required to prepare a written thesis proposal and obtain approval from the supervisory committee. For complete details of the proposal requirements, see KNES Candidacy Requirements.

Master of Science

All Master of Science students must present a research proposal to their supervisory committee prior to commencing data collection. The proposal must include the objectives and methodology of the proposed research program as well as the expected contributions to the field. The supervisory committee must approve the thesis proposal before it is submitted to the Faculty of Kinesiology, Associate Dean (Graduate).

Master of Kinesiology

Not applicable.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements, the Faculty of Kinesiology requires:

Doctoral Candidacy

Doctoral students must pass oral and written Field of Study examinations. For complete details of the examination format and other candidacy requirements, see KNES Candidacy Requirements document.

Thesis Examinations (Doctor of Philosophy and Master of Science)

Thesis Oral Examinations are administered according to the Faculty of Graduate Studies' procedures and are open examinations.

Composition of the Committee

The Internal Examiner must be external to the home program.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Prior to a doctoral or a Master's thesis oral examination being scheduled, the following program requirements must be met:

1. The student must provide a relevant written sample of their research which is comprised of the following:

   a) Table of Contents from the thesis;
   b) Thesis chapter or manuscript (prepared, submitted, accepted) for publication. In cases where a thesis chapter may consist of a literature review, it must be from the thesis and not the research proposal.

2. The supervisor must schedule a supervisory committee meeting where the student will present their results to the supervisory committee. The supervisor and supervisory committee members must unanimously:

   a) agree the student has conducted sufficient work on their research project;

   b) approve the relevant written sample of research;

   c) approve the student to write their thesis and schedule a Thesis Oral Examination.

A final copy of supervisory committee meeting minutes must be submitted to the Graduate Program Office confirming that the above requirements have been met. Thesis examinations will not be approved by the Associate Dean (Graduate) until the meeting minutes are received.

Master of Kinesiology

Not applicable.

11. Financial Assistance

Doctor of Philosophy

Evidence of external financial support in accordance with the Faculty of Kinesiology Graduate Program requirements must be provided before admission. This external funding must be in the form of a Supervisor's Grant, external award(s), government funding, etc.

Master of Science

Students are encouraged to apply for external awards, government funding, etc.

Financial assistance may be available to qualified thesis-based students in the form of Graduate Assistantships (Teaching).

For information on other awards, please contact the Faculty of Kinesiology Graduate Program.

Master of Kinesiology

MKin students may apply for Graduate Assistantship (Teaching) positions.

Languages, Literatures and Cultures LLAC

Contact Information

Location: Craigie Hall, Room D310 / Room C205

Program number: 403.220.4001

Fax: 403.284.3634 / 403.284.3610

Email address: llac@ucalgary.ca

Web page URL: slllc.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Specializations:

- Applied Linguistics
- French
- German
- Spanish
- Transcultural Studies

Master of Arts (MA), thesis-based

Specializations:

- Applied Linguistics
- French
- German

- Spanish
- Transcultural Studies

Master of Arts (MA), course-based

Specializations:

- French
- Spanish

The MA degree may be taken on a full-time or a part-time basis.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) A sufficiently high level of oral and written competence in the target language (a recommended minimum of CEFR level B2, ACTFL Intermediate-High, or equivalent. For CEFR standards, see: coe.int/lang-CEFR. For ACTFL standards, see: actfl.org/publications/all.

b) An adequate academic background in one the fields of Modern Languages, Linguistics, Literary, Film or Cultural Studies or other closely related field.

c) An academic writing sample (of approximately 8-15 pages): a term paper, research paper or other writing, which the applicant considers representative of his or her best work.

d) A Statement of intent: 250-word (minimum) statement of research interest including research topic and the reasons for wishing to pursue graduate work in this program.

e) Two reference letters.

Doctor of Philosophy

a) A Master of Arts degree in one of LLAC's areas of specialization, or equivalent.

b) A grade point average of 3.40 (based on a four-point system) on the work of the last two years of study.

c) A sufficiently high level of oral and written competence in the target language (CEFR level C1 or equivalent). For CEFR standards, see: coe.int/lang-CEFR.

d) An adequate academic background in the discipline.

e) A research proposal of approximately 2-3 pages.

f) A sample of critical writing: MA thesis or research paper or other writing, which the applicant considers representative of his or her best work. Either the sample research paper or the research proposal must be submitted in the target language of study.

g) A statement of intent: 250-word (minimum) statement of research interest including research topic and the reasons for wishing to pursue graduate work in this unit.

h) Two reference letters.

3. Application Deadline

Deadline for the submission of complete applications are available on the Future Students website:

Master of Arts (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/languages-literatures-cultures-master-arts-thesis-based.

Master of Arts (course-based): ucalgary.ca/future-students/graduate/explore-programs/languages-literatures-cultures-master-arts-course-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/languages-literatures-cultures-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process, as set out in section Advanced Credit.

5. Program/Course Requirements

Note: Normally no more than 3 units (0.5 full-course equivalent) of Directed Reading may be taken for credit.

In addition to Faculties of Graduate Studies and Arts requirements, the program requires:

Master of Arts (thesis-based)

1) Eighteen units (3.0 full-course equivalents), including LLAC 601 and, depending on research perspective, either LLAC 602 or LLAC 603.

2) A scholarly and/or critical thesis (approximately 100 pages).

Applicants lacking the requisite background in language or literature may be admitted as qualifying students. In this case, extra course work is normally required. A qualifying oral examination based on set texts may be required before the students attain regular Master of Arts status. Courses taken as a qualifying student do not normally count as part of the student's course requirements.

Master of Arts (course-based)

1) Thirty units (5.0 full-course equivalents), including LLAC 601 and, depending on research perspective, either LLAC 602 or LLAC 603.

2) A written essay (of approximately 20 pages), to form the basis for the Capstone Examination.

Applicants lacking the requisite background in language or literature may be admitted as qualifying students. In this case, extra course work is normally required. A qualifying oral examination based on set texts may be required before the students attain regular Master of Arts status. Courses taken as a qualifying student do not normally count as part of the student's course requirements.

Doctor of Philosophy

1) Course Requirements: Eighteen units (3.0 full-course equivalents) beyond the MA. Courses must include LLAC 601 and, depending on research perspective, either LLAC 602 or LLAC 603, unless these courses were taken in the MA program.

2) A Third Language Requirement: All students must demonstrate, at a minimum, reading comprehension of a language other than English and the target language of the PhD program, at a level sufficient for the use and understanding of scholarly material. This language will normally be related to the student's thesis research. The language requirement is deemed to have been satisfied when the student has either:

(i) successfully completed a fourth semester language course;

(ii) successfully completed a language-proficiency examination designed specifically for graduate students by a relevant academic designated specialist. Such an examination tests the student's reading proficiency, by testing his/her understanding of a scholarly article;

or (iii) successfully completed a B1 Common European Framework of Reference (CEFR) examination, when available.

3) A thesis.

Copyediting

The program prohibits copyediting of the students' theses for the MA or PhD degrees.

6. Additional Requirements

a) All students are encouraged to attend University orientation sessions. Students enrolled in a Fall Block week course are encouraged to attend an orientation session at the earliest opportunity.

b) Before the end of their second year of study, MA Thesis students are required to make an internal or external presentation relating to their research.

c) Students in the thesis-based programs are also expected to demonstrate their participation in university-wide research activities by attending internal or external scholarly presentations every year in their programs. A minimum of one workshop on language training (see section (d) below) and at least two other presentations are required. Students should list all presentations attended in their Annual Progress Report.

d) Our graduate students are expected to complete training that will enhance their profile as a Language Teacher. Beyond LLAC 601, training may include further courses such as:

- LANG 615 Second Language Learning and Technology
- LANG 625 Second Language Learning and Cultural Understanding
- LANG 699 Research Seminar in Second Language Learning
- EDER 613 Change and Innovation in Education
- EDER 667 Second Language Reading and Writing
- EDER 669 Aspects of Second Language and Culture
- EDER 696 Special Topics in Education
- DELE/DELF/German CEFR examiner accreditation courses

These courses do not count towards degree requirements.

It is also highly recommended that students avail themselves of other training offered by the Taylor Institute for Teaching and Learning.

e) MA students in French and Spanish have a knowledge areas requirement that must be satisfied by the first month of the second

year in program, or, as appropriate, one month after the completion of course work, whichever occurs first.

Knowledge areas: French

Medieval and Early Modern French Literature and Culture, Modern French Literature and Culture, Contemporary Literature and Culture of France, Franco-Canadian and Québécois Literature and Culture, Francophone Studies (outside Canada), History or Theories of Language, Theories of Culture or Literature.

Knowledge areas: Spanish

Medieval and early Modern Spanish Literature and Culture, Spanish American Literature and Culture to 1900, Modern and Contemporary Peninsular Literature and Culture, Latin American Literature and Culture since 1900, History or Theories of Language, Theories of Culture or Literature.

Details on the knowledge areas can be found at: slllc.ucalgary.ca/graduate/graduate-program-french and slllc.ucalgary.ca/graduate/graduate-program-spanish.

When studying an application for admission, the Graduate Program Director, in consultation with the Graduate Committee, will determine, based on undergraduate transcripts, which of the required knowledge areas have not yet been satisfied. Where the appropriateness of a course to fulfill a knowledge area is in doubt, a syllabus and/or a course description will be requested from the applicant. Upon admission, students will be advised of any specific course or other work needed to fulfill this requirement. Unfulfilled knowledge areas may be accomplished by either completing a graduate course in the area, which will form part of the course requirements (or may be in addition to them), or by completing specific readings under the supervision of an area specialist followed by demonstration of good knowledge of the specific area. This will be in the form of a paper written in response to a specific question, followed by an evaluation of the paper and an oral exam with the area specialist and another member of the School.

f) Graduate students must consult with the Graduate Program Director concerning course selection, leave of absence, course or program withdrawal.-

7. Credit for Undergraduate Courses

Only in exceptional circumstances and where appropriate to a student's program may graduate credit be received for courses numbered 500-599. No more than 6 units (1.0 full-course equivalent) can be at the 500 level.

8. Time Limit

Expected completion time for full-time students is two years for a thesis-based MA, three years for a course-based MA and four years for the Doctor of Philosophy. Maximum completion time is four years for a thesis-based MA, six years for a course-based MA and six years for the Doctor of Philosophy.

9. Supervisory Assignments

Master of Arts

The Graduate Program Director is normally the interim supervisor for newly admitted students. Students are expected to choose a permanent supervisor by the end of the second regular academic session after first registration (April 30 for September registrants and December 15 for January registrants). Selection of a supervisor should be by mutual agreement between the student and the staff member concerned, approved by the Graduate Program Director, and is based on the stated research interests of the students, the disciplinary expertise of faculty members and program capacity.

Doctor of Philosophy

A student is assigned an interim supervisor on admission to the program based on the stated research on interests of the student, the disciplinary expertise of faculty members and Program capacity. Students will normally have a permanent supervisor by the end of the second term of study (usually April) and must finalize supervisory arrangements no later than twelve months after first registration.

Once the student has finalized the choice of a supervisor, a supervisory committee is struck. It will normally consist of the supervisor and two other faculty members from the program. One of the two members of this committee may be external to the program. See Supervision for more information.

10. Required Examinations

Capstone Examination (Course-based MA)

The course-based programs require a capstone comprehensive examination with a written and an oral component, taken after the completion of all course work and any other requirement such as the knowledge areas requirement. Students are required, as early as possible and, in any case, at least before registering for a final semester, to file the reading list on their chosen area of specialization with the program's Graduate Committee. The list should be drafted after consultation with the student's supervisor and approved by that faculty member.

Doctoral Candidacy Examinations

Doctoral students are required to pass written and oral field of study examinations and an oral examination on the thesis proposal. Specific details of the examination format and other candidacy requirements can be found at slllc.ucalgary.ca/graduate/graduate-program-llac.

Thesis Examinations

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Masters of Arts

Thesis students are required to submit a written thesis proposal thirteen months after initial registration (for September registrants: 1st draft to the supervisor is due by September 1 and the thesis proposal to the Graduate Committee is due by September 30; for January registrants: 1st draft to the supervisor is due by January 2 and the thesis proposal to the Graduate Committee is due by February 1). This proposal should be approximately 1200 words in length and be accompanied by an abstract and an appropriately detailed preliminary bibliography. It should be drafted after consultation with the student's supervisor and have his/her preliminary approval. These documents will be circulated to the program's Graduate Committee for approval. Abstracts of proposals may be reproduced for information purposes.

Doctor of Philosophy

Students must prepare a thesis proposal as part of candidacy requirements. Details can be found at slllc.ucalgary.ca/graduate/graduate-program-llac.

13. Financial Assistance

Funding is available to qualified thesis-based students in the form of scholarships, awards and/or teaching assistantships. Students applying for departmental funding for the following academic year must submit their applications to the Department by February 1. All students are strongly encouraged to seek external financial assistance throughout their program. For information on other funding opportunities, see the Awards and Financial Assistance section of this Calendar and the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

14. Other Information

As part of the graduate program in German, students may participate in a one-semester exchange with Justus-Liebig-Universität Gießen.

Law LAW

Contact Information

Location: Murray Fraser Hall

Program number: 403.210.8718

Fax: 403.210.9662

Email address: law@ucalgary.ca

Web page URL: law.ucalgary.ca

1. Degrees and Specializations Offered

Master of Laws (LLM), thesis-based and course-based

Specializations:

- Natural Resources, Energy and Environmental Law
- Energy and Environmental Systems (Interdisciplinary, thesis-based only. See

the calendar section on Interdisciplinary Specializations for further information)

Thesis-based LLM students may elect not to have an area of specialization.

The Faculty also offers a Post-baccalaureate Certificate in Natural Resources, Energy and Environmental Law.

The course-based LLM program and the Post-Baccalaureate Certificate program are available for part-time enrolment.

2. Admission Requirements

In addition to the requirements of the Faculty of Graduate Studies, the Faculty of Law requires, for both the thesis-based and course-based LLM degree programs and the Post-baccalaureate Certificate program:

a) An academic degree in law.

b) For applicants required to provide proof of proficiency in English, a minimum TOEFL Internet-based score of 97, of which the reading, listening and writing component must total 75; or a minimum TOEFL Paper-based score of 580 and a TWE score of 5.5; or the minimum IELTS overall band score of 7.0, with a reading and writing band minimum of 7.0; or a MELAB score of 83; or a PTE score of 68. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

c) Applicants to the LLM program must submit a brief statement of their proposed thesis or major paper and indicate their proposed supervisor. Forms and details are available from the Faculty. For applicants interested in the specialization in Natural Resources, Energy, and Environmental Law, the proposal must be in this area.

d) Two reference letters.

3. Application Deadline

Deadlines for submission of completed applications are available on the Future Students website:

LLM (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/law-master-laws-thesis-based.

LLM (course-based): ucalgary.ca/future-students/graduate/explore-programs/law-master-laws-course-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for courses taken as part of another completed degree/diploma/certificate or for courses taken to bring the grade point average to a required level for admission. Credit may be given for courses taken towards the Faculty of Law's thesis-based or course-based LLM degree program or as part of the Faculty's Post-baccalaureate Certificate program when transferring between programs.

5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements, the Faculty of Law requires:

LLM (thesis-based)

a) Law 703: Graduate Seminar in Legal Research and Methodology. Students must receive a passing grade in this course to advance in the program.

b) Law 705: Graduate Seminar in Legal Theory.

c) At least two additional 600-level courses (6 units or 1.0 full-course equivalent) approved by the Graduate Director. For students in the specialization in Natural resources, Energy and Environmental Law, the courses should be in the areas of natural resources, energy or environmental law or in a related area or from a related discipline with the approval of the Graduate Director.

d) A substantial research thesis, approximately 100 to 125 pages (30,000-38,000 words) in length, exclusive of the bibliography, prepared under the supervision of a faculty member or other suitable person appointed by the Graduate Director. For students in the specialization in Natural resources, Energy and Environmental Law, the thesis should be on a topic in that subject area.

e) Two terms in residence, normally consecutive and normally from September to April. Students usually require at least 15 to 18 months from initial registration for thesis completion and defence.

LLM (course-based)

a) Law 703: Graduate Seminar in Legal Research and Methodology. Students must receive a passing grade in this course to advance in the program.

b) An additional five courses (15 units or 2.5 full-course equivalents) in the areas of natural resources, energy or environmental law or in a related area or from a related discipline with the approval of the Graduate Director. At least two of the five additional courses must be at the 600 level and at least two of the five additional courses must include a research paper evaluation worth at least 50 per cent of the course grade. One of the additional courses may be Law 705, the Graduate Seminar in Legal Theory.

c) Law 706: A major research paper, approximately 50 to 60 pages (15,000–18,000 words) in length, prepared under the supervision of a Faculty member or other suitable person appointed by the Graduate Director and evaluated on a Pass/Fail basis.

Post-baccalaureate Certificate Program

The completion of four courses (12 units or 2.0 full-course equivalents) in the area of natural resources, energy or environmental law or a related area, including at least one with a research paper evaluation worth at least 50 per cent of the course grade and including at least two at the 600 level. All courses require the approval of the Graduate Director.

6. Credit for Undergraduate Courses

Some of the JD courses may be eligible for credit toward the LLM program.

7. Time Limit

a) All requirements for the thesis-based LLM degree must be completed within three calendar years of initial registration.

b) All requirements for the course-based LLM degree must be completed within five years of initial registration. It is expected that full-time students will complete the program in one calendar year.

c) All requirements for the Post-Baccalaureate Certificate program must be completed within three calendar years of initial registration.

d) All requirements for the Special Case PhD must be completed within six calendar years.

8. Supervisory Assignments

Contact the Faculty of Law Graduate Director for information.

9. Required Examinations

In addition to the Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Thesis Examination

Thesis examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee (where applicable), must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

10. Financial Assistance

Financial assistance may be available to qualified students, although funding for course-based LLM and Post-Baccalaureate Certificate students will very rarely be provided. For information on awards, see the Awards and Financial Assistance section of this calendar or the Faculty of Law Calendar or website.

Students applying for scholarships must submit their scholarship applications to the Faculty of Law by the deadlines for completed admission applications.

11. Other Information

Attaining an LLM degree without a Canadian LLB degree will not qualify graduates to practice law in Canada. Inquiries on this issue must be addressed to the appropriate provincial governing body for the legal profession. In Alberta, contact the Law Society of Alberta.

Linguistics LING

The Linguistics Graduate Program is offered through the School of Languages, Linguistics, Literatures and Cultures.

Contact Information

Location: Craigie Hall D, Room 310

Program number: 403.220.6136

Fax: 403.284.3810

Email address: linggrad@ucalgary.ca

Web page URL: slllc.ucalgary.ca/graduate/graduate-program-linguistics

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA)

The norm is full-time study, but part-time study may also be arranged. Full-time study is defined as in the Graduate Calendar (see Student Status) and is not compatible with full-time employment. Status of students with part-time employment will be determined on a case-by-case basis.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) Significant undergraduate training in linguistics, normally including at least one course in syntax and one course in phonology.

b) A statement of purpose specifying the applicant's research interests and reasons for wishing to pursue a Master of Arts degree at the University of Calgary.

c) A sample of previous work in linguistics or a related field (e.g., an Honours undergraduate thesis, or a course paper).

d) For applicants required to provide proof of proficiency in English, a minimum IELTS score of 6.5; OR a minimum TOEFL score of 560 (paper-based) AND a minimum score of 5.0 on the Test of Written English (TWE); OR a minimum TOEFL score of 86 (Internet-based test); OR a MELAB score of 80; OR a PTE score of 59. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "C" on Reading Comprehension & Proficiency III, and "C" on Listening Comprehension & Oral Fluency III.

e) Three reference letters.

Doctor of Philosophy

a) A master's degree in linguistics, or a master's degree in a related field with significant training in linguistics at the graduate level, normally including at least one graduate course in syntax and one graduate course in phonology, with a minimum grade point average of 3.40 on a four-point scale.

b) A statement of purpose specifying the applicant's research interests and reasons for wishing to pursue a doctoral degree at the University of Calgary.

c) A sample of previous work in linguistics or a related field (e.g., a seminar paper or Master of Arts thesis).

d) For applicants required to provide proof of proficiency in English, a minimum IELTS score of 6.5; OR a minimum TOEFL score of 560 (paper-based) AND a minimum score of 5.0 on the Test of Written English (TWE); OR a minimum TOEFL score of 86 (Internet-based test); OR a MELAB score of 80; OR a PTE score of 59. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "C" on Reading Comprehension & Proficiency III, and "C" on Listening Comprehension & Oral Fluency III.

e) Three reference letters.

3. Application Deadline

Application deadlines are available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/linguistics-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/linguistics-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) A departmental presentation relating to the student's thesis research. Continuation in program is dependent upon this presentation being judged acceptable by the faculty members of the Linguistics Department.

b) A minimum of 18 units (3.0 full-course equivalents), including Linguistics 611, 613, and 697.

c) Linguistics 600.

d) Knowledge of a language other than English demonstrated to the satisfaction of the Graduate Studies Committee. The following groups will be judged on acceptance to the program to have met the MA language requirement:

- Students whose mother tongue is not English and who were required to satisfy the English language proficiency requirements for admission to program.
- Students whose mother tongue is English and who provide evidence of past schooling in another language (e.g., schooling in an immersion program in French, German or a First Nations language).
- Students whose mother tongue is English and who provide evidence of having completed a foreign language secondary school credit such as Spanish Language Arts 30, or French Language Arts 31.
- Students whose mother tongue is English and who provide evidence of at least A1 ("Basic User") level of proficiency in another language in the Common European Frame of Reference from a certified testing agency or a recognised academic institution (e.g., university or college) or a recognised language teaching organization.

Students whose mother tongue is English and who cannot provide evidence of prior exposure to another language on admission can meet the MA language requirement during their MA program in the following ways:

- By providing evidence of having received credit for 3 units (0.5 full-course equivalent) for a University of Calgary language course, e.g., Chinese 205, French 209, German 202, Japanese 205, Russian 201.
- By providing evidence of having received credit for one of the following courses: Indigenous Languages 205, Linguistics 551 or 605.

It is the responsibility of the student to provide relevant documentation that the MA language requirement has been met. It is strongly recommended that this program requirement be met within the first 16 months of program. It is the responsibility of the supervisor to ensure that the student meets the deadline for completing this requirement.

Doctor of Philosophy

a) Completion of 18 units (3.0 full-course equivalents) in Linguistics beyond the MA, including Linguistics 611 and 613. Course requirements are normally completed during the first two years.

Note: No more than 6 units (1.0 full-course equivalent) can be taken with the same instructor.

b) Linguistics 600.

c) Knowledge of a language other than English demonstrated to the satisfaction of the Graduate Studies Committee. The following groups will be judged on acceptance to the program to have met the PhD language requirement:

- Students whose mother tongue is not English and who were required to satisfy the English language proficiency requirements for admission to program.
- Students whose mother tongue is English and who provide evidence of past schooling in another language (e.g., schooling in an immersion program in French, German or a First Nations language).
- Students whose mother tongue is English and who provide evidence of having completed a foreign language secondary school credit such as Spanish Language Arts 30, or French Language Arts 31.
- Students whose mother tongue is English and who provide evidence of at least A1 ("Basic User") level of proficiency in another language in the Common European Frame of Reference from a certified testing agency or a recognised academic institution (e.g., university or college) or a recognised language teaching organization.

Students whose mother tongue is English and who cannot provide evidence of prior exposure to another language on admission can meet the doctoral language requirement during their PhD program in the following ways:

- By providing evidence of having received credit for 3 units (0.5 full-course equivalent) for a University of Calgary language course, e.g. Chinese 205, French 209, German 202, or Japanese 205, or Russian 201.
- By providing evidence of having received credit for one of the following courses: Indigenous Languages 205, Linguistics 551 or 605.

It is the responsibility of the student to provide relevant documentation that the doctoral language requirement has been met. This program requirement must be met by the time the thesis proposal is submitted. It is the responsibility of the supervisor to ensure that the student meets the deadline for completing this requirement.

Copyediting

Copyediting of the examination version of the thesis is not permitted. Students may make use of a copyeditor or copyediting service for the final version only of the thesis. The name of the copyeditor or copyediting service must appear on the Acknowledgements page.

Acknowledgement is required whether the copyediting was done by a paid professional or by an acquaintance, friend or family member. Fees for copyediting must be assumed by the student.

6. Credit for Undergraduate Courses

At both the master's and the doctoral level, with the approval of the Graduate Program Director and the Department Head, a student may take for credit a maximum of 6 units (1.0 full-course equivalent) at the undergraduate level. Normally, only 500-level courses are approved as acceptable, and students must provide evidence that such courses represent a necessary contribution to their program.

7. Time Limit

Expected completion time is two years for a master's degree and four years for a doctoral degree. Maximum completion time is four years for a master's degree and six years for a doctoral degree.

8. Supervisory Assignments

Master of Arts

A student is assigned a supervisor on admission to the program based on the stated research interests of the student, the disciplinary expertise of faculty members and Departmental capacity. This faculty member commits to supervising the student's thesis and to advising and mentoring the student. Since research interests can change while in program, students are free to select a different supervisor after admission to program but must finalize supervisory arrangements by the end of the second term of study (usually April). When a student wishes to change supervisor, that choice must be made by mutual agreement between the student and the faculty member concerned, in consultation with the Graduate Program Director.

Doctor of Philosophy

A student is assigned a supervisor on admission to the program based on the stated research interests of the student, the disciplinary expertise of faculty members and Departmental capacity. This faculty member commits to supervising the student's thesis and to advising and mentoring the student. Since research interests can change while in program, students are free to select a different supervisor after admission to program but will normally finalize supervisory arrangements by the end of the second term of study (usually April) and must finalize supervisory arrangements by the end of the second annual registration. When a student wishes to change supervisor, that choice must be made by mutual agreement between the student and the faculty member concerned, in consultation with the Graduate Program Director.

Once the student has finalized the choice of a thesis supervisor, a supervisory committee is struck. It will normally consist of the supervisor and two other faculty members from the Department. One of the two members of this committee may be external to the department. It is desirable to have at least one committee member with supervisory experience at the doctoral level. The supervisory committee must be recommended by the Graduate Program Director and be approved by the Dean of the Faculty of Graduate Studies no later than three months after supervisory arrangements are finalized. This will normally be during the summer of the first year of study, but no later than the third month following the second annual registration. The responsibility for organizing the supervisory committee lies with the supervisor but it should be constituted in consultation with the student.

9. Required Examinations

Doctor of Philosophy Candidacy

Doctoral students must pass a Field of Study examination with oral and written components. For complete details of the examination format and other candidacy requirements, see Linguistics Candidacy Requirements document.

Thesis Examination

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

10. Research Proposal Requirements

Master of Arts

Students in the master's program must complete Linguistics 697.

Doctor of Philosophy

Students in the doctoral program must complete a written thesis proposal, approved by the Supervisory Committee. See Linguistics Candidacy Requirements for further information about the proposal requirements and approval process.

11. Financial Assistance

Financial assistance is normally available to qualified students. Funding is provided to full-time students only. Students are required to inform the department of any part-time employment. Failure to do so will result in revocation of departmental funding.

For information on awards, see the Awards and Financial Assistance section of this calendar. Students applying for scholarships must submit their applications to the Department by January 15.

Students whose applications are complete by January 15 will automatically be considered by the Department for Graduate Research Scholarships and Graduate Assistantship support. In addition, faculty members of this Department may have special project funds for research assistantships.

Information on Departmental assistantships is available on the Department's graduate programs web page: llc.ucalgary.ca/graduate.

Medicine Programs

Contact Information

Graduate Science Education Office

Location: Health Sciences Centre, Room G329

Fax: 403.210.8109

Web page URL: cumming.ucalgary.ca/gse/

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD), thesis-based

Master of Science (MSc), thesis-based

Master of Biomedical Technology (MBT), course-based

Master of Community Medicine (MCM), course-based

Master of Disability and Community Studies (MDCS), course-based

Master of Pathologists' Assistant (MPath), course-based

Joint programs, offered with other Faculties:

The Cumming School of Medicine and the Haskayne School of Business offer a combined Master of Biomedical Technology/ Master of Business Administration (MBT/ MBA) program. Contact either program for further information.

Students in the Cumming School of Medicine and the Departments of Anthropology and Archaeology may choose an interdisciplinary specialization in Biological Anthropology. For further information on the Biological Anthropology specialization, see Interdisciplinary Specializations.

The University of Calgary and Alberta offer a joint Biomedical Engineering Program. For further information, see Biomedical Engineering program description.

In addition, the University of Calgary offers the joint Leaders in Medicine Program leading to MD/Master's or MD/Doctoral degrees. Students applying to the MD/MSc or MD/PhD program must apply individually to each program and complete a supplementary application for the Leaders in Medicine Program.

Further information regarding the Leaders in Medicine Program is provided under the Combined Degrees section in this Calendar.

2. Admission Requirements

In addition to the Faculty of Graduate Studies regulations, the Cumming School of Medicine graduate programs require:

a) Qualifications

Master of Science

- Four-year BSc degree or equivalent
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy

- MSc degree, or relevant master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work if applicable.

Please note that grades in relevant undergraduate course work will also be considered.

b) English Language Proficiency

For applicants required to provide proof of proficiency in the English language:

- A minimum TOEFL internet based score of 105 (with no section less than 20), or TOEFL paper based score of 600, or
- A minimum IELTS overall band score of 7.5 (with no individual band less than 6.0), or
- A minimum MELAB score of 86, or
- A minimum PTE academic version score of 75, or
- Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

c) Immunizations

All students in graduate programs in the Cumming School of Medicine are required to complete a series of immunizations and diagnostic tests as outlined on the Student Immunization Worksheet.

Throughout their graduate program, students are required to ensure that immunizations are current and provide proof of updates to the Cumming School of Medicine. Failure to do so may result in students being removed from the program until such time as adequate proof has been provided. Please note that requirements may change during the program as determined by Alberta Health Services guidelines. Contact your Graduate Program Administrator for more information.

d) Additional Requirements

Refer to the individual program entries for additional program admission requirements.

3. Application Deadline

See ucalgary.ca/future-students/graduate/explore-programs for individual programs' deadlines.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies. Refer to individual programs for additional advanced credit information.

5. Program/Course Requirements

Refer to individual program information.

6. Additional Requirements

Research Integrity Day

Research Integrity Day is a Research Ethics session offered several times each year. All graduate students in the Cumming School of Medicine are required to attend Research Integrity Day in the first year of their program as part of their course requirements. See the Graduate Science Education cumming.ucalgary.ca/gse/current-students/research-integrity-day-requirement for details and to register for the Research Integrity Day session.

Refer to individual program information for any additional requirements.

7. Credit for Undergraduate Courses

Refer to individual program information.

8. Time Limit

According to the Faculty of Graduate Studies regulations, maximum completion times are:

- Six years for a course-based master's program
- Four years for a thesis-based master's program
- Six years for a doctoral program
- Six years for the MD/master's program
- Eight years for the MD/PhD program

For specific program expected time to completion, please refer to individual program information.

9. Supervisory Assignments

Supervisors and supervisory committees are assigned according to the Faculty of Graduate Studies regulations (see Academic Regulations) and are approved by the Graduate Program Director of each program. Master of Science students in the Leaders in Medicine Program must have supervisory committees constituted according to the regulations of the graduate home program. Both master's and doctoral students will also be evaluated and advised by a Joint Liaison Committee composed of the Associate Dean (Graduate Sciences Education) and the Associate Dean (Undergraduate Medical Education).

For specific program supervisory assignment information, please refer to the individual program entry.

10. Research Proposal Requirements

Refer to the individual program sections.

11. Required Examinations

Candidacy

Refer to the individual program sections.

Thesis Examinations

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination. The examination will consist of a public seminar followed by an open oral examination.

For Faculty of Graduate Studies regulations, see Thesis Examinations.

For specific program examination information, refer to the individual program descriptions.

12. Financial Assistance

Refer to the individual program sections.

Medicine, Biochemistry and Molecular Biology MDBC

Contact Information

Location: Health Sciences Centre, Room G329

Program number: 403.220.8306

Fax: 403.210.8109

Email address: bmbgrad@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/BMB

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Specialization:

- Bioinformatics

2. Admission Requirements

All master's thesis and doctoral students are considered full-time. In exceptional circumstances part-time status may be considered and must be approved by the Graduate Program Director.

In addition to Faculties of Graduate Studies and Medicine requirements, the program requires:

a) Qualifications

Master of Science:

- Four-year BSc degree or equivalent;
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy:

- MSc degree, or relevant Master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, four year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work if applicable.

b) English Language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements:

- Master's applicants are required to arrange for the submission of two reference letters and doctoral applicants are required to arrange for the submission of three reference letters. References must follow the guidelines posted on the program's website for prospective students.
- A current curriculum vitae.
- Students must have confirmed a faculty member willing to supervise their studies.
- Endorsement by the Graduate Program Director that the applicant is acceptable and that adequate supervision in the proposed program is available.

Meeting the minimum admission criteria above does not guarantee acceptance into the program. Applications will be ranked according to academic excellence, prior research experience and commitment to the study of biochemistry and molecular biology.

3. Application Deadline

MSc program: See ucalgary.ca/future-students/graduate/explore-programs/biochemistry-molecular-biology-master-science-thesis-based.

PhD program: See ucalgary.ca/future-students/graduate/explore-programs/biochemistry-molecular-biology-doctor-philosophy-thesis-based.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program Requirements

Master of Science

The minimum academic course requirement is normally 6 units (1.0 full-course equivalent) which is met by:

- The satisfactory completion of Biochemistry and Molecular Biology (Medical Science 721), or Advanced Genetics (Medical Science 641.01) in the first year;
- The satisfactory completion of another 3 unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.
- Bioinformatics specialization students are required to take the Fundamentals of Bioinformatics course Medical Science 679).

Doctor of Philosophy

The minimum academic course requirement is normally 9 units (1.5 full-course equivalents) which is met by:

- The satisfactory completion of Biochemistry and Molecular Biology (Medical Science 721), or Advanced Genetics (Medical Science 641.01) in the first year;
- The satisfactory completion of two additional 3 unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.
- Bioinformatics specialization students are required to take the Fundamentals of Bioinformatics course (Medical Science 679).

Exceptions require the approval of the Graduate Program Director.

6. Additional Requirements

Each student is required to participate regularly in journal club and work-in-progress seminar programs administered by the Institute or Research Group to which the student and supervisor belong, and the student will present at least one journal club seminar and one work-in-progress presentation per year.

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Under exceptional circumstances, credit may be given for courses taken below the 600 level. At least one half of a graduate student's course work must be at the 600 level or higher. Students may receive credit for completing a course numbered 500-599 providing that the course is recommended by the supervisory committee and approval is received by the Graduate Program Director.

8. Time Limit

For a thesis-based MSc program, maximum completion time is four years. Expected completion time is two years.

For a doctoral program, maximum completion time is six years. Expected completion time is four years.

9. Supervisory Assignments

Students typically apply for admission into the program after identification of a supervisor. As an alternative, the Biochemistry and Molecular Biology Graduate Program has an optional rotation program that may last up to six months. This allows the graduate student and the potential supervisor time to learn more about each other's research interests and available research projects. The student will spend two months in each laboratory of up to three faculty members. After the rotation program, the student will select a permanent supervisor. Alternatively, a student may begin the program with a permanent supervisor, if such arrangements have been made prior to arrival.

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the students and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of supervisor and co-supervisor (if applicable), plus two additional members, must be in place no later than 3 months after the appointment of the permanent supervisor.

10. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For additional information about the PhD research proposal, refer to: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

11. Required Examinations

Candidacy

Candidacy must be completed within 28 months (for MSc to PhD transfers) or 24 months (direct entry PhD) from the program start date. Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) attend Research Integrity Day (3) have their thesis proposal approved at a proposal evaluation meeting, and (4) successfully complete a Field of Study oral examination.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program.

Specific details of the examination format and other candidacy requirements can be found at: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final

Thesis Oral Examination. The examination will consist of a public seminar followed by an open oral examination. In addition to FGS regulations for Thesis Examinations, the program has the following requirements:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

12. Financial Assistance

All students who are accepted into the Program and are full-time will receive a minimum stipend ($21,000 per annum for MSc students and $23,000 per annum for PhD students) generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self-funding is not an option, except for MD holders also enrolled in a clinical training program.

Students are expected to apply to external agencies for financial support from scholarships or studentship awards and for University of Calgary Scholarships (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Some awards provide stipends in excess of the program minimum. More information on awards can be obtained from the office of the Biochemistry and Molecular Biology Graduate Program.

13. Other Information

Descriptions of courses with biochemistry and molecular biology content at the University of Calgary are included under Biochemistry (BCEM), Cellular, Molecular and Microbial Biology (CMMB) and Medical Science (MDSC) listings.

Potential additional graduate-level courses for BMB students:

Biochemistry 731

Medical Science 604

Medical Science 605 (Computer Science 605)

Medical Science 609.02

Medical Science 613.05

Medical Science 619.01

Medical Science 621.01

Medical Science 631

Medical Science 639.02

Medical Science 640

Medical Science 641.01

Medical Science 641.04

Medical Science 671

Medical Science 675

Medical Science 679

Medical Science 721

Medical Science 751.09

Medicine, Biomedical Technology MDBT

Contact Information

Location: Health Sciences Centre, Room G347B

Program number: 403.210.6689

Fax: 403.210.8109

Email address: mbtgrad@ucalgary.ca

Web page URL: wcm.ucalgary.ca/gse/programs/master-biomedical-technology-mdbt-0

1. Degrees and Specializations Offered

Master of Biomedical Technology (MBT), course-based

The Master of Biomedical Technology Graduate Program and the Haskayne School of Business offer a combined MBT/MBA program. Contact the Graduate Science Education Office for further information.

All students are considered full-time. Part-time status may be considered and must be approved by the Graduate Program Director.

2. Admission Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the program requires:

a) Qualifications:

- Normally, a four-year BSc degree in biological sciences or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

b) English Language Proficiency:

See Medicine Programs.

c) Immunizations:

See Medicine Programs.

d) Additional Requirements:

- Applicants are required to arrange for the submission of two reference letters. References must follow the guidelines posted on the program's website for prospective students.
- A current curriculum vitae.
- A Vision Statement (no more than one page in length) outlining career goals, and how the MBT program will help to achieve them.

Suggested Preparatory Courses: Genetics (Biology 311 or equivalent), Cellular and Molecular Biology (Biology 331 or equivalent), Biochemistry or macro molecules (Biochemistry 393 or equivalent), and senior-level course work in at least two of the following subject areas: microbiology, immunology, pharmacology and/or physiology.

3. Application Deadline

See the Future Students website at ucalgary.ca/future-students/graduate/explore-programs/biomedical-technology-master-biomedical-technology-course-based.

4. Advanced Credit

In consultation with the Graduate Program Director, advanced credit may be requested in accordance with Faculty of Graduate Studies regulations. Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the program requires:

a) 27 units of courses:

- Medical Graduate Education 601 (1 unit - Fall Term)
- Medical Graduate Education 602 (1 unit - Fall Term)
- Medical Graduate Education 603 (1 unit - Fall Term)
- Medical Graduate Education 604 (1 unit - Fall Term)
- Medical Graduate Education 605 (1 unit - Fall Term)
- Medical Graduate Education 606 (1 unit - Winter Term)
- Medical Graduate Education 607 (1 unit - Winter Term)
- Medical Graduate Education 608 (1 unit - Winter Term)
- Medical Graduate Education 609 (1 unit - Winter Term)
- Medical Science 673 (3 units - runs over Fall and Winter)
- Medical Science 674.01 (6 units - runs over Fall and Winter)
- Medical Science 674.02 (6 units - runs over Fall and Winter)
- Medical Science 678 (3 units - runs over Fall and Winter)

b) 6-unit practicum Medical Science 670 (runs over Spring and Summer)

It is required that MDBT students will successfully complete all Fall and Winter courses prior to beginning their practicum.

6. Additional Requirements

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Credit will not be given for undergraduate-level courses.

8. Time Limit

It is recommended that the program be completed in one year on a full-time basis. It may also be completed on a part-time basis with the Director's approval.

9. Supervisory Assignments

The Graduate Program Director will serve as interim supervisor for all newly admitted

students. In the MBT program, there is no official requirement for students to have a supervisor. We do recommend, however, that students have a faculty supervisor and/or a mentor from the business community.

Master's students in the Leaders in Medicine program will be evaluated and advised by a Joint Liaison Committee composed of the Associate Dean (Graduate Sciences Education) and the Associate Dean (Undergraduate Medical Education).

10. Financial Assistance

None.

Medicine, Cardiovascular and Respiratory Sciences MDCV

Contact Information

Location: Health Sciences Centre, Room 341B

Program number: 403.210.6689

Fax: 403.210.8109

Email address: cvrgrad@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/programs/cardiovascular-respiratory-sciences

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

2. Admission Requirements

All MSc and PhD students are considered full-time. In exceptional circumstances part-time status may be considered and must be approved by the Graduate Program Director.

In addition to the Faculty of Graduate Studies and Cumming School of Medicine regulations, the program requires:

a) Qualifications

Master of Science

- Four year BSc degree or equivalent
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy

- MSc degree, or relevant master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, four year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work if applicable.

b) English language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements

- Master's applicants are required to arrange for the submission of two reference letters and doctoral applicants are required to arrange for the submission of three reference letters. References must follow the guidelines posted on the program's website for prospective students.
- Students must have confirmed a faculty member willing to supervise their studies.
- Endorsement by the Graduate Program Director that the applicant is acceptable and that adequate supervision in the proposed program is available.

Meeting the minimum admission criteria above does not guarantee acceptance into the program. Applications will be ranked according to academic excellence, prior research experience and commitment to the study of cardiovascular and respiratory sciences.

3. Application Deadline

Deadlines for submission of required documents are available on the Future Students website:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/cardiovascular-respiratory-sciences-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/cardiovascular-respiratory-sciences-doctor-philosophy-thesis-based.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

The amount of course work to be undertaken is determined by the student's supervisory committee; however, it also must meet the minimum requirements of the program.

Master of Science

a) The minimum academic course requirement is normally 6 units (1.0 full-course equivalent). At least one course (3 units) should be from the list of recommended MDCV graduate courses.

Doctor of Philosophy

The minimum academic course requirement is normally 9 units (1.5 full-course equivalent). At least two courses (6 units total) should be from the list of recommended MDCV graduate courses.

Students holding a completed BSc degree entering the PhD program are required to successfully complete a minimum of 9 units (1.5 full-course equivalents).

Students holding a completed MSc degree in the same area of study entering the PhD program are required to complete a minimum of 3 units (0.5 full-course equivalent) provided that a minimum of 6 units (1.0 full-course equivalent) were completed during their MSc program.

Students transferring from the MSc program to the PhD program are required to complete a minimum of one additional 3 units (0.5 full-course equivalent).

Students holding a completed MSc degree in an unrelated field of studies entering the PhD program are required to complete a minimum of 9 units (1.5 full-course equivalents) unless otherwise agreed by the student's supervisory committee.

6. Additional Requirements

Each student is required to participate regularly in journal club and work-in-progress seminar programs administered by the Institute or Research Group to which the student and supervisor belong, and the student will present at least one journal club seminar and one work-in-progress presentation per year.

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Under exceptional circumstances, credit may be given for courses taken below the 600 level. At least one half of a graduate student's course work must be at the 600 level or higher. Students may receive credit for completing a course numbered 500-599 providing that the course is recommended by the supervisory committee and a written approval is received by the program director.

8. Time Limit

Completion times follow the Faculty of Graduate Studies regulations (see Time Limits):

- Maximum completion time for a thesis-based master's program is four years. Expected completion time is two years.
- Maximum completion time for a doctoral program is six years. Expected completion time is four years.

9. Supervisory Assignments

The selection of a graduate supervisor must be by mutual agreement between the student and the faculty member concerned at the time of application to the program and approved by the Graduate Program Director. The supervisor will be a member of one of the recognized research institutes within the Cumming School of Medicine (e.g. Libin Cardiovascular Institute, Hotchkiss Brain Institute, Snyder Chronic Disease Institute, etc.).

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of supervisor and co-supervisor (if applicable), plus two additional members, must be in place no

later than 3 months after the student's first registration in the program.

10. Required Examinations

Doctoral Candidacy

Candidacy requirements must be completed within 28 months (for MSc to PhD transfers) or 24 months (direct entry PhD) from the program start date. Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) attend Research Integrity Day (3) have their thesis proposal approved at a proposal evaluation meeting, and (4) successfully complete a Field of Study oral examination.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program. Specific details of the examination format and other candidacy requirements can be found at: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination (see Thesis Examinations). The examination will consist of a public seminar followed by an open oral examination.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For additional information about the PhD research proposal, refer to: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

12. Financial Assistance

All students who are accepted into the program and are full-time will receive a minimum stipend ($21,000 per annum for MSc students and $23,000 per annum for PhD students) generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self-funding is not an option except for MD holders also enrolled in a clinical training program.

Students are expected to apply to external agencies for financial support from scholarships or studentship awards and for University of Calgary Scholarships (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Medicine, Community Health Sciences MDCH

Contact Information

Location: Health Sciences Centre, Room G345C

Program number: 403.210.7051

Fax: 403.210.8109

Email address: chsgrad@ucalgary.ca

Web page URL: ucalgary.ca/communityhealthsciences

The Department of Community Health Sciences offers a number of degrees and specializations. Details on the course-based master's degrees are presented first, followed by the thesis-based degrees.

Further information on degree offerings can be obtained from the Department's website.

Course-Based Degrees

1. Degrees and Specializations Offered

a) Master of Community Medicine (MCM) a course-based degree available only to physicians registered in the Public Health and Preventive Medicine Residency Training Program.

b) Master of Disability and Community Studies (MDCS), a course-based degree examines the intersection between community, disability, chronic illness, and marginalizing conditions within a social justice framework. The goal is to generate research, leadership, capacity, innovation, and partnerships. The graduate program attracts professionals across disciplines and sectors. The MDCS is offered in an alternate delivery format (combined face-to-face and online) and has a differential tuition fee.

2. Admission Requirements

a) MCM

- Currently enrolled in the Royal College Residency Training Program in Public Health and Preventive Medicine at University of Calgary
- Hold an MD or equivalent degree
- Meet the admission requirements of the Department of Community Health Sciences
- Two letters of reference

b) MDCS

- Minimum admission grade point average of 3.30 on a four-point scale over the last two full years or equivalent
- Three years of experience in a field of practice in community rehabilitation
- A written statement and professional profile of past education and work experience
- Two letters of reference

c) For applicants required to provide proof of proficiency in the English language:

See Medicine Programs.

3. Application Deadline

a) MCM - January 31 for September admission

b) MDCS - January 31 for September admission

4. Advanced Credit

a) MCM - Applicable graduate courses may be considered.

b) Completed at a satisfactory level (minimum "B+") and within three years of admission to the graduate program, may be credited toward a student's degree requirements.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the Department requires:

a) MCM - A minimum of 36 units (6.0 full-course equivalents), in combination with the Public Health and Preventive Medicine Residency Program.

b) MDCS - A minimum of 36 units (6.0 full-course equivalents).

Course descriptions and detailed outlines of courses offered by the Department of Community Health Sciences are found on the website at wcm.ucalgary.ca/gse/current-students.

They are also listed in the Courses of Instruction section of this Calendar.

6. Credit for Undergraduate Courses

The Department does not normally give credit for undergraduate courses.

7. Time Limit

a) MCM - Expected completion time is within 6 years (maximum six years).

b) MDCS - Expected completion time is 3 years (maximum six years).

8. Supervisory Assignments

a) MCM - A Supervisor must be named as part of the admission process. The Supervisory Committee must be named prior to planning the Community Health Sciences 602: Practicum in Public Health and Preventive Medicine, usually in the second term of the second year of the student's program.

b) MDCS - A faculty member is assigned as a supervisor prior to the final project; supervisory committee is not required.

9. Required Examinations

a) MCM - A final comprehensive written and oral examination with respect to the course content, plus a practicum evaluation.

b) MDCS - A capstone project with a public presentation and paper will be required for completion of the degree. For further details, please see the Department website.

10. Research Proposal Requirements

a) MCM – A formal research proposal is not necessary, however a practicum proposal is required.

b) MDCS – Not applicable.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

Thesis-Based Degrees

1. Degrees and Specializations Offered

a) Doctor of Philosophy (PhD)

b) Master of Science (MSc)

Specializations:

- Biostatistics (see Interdisciplinary Specializations for further information)
- Community Rehabilitation and Disability Studies
- Epidemiology
- Healthcare Epidemiology
- Clinical Epidemiology
- Health Economics
- Health Services Research
- Medical Education
- Population/Public Health

Within the thesis-based programs, the student must select a specialization from the list above.

Descriptions of each specialization and its requirements are found on the website at: cumming.ucalgary.ca/gse/programs/community-health-sciences.

2. Admission Requirements

In addition to the Cumming School of Medicine requirements, the program requires:

a) Minimum admission grade point average of 3.30 on a four-point scale over the last two years consisting of a minimum of 60 units (10 full-course equivalents).

b) For applicants required to provide proof of proficiency in the English language:

See Medicine Programs.

c) A statement outlining the applicant's interest and reasons for choosing the program.

d) A letter from a faculty member of our Department indicating interest in supervising the applicant.

e) Work and/or research experience in the health system, community rehabilitation and/or disability studies is highly recommended.

f) Two letters of reference.

3. Application Deadline

The deadlines for the submission of complete applications are available on the Future Students website:

Master of Science (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/community-health-sciences-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/community-health-sciences-doctor-philosophy-thesis-based.

Students applying to the MD/MSc or MD/PhD program must apply individually to each program and complete a supplementary application for the Leaders in Medicine Program.

4. Advanced Credit

Open Studies Students may take courses before applying for admission to a graduate program. However, these students are not eligible to enrol in the Block Week course: Introduction to Community Health Sciences (Community Health Sciences 600) and three core courses, Essentials of Biostatistics (Community Health Sciences 610), Fundamentals of Epidemiology (Community Health Sciences 640) and Health Research Methods (Community Health Sciences 681). A maximum of 6 units (1.0 full-course equivalent), completed at a satisfactory level (minimum "B+") and within three years of admission to the graduate program, may be credited toward a student's degree requirements. Completing courses does not guarantee admission into the program.

5. Program/Course Requirements

All students must complete the Block Week course: Community Health Sciences 600: Introduction to Community Health Sciences.

The additional program requirements are as follows:

Master of Science

Biostatistics

See Interdisciplinary Specializations for further information.

Community Rehabilitation and Disability Studies (CRDS) - Minimum of 24 units (4 full-course equivalents)

Core Course

Community Health Sciences 600

Required Courses for Specialization

Community Rehabilitation 630

6 units (1.0 full-course equivalent) in CRDS

Minimum of 3 units (0.5 full-course equivalents) in quantitative research methods

Minimum of 3 units (0.5 full-course equivalents) in qualitative research methods

A minimum of 6 units (two 3-unit specialization courses) determined with the supervisor.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Practicum/Internships

Arranged in conjunction with supervisor.

Epidemiology - Minimum of 21 units (3.5 full-course equivalents)

Core Courses

Community Health Sciences 600, 610, 640, 681

Required Courses for Specialization

Community Health Sciences 611, 740

Electives

At least one 3-unit graduate course appropriate to the advancement of thesis research topic and agreed upon with the supervisor.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Clinical Epidemiology - Minimum of 27 units (4.5 full-course equivalents)

Core Courses

Community Health Sciences 600, 610, 640, 681

Required Courses for Specialization

Community Health Sciences 611, 641, 647, 741

Electives

At least one 3-unit graduate course appropriate to the advancement of thesis research topic and agreed upon with supervisor.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Healthcare Epidemiology - Minimum of 27 units (4.5 full-course equivalents)

Core Courses

Community Health Sciences 600, 610, 640, 681

Required Courses for Specialization

Community Health Sciences 611, 649, 643

Medical Science 611 or 613.02

Electives

At least one 3-unit graduate course appropriate to the advancement of thesis research topic and agreed upon with supervisor.

Additional Seminars

Students are required to attend weekly Infectious Diseases Rounds, and the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Practicum

Practice half-time (i.e. about 15– 20 hours/week) in an infection control capacity for a period of 3–6 months.

Health Economics - Minimum of 21 units (3.5 full-course equivalents)

Core Courses

Community Health Sciences 600, 610, 640, 681

Required Courses for Specialization

Two of the following three courses (minimum of 6 units):

Community Health Sciences 661, 662, 663

Electives

At least one 3-unit graduate elective appropriate to the advancement of thesis research topic and agreed upon with the supervisor.

Additional Seminars

Students are required to attend the monthly Health Economics and Health Technology Assessment seminars and the CHS-OIPH weekly seminar. Additional seminars may recommended by the student's supervisor/committee.

Health Services Research - Minimum of 21 units (3.5 full-course equivalents)

Core Courses

Community Health Sciences 600, 610, 640, 681

Required Courses for Specialization

Community Health Sciences 660

Electives

At least two graduate electives (6 units) appropriate to the advancement of thesis research topic and agreed upon with the supervisor.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Medical Education - Minimum of 18 units (3 full-course equivalents)

Core Courses

Community Health Sciences 600

Required Courses for Specialization

Community Health Sciences 627, 628, 629, 630, 631

Electives

None required. Students may take additional graduate courses appropriate to the advancement of the thesis research topic and agreed upon with supervisor.

Additional Seminars

Students are required to attend the weekly Medical Education Journal Series and the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Population and Public Health - Minimum of 24 units (4 full-course equivalents)

Core Courses

Community Health Sciences 600, 610, 640, 681

Required Courses for Specialization

Community Health Sciences 680, 683

Electives

Minimum of two graduate courses (6 units) appropriate to the advancement of thesis research topic and agreed upon with the supervisor.

Additional Courses

Students will be advised in their offer of admission if any courses in addition to the 24 units of required coursework listed above are deemed necessary; the admissions evaluators will determine this in consideration of the student's prior learning (transcripts), experience, and their intended research focus.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Doctor of Philosophy

Biostatistics

See Interdisciplinary Specializations for further information on program requirements.

Community Rehabilitation and Disability Studies (CRDS) - Minimum of 6 units (1 full-course equivalent)

Core Courses

All incoming PhD students are expected to have completed the core courses required at the master's level. If they have not completed the core courses, they must either complete them during the PhD program, or request an exemption from the Graduate Program Director based on completing equivalent courses at another university.

Required Courses for Specialization

Community Rehabilitation 730

Courses appropriate to the advancement of the thesis research topic are required. These are selected in consultation with Supervisor/Committee, must be approved by the Graduate Program Director, and may include the Required Courses for Specialization at the Master's level if not previously completed. **Note:** All course work must be completed prior to the PhD Candidacy Examination.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Practicum/Internships

Arranged in conjunction with the student's supervisor/committee.

Epidemiology - Minimum of 9 units (1.5 full-course equivalents)

Core Courses

All incoming PhD students are expected to have completed the core courses required at the master's level. If they have not completed the core courses, they must either complete them during the PhD program, or request an exemption from the Graduate Program Director based on completing equivalent courses at another university.

Required Courses for Specialization

Other courses appropriate to the advancement of the thesis research topic. These are selected in consultation with Supervisor/Committee, require Graduate Program Director approval and must include the Required Courses for Specialization at the Master's level if not previously completed. Suggested courses for consideration include:

Community Health Sciences 661, 664, 741. **Note:** All course work must be completed prior to the PhD Candidacy Examination.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Health Economics - Minimum of 24 units (4 full-course equivalents)

Core Courses

All incoming PhD students are expected to have completed the core courses required at the master's level. If they have not completed the core courses, they must either complete them during the PhD program, or request an exemption from the Graduate Program Director based on completing equivalent courses at another university.

Courses will be selected with the supervisor and receive Graduate Program Director approval depending on the student's master's training and as appropriate to the advancement of the thesis research topic.

Required Courses for Specialization

Students are expected to have completed the required courses for the Health Economics specialization at the Master's level. If they have not completed the required courses, incoming students are expected to complete two of the three courses (6 units) as required for the specialization at the Master's level.

Electives

At least four electives (12 units, including advanced methods courses) appropriate to the advancement of the thesis research topic and agreed upon with the Supervisor. **Note:** All course work must be completed prior to the PhD Candidacy Examination.

Additional Seminars

Students are required to attend the monthly Health Economics and Health Technology Assessment seminars and the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Health Services Research - Minimum of 9 units (1.5 full-course equivalents)

Core Courses

All incoming PhD students are expected to have completed the core courses required at the master's level. If they have not completed the core courses, they must either complete them during the PhD program, or request an exemption from the Graduate Program Director based on completing equivalent courses at another university.

Courses will be selected with the supervisor and receive Graduate Program Director approval depending on the student's master's training and as appropriate to the advancement of the thesis research topic.

Required Courses for Specialization

Students are expected to have completed the required course for the Health Services Research specialization at the Master's level or request an exemption from the Graduate Program Director based on completing equivalent courses at another university.

In consultation with the supervisor, and with the Graduate Program Director's approval, students are expected to complete at least three (9 units) advanced methods courses (at the 600 or 700 level) either from the following list (Community Health Sciences 611, 664, 683, 741, 761) or from another department.

Electives

Electives appropriate to the advancement of thesis research topic and agreed upon with the supervisor. **Note:** All course work must be completed prior to the PhD Candidacy Examination.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Medical Education - Minimum of 12 units (2 full-course equivalents)

Core Courses

Community Health Sciences 600

All incoming PhD students are expected to have completed the core course required at the master's level. If they have not completed the course, they must either complete it during the PhD program, or request an exemption from the Graduate Program Director based on completing equivalent courses at another university.

Required Courses for Specialization

All incoming PhD students are expected to have completed the specialization courses or equivalents required at the master's level.

Complete a minimum of 9 units (1.5 FCE) of coursework, including: (i) Community Health Sciences 730 (6 units), and (ii) a graduate level methods course (3 units) appropriate to the student's dissertation work, available within the Cumming School of Medicine or elsewhere on campus, that has been agreed upon by the supervisor and/or supervisory committee.

Electives

Students may elect to take additional courses which benefit their needs and interests.

Note: All course work must be completed prior to the PhD Candidacy Examination.

Additional Seminars

Students are required to attend the weekly Medical Education Journal Series and the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

Population and Public Health - Minimum of 9 units (1.5 full-course equivalents) of core and specialization courses.

All incoming PhD students are expected to have completed the core courses required at the master's level. If they have not completed them, they must either complete the core courses in the PhD program or request an exemption from the Graduate Program Director based on completing equivalent courses at another university.

Core Courses

Community Health Sciences 600 and 680

Required Courses for Specialization

Community Health Sciences 681 (or 3 units of relevant advanced research methods coursework as approved by the Graduate Program Director).

Additional Courses

Students will be advised in their offer of admission if any courses in addition to the 9 units of required coursework listed above are deemed necessary; the admissions evaluators will determine this in consideration of the student's prior learning (transcripts), experience, and their intended research focus.

Electives

Any electives are to be determined in consultation between the student and their Supervisor/Supervisory Committee.

Note: All course work must be completed prior to the PhD Candidacy Examination.

Additional Seminars

Students are required to attend the CHS-OIPH weekly seminar. Additional seminars may be recommended by the student's supervisor/committee.

6. Additional Requirements

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

The program does not normally give credit for undergraduate courses.

8. Time Limit

Completion times follow the Faculty of Graduate Studies regulations (see Time Limits):

- Maximum completion time for a thesis-based master's program is four years. Expected completion time is two years.
- Maximum completion time for a doctoral program is six years. Expected completion time is four years.

9. Supervisory Assignments

The selection of a graduate supervisor must be by mutual agreement between the student and the faculty member concerned at the time of the application to the program and approved by the Graduate Program Director. Supervisors must commit to supporting the student for the duration of their graduate studies, before admission is recommended.

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of a supervisor and co-supervisor (if applicable), plus two additional members, must be in place no later than 3 months after the student's first registration in the program.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements, the program requires:

Candidacy

For the PhD candidacy exam the student and Supervisory Committee establish a concept map outlining the student's study area and an accompanying reading list. The Supervisory Committee develops three exam questions that meet the competency requirements as outlined by the Department. These questions are derived from the concept map and reading list developed for each student. Questions on the research proposal are not included. The student has three weeks to prepare written solutions to the three questions. The oral examination follows seven days later.

Revised candidacy requirements will be posted in the 2018-2019 academic year.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination (see Thesis Examinations). The examination will consist of a public seminar followed by an open oral examination.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

The proposal is usually 12 to 15 single-spaced, typed pages. Appendices are permitted and should include the research instrument and, if the research involves agencies or institutions outside of the Department, their written permission to conduct the research. The Supervisory Committee must approve the formal Thesis Proposal prior to students commencing their research. Research proposals should be submitted and approved within 12 months of the start of program. For PhD students, the final version needs to be approved at least 3 months prior to admission to candidacy.

After approval by the student's Supervisory Committee and before commencement of data collection, all proposals are submitted to the Conjoint Health Research Ethics Board for ethical review, and some are submitted to the appropriate committee for impact review.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

The Department's deadline for applications to the Graduate Award Competition is January 15. Funding opportunities can be found at grad.ucalgary.ca/awards and wcm.ucalgary.ca/gse/programs/community-health-sciences.

Medicine, Gastrointestinal Sciences MDGI

Contact Information

Location: Health Sciences Centre, Room G329

Program number: 403.220.8306

Fax: 403.210.8109

Email address: gigrad@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/programs/gi-im-mid

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

All master's thesis and doctoral students are considered full-time. In exceptional circumstances part-time status may be considered and must be approved by the Graduate Program Director.

Specializations:

- Physiology
- Biochemistry
- Molecular Biology
- Pharmacology
- Immunology
- Immunopharmacology
- Microbiology
- Nutrition
- Parasitology
- Pathology
- Epidemiology
- Host-Pathogen Interactions

2. Admission Requirements

In addition to the Faculty of Graduate Studies and the Cumming School of Medicine requirements, the program requires:

a) Qualifications

Master of Science

- Four-year BSc degree or equivalent
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy

- MSc degree, or relevant master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, four-year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work, if applicable.

b) English language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements

- Applicants are required to arrange for the submission of two reference letters. References must follow the guidelines posted on the program's website for prospective students.
- Students must have confirmed a faculty member willing to supervise their studies.
- Endorsement by the Graduate Program Director that the applicant is acceptable and that adequate supervision in the proposed program is available.

Meeting the minimum admission criteria does not guarantee acceptance into the program. Applications are ranked according to academic excellence, prior research experience and commitment to the study of gastrointestinal sciences.

3. Application Deadline

Application deadlines are available on the Future Students web pages:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/gastrointestinal-sciences-doctor-philosophy-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/gastrointestinal-sciences-doctor-philosophy-thesis-based.

Students applying to the MD/Masters or MD/PhD program must apply individually to each program and complete a supplementary application to the Leaders in Medicine program.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the Department requires:

Master of Science

The minimum academic course requirement is normally 6 units (1.0 full-course equivalents) which is met by:

- The satisfactory completion of Gastrointestinal Physiology (Medical Science 637.01) in the first year, and
- The satisfactory completion of another 3 unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Doctor of Philosophy

The minimum academic course requirement is normally 9 units (1.5 full-course equivalents) which is met by:

- The satisfactory completion of Gastrointestinal Physiology (Medical Science 637.01) in the first year, and
- The satisfactory completion of two additional 3-unit graduate-level courses (1 full-course equivalent) in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Exceptions require the approval of the Graduate Program Director.

To qualify for an approved specialization, the supervisor and/or at least one member of the supervisory committee should have expertise in that specialization and the research in the thesis should be largely based in that discipline. In addition, the student should complete graduate course work deemed relevant/required by the supervisor and the supervisory committee for the student to be competent in the specialization.

6. Additional Requirements

Each student is required to participate regularly in the Synder Institute graduate program seminar series and present at least one work in progress seminar per year.

Contributions to journals, relevant journal clubs and/or seminars are an expectation. Visit the program website at cumming.ucalgary.ca/gse/programs/gi-im-mid for additional information.

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Under exceptional circumstances, credit may be given for courses taken below the 600 level. At least one half of a graduate student's course work must be at the 600 level or higher. Students may receive credit for completing a course numbered 500-599 providing that the course is recommended by the supervisory committee and approval is received by the Graduate Program Director.

8. Time Limit

Completion times follow the Faculty of Graduate Studies regulations (see Time Limits):

- Maximum completion time for a thesis-based master's program is four years. Expected completion time is two years.
- Maximum completion time for a doctoral program is six years. Expected completion time is four years.

9. Supervisory Assignments

The selection of a graduate supervisor must be by mutual agreement between the student and the faculty member concerned at the time of application to the program and approved by the Graduate Program Director.

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of supervisor and co-supervisor (if applicable), plus two additional members, must be set up no later than 3 months after the student's first registration in the program.

10. Required Examinations

Doctoral Candidacy

In addition to the Faculty of Graduate Studies regulations (see Candidacy), the program requires the following:

Candidacy must be completed within 28 months (for MSc to PhD transfers) or 24 months (direct entry PhD) from the program start date. Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) attend Research Integrity Day (3) have their thesis proposal approved at a proposal evaluation meeting, and (4) successfully complete a Field of Study oral examination.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program. Specific details of the examination format and other candidacy requirements can be found at: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination (see Thesis Examinations). The examination will consist of a public seminar followed by an open oral examination.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For additional information about the PhD research proposal, refer to: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

12. Financial Assistance

All students who are accepted into the program and are full-time will receive a minimum stipend ($21,000 per annum for MSc students and $23,000 per annum for PhD students) generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self-funding is not an option except for MD holders also enrolled in a clinical training program.

Students are expected to apply to external agencies for financial support from scholarships or studentship awards and for University of Calgary Scholarships (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Some program awards are also available, dependent on funding. Some awards provide stipends in excess of the program minimum. Please see the program website: cumming.ucalgary.ca/gse/programs/gi-im-mid.

Medicine, Immunology MDIM

Contact Information

Location: Health Sciences Centre, Room G329

Program number: 403.220.8306

Fax: 403.210.8109

Email address: imgrad@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/programs/gi-im-mid

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Specialization:

- Host-Pathogen Interactions

Faculty members are affiliated with the Cumming School of Medicine and the Faculties of Science and Veterinary Medicine.

The Immunology Graduate Program is offered in collaboration with the above faculties, and the curriculum has been designed for students with undergraduate or MSc degrees in those faculties. Background experience, qualifications, and areas of interest of applicants will be taken into account at the time of admission.

Students in the MSc and PhD degree programs are normally considered full-time.

2. Admission Requirements

In addition to the Faculty of Graduate Studies and the Cumming School of Medicine requirements, the program requires:

a) Qualifications

Master of Science

- Four-year BSc degree or equivalent
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy

- MSc degree, or relevant master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, four-year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work, if applicable.

b) English Language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements

- Applicants are required to arrange for the submission of two reference letters. References must follow the guidelines posted on the program's website for prospective students.
- An undergraduate course in immunology (Cellular, Molecular and Microbial Biology 527 or equivalent). It will be possible for a student to take Medical Science 640 during the first year of their program if they do not have an appropriate prerequisite course.
- Students must have confirmed a faculty member willing to supervise their studies.
- Endorsement by the Graduate Program Director that the applicant is acceptable and that adequate supervision in the proposed program is available.

Meeting the minimum admission criteria does not guarantee acceptance into the program. Applications are ranked according to academic excellence, prior research experience and commitment to the study of gastrointestinal sciences.

3. Application Deadline

Application deadlines are available on the Future Students web pages:

Master of Science (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/immunology-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/immunology-doctor-philosophy-thesis-based.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the Immunology Graduate Program requires:

Master of Science

The minimum academic course requirement is normally 6 units (1.0 full-course equivalents) which is met by:

- The satisfactory completion of Cellular and Molecular Immunology (Medical Science 639.02) or Inflammation (Medical Science 639.04) in the first year, and
- The satisfactory completion of another 3-unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Doctor of Philosophy

The minimum academic course requirement is normally 9 units (1.5 full-course equivalents) which is met by:

- The satisfactory completion of Cellular and Molecular Immunology (Medical Science 639.02) and Inflammation (Medical Science 639.04) in the first year, and

- The satisfactory completion of another 3-unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Exceptions require the approval of the Graduate Program Director.

6. Additional Requirements

Each student is required to participate regularly in the Synder Institute graduate program seminar series and present at least one work in progress seminar per year.

Contributions to journals, relevant journal clubs and/or seminars are an expectation. Visit the program website at cumming.ucalgary.ca/gse/programs/gi-im-mid for additional information.

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Under exceptional circumstances, credit may be given for courses taken below the 600 level. At least one half of a graduate student's course work must be at the 600 level or higher. Students may receive credit for completing a course numbered 500-599 providing that the course is recommended by the supervisory committee and approval is received by the Graduate Program Director.

8. Time Limit

Completion times follow the Faculty of Graduate Studies regulations (see Time Limits):

- Maximum completion time for a thesis-based master's program is four years. Expected completion time is two years.
- Maximum completion time for a doctoral program is six years. Expected completion time is four years.

9. Supervisory Assignments

The selection of a graduate supervisor must be by mutual agreement between the student and the faculty member concerned at the time of the application to the program and approved by the Graduate Program Director. Supervisors must commit to supporting the student for the duration of their graduate studies, before admission is recommended.

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of supervisor and co-supervisor (if applicable), plus two additional members, must be in place no later than 3 months after the student's first registration in the program.

10. Required Examinations

Candidacy

In addition to the Faculty of Graduate Studies regulations (see Candidacy), the program requires the following:

Candidacy must be completed within 28 months (for MSc to PhD transfers) or 24 months (direct entry PhD) from the program start date. Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) attend Research Integrity Day (3) have their thesis proposal approved at a proposal evaluation meeting, and (4) successfully complete a Field of Study oral examination.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program. Specific details of the examination format and other candidacy requirements can be found at: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination (see Thesis Examinations). The examination will consist of a public seminar followed by an open oral examination.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For additional information about the PhD research proposal, refer to: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

12. Financial Assistance

All students who are accepted into the program and are full-time will receive a minimum stipend ($21,000 per annum for MSc students and $23,000 per annum for PhD students) generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self-funding is not an option except for MD holders also enrolled in a clinical training program.

Students are expected to apply to external agencies for financial support from scholarships or studentship awards and for University of Calgary Scholarships (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Some program awards are also available, dependent on funding. Some awards provide stipends in excess of the program minimum. Please see the program website: cumming.ucalgary.ca/gse/programs/gi-im-mid.

13. Other Information

The Immunology Graduate Program offers the following courses:

Medical Science 639.02

Medical Science 639.04

Medical Science 640

Information regarding the courses can be obtained at cumming.ucalgary.ca/gse/programs/gi-im-mid.

Medicine, Microbiology and Infectious Diseases MDMI

Contact Information

Location: Health Sciences Centre, Room G329

Program number: 403.220.8306

Fax: 403.210.8109

Email address: midgrad@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/programs/gi-im-mid

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc) thesis-based

2. Admission Requirements

In addition to the Faculty of Graduate Studies and the Cumming School of Medicine requirements, the program requires:

a) Qualifications

Master of Science

- Four-year BSc degree or equivalent
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy

- MSc degree, or relevant master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, four-year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work, if applicable.

b) English Language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements

- Applicants are required to arrange for the submission of two reference letters. References must follow the guidelines posted on the program's website for prospective students.
- Students must have confirmed a faculty member willing to supervise their studies.
- Endorsement by the Graduate Program Director that the applicant is acceptable and that adequate supervision in the proposed program is available.

Meeting the minimum admission criteria does not guarantee acceptance into the program. Applications are ranked according to academic excellence, prior research experience and commitment to the study of gastrointestinal sciences.

3. Application Deadline

Application deadlines are available on the Future Students web pages:

Master of Science (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/microbiology-infectious-disease-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/microbiology-infectious-disease-doctor-philosophy-thesis-based.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the Immunology Graduate Program requires:

Master of Science

The minimum academic course requirement is normally 6 units (1.0 full-course equivalents) which is met by:

- The satisfactory completion of Cellular and Molecular Immunology (Medical Science 639.02) or Inflammation (Medical Science 639.04) in the first year, and
- The satisfactory completion of another 3-unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Doctor of Philosophy

The minimum academic course requirement is normally 9 units (1.5 full-course equivalents) which is met by:

- The satisfactory completion of Cellular and Molecular Immunology (Medical Science 639.02) and Inflammation (Medical Science 639.04) in the first year, and
- The satisfactory completion of another 3-unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Exceptions require the approval of the Graduate Program Director.

6. Additional Requirements

Each student is required to participate regularly in the Synder Institute graduate program seminar series and present at least one work in progress seminar per year.

Contributions to journals, relevant journal clubs and/or seminars are an expectation. Visit the program website at cumming.ucalgary.ca/gse/programs/gi-im-mid for additional information. Research Integrity Day is a Research Ethics session offered several times each year.

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Under exceptional circumstances, credit may be given for courses taken below the 600 level. At least one half of a graduate student's course work must be at the 600 level or higher. Students may receive credit for completing a course numbered 500-599 providing that the course is recommended by the supervisory committee and approval is received by the program director.

8. Time Limit

Completion times follow the Faculty of Graduate Studies regulations (see Time Limits):

- Maximum completion time for a thesis-based master's program is four years. Expected completion time is two years.
- Maximum completion time for a doctoral program is six years. Expected completion time is four years.

9. Supervisory Assignments

The selection of a graduate supervisor must be by mutual agreement between the student and the supervisor at the time of application to the program and approved by the Graduate Program Director.

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of supervisor and co-supervisor (if applicable), plus two additional members, must be in place no later than 3 months after the student's first registration in the program.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements, the program requires:

Doctoral Candidacy

Candidacy must be completed within 28 months (for MSc to PhD transfers) or 24 months (direct entry PhD) from the program start date. Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) attend Research Integrity Day (3) have their thesis proposal approved at a proposal evaluation meeting, and (4) successfully complete a Field of Study oral examination.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program. Specific details of the examination format and other candidacy requirements can be found at: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination (see Thesis Examinations). The examination will consist of a public seminar followed by an open oral examination.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For additional information about the PhD research proposal, refer to: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

12. Financial Assistance

All students who are accepted into the program and are full-time will receive a minimum stipend ($21,000 per annum for MSc students and $23,000 per annum for PhD students) generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self-funding is not an option except for MD holders also enrolled in a clinical training program.

Students are expected to apply to external agencies for financial support from scholarships or studentship awards and for University of Calgary Scholarships (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Some program awards are also available, dependent on funding. Some awards pro-

vide stipends in excess of the program minimum. See the program website: cumming.ucalgary.ca/gse/programs/gi-im-mid.

Medicine, Neuroscience MDNS

Contact Information

Location: Health Sciences Centre, Room G45A

Program number: 403.220.2558

Fax: 403.210.8109

Email address: neurosci@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/programs/neuroscience

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

2. Admission Requirements

In addition to the Faculty of Graduate Studies and the Cumming School of Medicine requirements, the program requires:

a) Qualifications

Master of Science

- Four-year BSc degree or equivalent
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy

- MSc degree, or relevant master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, four-year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work, if applicable.

b) English Language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements

- Applicants are required to arrange for the submission of two reference letters. References must follow the guidelines posted on the program's website for prospective students.
- Students must have confirmed a faculty member willing to supervise their studies.
- Endorsement by the Graduate Program Director that the applicant is acceptable and that adequate supervision in the proposed program is available.

Meeting the minimum admission criteria does not guarantee acceptance into the program. Applications are ranked according to academic excellence, prior research experience and commitment to the study of gastrointestinal sciences.

3. Application Deadline

Application deadlines are available on the Future Students web pages:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/neuroscience-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/neuroscience-doctor-philosophy-thesis-based.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the program requires:

Master of Science

The minimum academic course requirement is normally 6 units (1.0 full-course equivalent) which is met by the satisfactory completion of Cellular, Molecular and Developmental Neuroscience (Medical Science 619.01), and Systems Neuroscience and Neuropathology (Medical Science 619.02) in the first year.

Doctor of Philosophy

The minimum academic course requirement is normally 9 units (1.5 full-course equivalents) which is met by:

- The satisfactory completion of Cellular, Molecular and Developmental Neuroscience (Medical Science 619.01) and Systems Neuroscience and Neuropathology (Medical Science 619.02) in the first year, and
- The satisfactory completion of another 3-unit (0.5 full-course equivalent) graduate-level course in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

6. Additional Requirements

Each student is required to participate regularly in the Hotchkiss Brain Institute journal club and work-in-progress seminar programs and the student will present at least one journal club seminar and one work-in-progress presentation per year.

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Under exceptional circumstances, credit may be given for courses taken below the 600 level. At least one half of a graduate student's course work must be at the 600 level or higher. Students may receive credit for completing a course numbered 500-599 providing that the course is recommended by the supervisory committee and approval is received by the Graduate Program Director.

8. Time Limit

Completion times follow the Faculty of Graduate Studies regulations (see Time Limits):

- Maximum completion time for a thesis-based master's program is four years. Expected completion time is two years.
- Maximum completion time for a doctoral program is six years. Expected completion time is four years.

9. Supervisory Assignments

The selection of a graduate supervisor must be by mutual agreement between the student and the faculty member concerned at the time of the application to the program and approved by the Graduate Program Director. Supervisors must commit to supporting the student for the duration of their graduate studies, before admission is recommended.

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of supervisor and co-supervisor (if applicable), plus two additional members, must be in place no later than 3 months after the student's first registration in the program.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements, the program requires:

Doctoral Candidacy

Candidacy must be completed within 28 months (for MSc to PhD transfers) or 24 months (direct entry PhD) from the program start date. Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) attend Research Integrity Day (3) have their thesis proposal approved at a proposal evaluation meeting, and (4) successfully complete a Field of Study oral examination.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program. Specific details of the examination format and other candidacy requirements can be found at: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination (see Thesis Examinations). The examination will consist of a public seminar followed by an open oral examination.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For additional information about the PhD research proposal, refer to: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

12. Financial Assistance

All students who are accepted into the program and are full-time will receive a minimum stipend ($21,000 per annum for MSc students and $23,000 per annum for PhD students) generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self-funding is not an option except for MD holders also enrolled in a clinical training program.

Students are expected to apply to external agencies for financial support from scholarships or studentship awards and for University of Calgary Scholarships (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Some program specific awards are also available, dependent on funding. Some awards provide stipends in excess of the program minimum. Please see the program website: cumming.ucalgary.ca/gse/programs/neuroscience. Some awards are also available through the Hotchkiss Brain Institute at hbi.ucalgary.ca/education.

Medicine, Pathologists' Assistant MDPA

Contact Information

Location: Health Sciences Centre, Graduate Science Education, G341B

Program Number: 403.210.6689

Fax: 403. 210.8109

Email address: mpath@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/programs/pathologists-assistant

1. Degrees and Specializations Offered

Master of Pathologists' Assistant (MPath), course-based

This degree is accredited by NAACLS and allows graduates to qualify for the ASCP and CCCPA examinations.

All students are considered full-time. Part-time status may be considered and must be approved by the Graduate Program Director.

Master of Science with a Pathologists' Assistant specialization is also offered as a thesis-based program. Contact the Medical Science Graduate Program for further information.

2. Admission Requirements

In addition to the Faculty of Graduate Studies and the Cumming School of Medicine requirements, the program requires:

a) Qualifications

- Four-year BSc degree in biological sciences, or its equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

b) English Language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements

- Applicants are required arrange for the submission of two reference letters. References must follow the guidelines posted on the program's website for prospective students.
- A current Curriculum Vitae (CV).
- Ability to perform the Essential Functions of a Pathologists' Assistant, as described on the program's website.

Suggested Preparatory Courses

Principles of Genetics (Biology 311 or equivalent), Introduction to Cellular and Molecular Biology (Biology 331 or equivalent), Introduction to Biochemistry (Biochemistry 393 or equivalent), and senior-level course work in at least two of the following subject areas: anatomy, physiology, or molecular biology.

3. Application Deadline

For application deadline, see the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/pathologists-assistant-master-pathologists-assistant-course-based.

4. Advanced Credit

In consultation with the Graduate Program Director, advanced credit may be requested in accordance with Faculty of Graduate Studies regulations (see Advanced Credit). Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the program requires all Pathologists' Assistant students to successfully complete 45 units (7.5 full-course equivalents):

- Medical Science 751.43 (3 units)
- Medical Science 620: Topics in Systems Physiology (3 units)
- Medical Science 703 (3 units)
- Medical Science 744 (6 units)
- Medical Science 515 (3 units)
- Medical Science 745 (3 units)
- Medical Science 748.01 (3 units)
- Medical Science 748.02 (3 units)
- Medical Science 749.01 (3 units)
- Medical Science 749.02 (3 units)
- Medical Science 747 (3 units)
- Medical Science 750.01 (3 units)
- Medical Science 750.02 (3 units)
- Medical Science 746 (3 units)

It is required that all PA students will successfully complete (minimum "B-") all Fall and Winter courses prior to beginning their practicum.

In addition to the courses listed above, students must complete a medical terminology course.

6. Additional Requirements

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

With the exception of Medical Science 515, credit will not be given for courses taken below the 600-level.

8. Time Limit

It is highly recommended that the program be completed in two years on a full-time basis. It may also be completed on a part-time basis with the Director's approval.

9. Supervisory Assignments

The Graduate Program Director will serve as interim supervisor for all newly admitted students. In the course-based Pathologists' Assistant program, there is no official requirement for students to have a supervisor. We do recommend, however, that students have a faculty supervisor and/or a mentor within the Department of Pathology and Laboratory Medicine.

Master's students in the Leaders in Medicine program will be evaluated and advised by a Joint Liaison Committee composed of the Associate Dean (Graduate Sciences Education) and the Associate Dean (Undergraduate Medical Education).

10. Financial Assistance

None.

11. Other Information

A program fee applies to this program. See Program-Specific Fees.

Medicine, Medical Science MDSC

Contact Information

Location: Health Sciences Centre, Room G347A

Program number: 403.220.6852

Fax: 403.210.8109

Email address: medgrad@ucalgary.ca

Web page URL: cumming.ucalgary.ca/gse/programs/medical-science

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Students in the MSc and PhD degree programs are normally considered full-time.

Specializations:

- Cancer Biology
- Critical Care Medicine
- Mountain Medicine and High Altitude Physiology
- Joint Injury and Arthritis
- Biomechanics
- Biomedical Ethics
- Molecular & Medical Genetics
- Pathologists' Assistant
- Physiology
- Surgery (In co-operation with the Department of Surgery)
- Medical Imaging (Interdisciplinary)*

**See the Calendar section on Interdisciplinary Specializations for further information.*

2. Admission Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the Medical Science Graduate Program requires:

a) Qualifications

Master of Science:

- A four-year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

Doctor of Philosophy:

- A MSc degree, or relevant Master's degree, recognized by the Faculty of Graduate Studies, or transfer from MSc program, or, in exceptional cases, four year BSc degree or equivalent.
- A minimum admission grade point average of 3.30 (on the University of Calgary four-point system; equivalent to a "B+") based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents) and any master's course work if applicable.
- A minimum 3.30 grade point average is also required in courses relevant to the proposed field of study.

Additionally, both Master of Science and Doctor of Philosophy programs require:

b) English Language Proficiency

See Medicine Programs.

c) Immunizations

See Medicine Programs.

d) Additional Requirements

- Applicants are required to arrange for the submission of two reference. References must follow the guidelines posted on the program's website for prospective students.
- For admission to the Master of Science program with a specialization in surgery, prior admission to the surgery residency program is required. Students will normally apply to the Master of Science program in the third year of the surgery residency program. For admission to the Surgeon Scientist Program, prior admission to the Medical Science Graduate Program is required.
- Students must have confirmed a faculty member willing to supervise their studies.
- Endorsement by the Graduate Program Director that the applicant is acceptable and that adequate supervision in the proposed program is available.

Meeting the minimum admission criteria above does not guarantee acceptance into the program. Applications will be ranked according to academic excellence, prior research experience and commitment to the study of medical science.

3. Application Deadline

Application deadlines are available on the Future Students web pages:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/medical-science-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/medical-science-doctor-philosophy-thesis-based.

4. Advanced Credit

Applicants must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

Any credit to be given for courses completed will be included in the letter of offer for admission to the Faculty of Graduate Studies.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and Cumming School of Medicine requirements, the Department requires:

Master of Science

The minimum academic course requirement is normally 6 units (1.0 full-course equivalent) at the graduate level in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Doctor of Philosophy

The minimum academic course requirement is normally 9 units(1.5 full-course equivalents) at the graduate level in an area that is pertinent to the student's thesis project and approved by the supervisor and supervisory committee.

Only one MDSC 755 course can be taken for credit.

Exceptions require the approval of the Graduate Program Director.

6. Additional Requirements

Each student is required to participate regularly in a journal club and work-in-progress seminar programs and the student will present at least one journal club seminar and one work-in-progress presentation per year. Specific training programs may have additional requirements.

Research Integrity Day

See Medicine Programs.

7. Credit for Undergraduate Courses

Under exceptional circumstances, credit may be given for courses taken below the 600 level. At least one half of a graduate student's course work must be at the 600 level or higher. Students may receive credit for completing a course numbered 500-599 providing that the course is recommended by the supervisory committee and approval is received by the Graduate Program Director.

8. Time Limit

Completion times follow the Faculty of Graduate Studies regulations (see Time Limits):

- Maximum completion time for a thesis-based master's program is four years. Expected completion time is two years.
- Maximum completion time for a doctoral program is six years. Expected completion time is four years.

9. Supervisory Assignments

The selection of a graduate supervisor must be by mutual agreement between the student and the faculty member concerned at the time of application to the program and approved by the Graduate Program Director.

Supervisory committees, required for both master's and doctoral students, are established based upon the needs of the student and the expertise of the committee members, following discussions between the student and the supervisor and approved by the Graduate Program Director. A supervisory committee, consisting of the supervisor and co-supervisor (if applicable), plus two additional members (MSc) or three additional members(PhD), must be in place no later than 3 months after the student's first registration in the program. Specializations may have additional requirements.

10. Required Examinations

Doctoral Candidacy

In addition to the Faculty of Graduate Studies regulations, the program requires the following:

Candidacy must be completed within 28 months (for MSc to PhD transfers) or 24 months (direct entry PhD) from the program start date. Admission to candidacy is an acknowledgement that a student is fully prepared to devote their full attention to the thesis research.

To enter into candidacy, students must: (1) successfully complete all required courses, (2) attend Research Integrity Day (3) have their thesis proposal approved at a proposal evaluation meeting, and (4) successfully complete a Field of Study oral examination.

Students who do not pass their candidacy requirements by the twenty-eighth month of their program may be required to withdraw from the program. Specific details of the examination format and other candidacy requirements can be found at: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

Thesis Examination

All students in thesis-based programs (MSc and PhD) must successfully pass the Final Thesis Oral Examination (see Thesis Examinations). The examination will consist of a public seminar followed by an open oral examination.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

All MSc and PhD students must defend a written research proposal to their supervisory committee. For MSc students, this document must be submitted within 12 months after initial registration in the program. For additional information about the PhD research proposal, refer to: wcm.ucalgary.ca/gse/files/gse/csm-candidacy-examination-process-effective-september-1-2015.pdf.

12. Financial Assistance

All students who are accepted into the program and are full-time will receive a minimum stipend ($21,000 per annum for MSc students and $23,000 per annum for PhD students) generally funded by their supervisor's operating grants, internal awards, and/or external awards. Self-funding is not an option except for MD holders also enrolled in a clinical training program.

Students are expected to apply to external agencies for financial support from scholarships or studentship awards and for University of Calgary Scholarships (see Awards and Financial Assistance section of this Calendar). Possible sources of financial support are listed on the Faculty of Graduate Studies website: grad.ucalgary.ca/awards.

Some awards provide stipends in excess of the program minimum. Information and deadlines for Medical Science Faculty of Graduate Studies' award competitions will be provided throughout the year.

Mathematics and Statistics MTST

Contact Information

Location: Math Sciences Building, Room 462

Program number: 403.220.6299

Fax: 403.282.5150

Email address: gradapps@math.ucalgary.ca

Web page URL: math.ucalgary.ca/graduate

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), course-based and thesis-based

The Master of Science (course-based) degree may be completed on a part-time basis. The normal course load for a full-time course-based Master of Science student is 9 units (1.5 full-course equivalents) per term.

Specializations:

- Actuarial Science
- Biostatistics (MSc (thesis-based) and PhD only. See Interdisciplinary Specializations for further information)
- Mathematics
- Statistics

2. Admission Requirements

In addition to the Faculties of Graduate Studies and Science requirements, the Department requires:

Master of Science

a) Normally, bachelor's degree, or its equivalent, in the subject of the specialization to which the application is made, or a closely related area.

b) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based); or 97 (Internet-based), or minimum IELTS score of 7.0; or minimum MELAB score of 83; or minimum PTE score of 68. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

c) Three Reference Forms with reference letters.

Doctor of Philosophy

a) A master's degree or equivalent in the subject of the specialization to which the application is made, or a closely related area.

b) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based); or 97 (Internet-based test); or minimum IELTS score of 7.0; or minimum MELAB score of 83; or a minimum PTE score of 68. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

c) Three Reference Forms with reference letters.

d) Excellent students, admitted to the master's program, may be transferred to the PhD program after having demonstrated exceptional performance at the graduate level, subject to endorsement by the supervisor and approval by the Graduate Committee. Such transfer requests are to be initiated by the supervisor and are to include information about research ability.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

Master of Science (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/math-statistics-master-science-thesis-based.

Master of Science (course-based): ucalgary.ca/future-students/graduate/explore-programs/math-statistics-master-science-course-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/math-statistics-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as a requirement of another completed degree/diploma. The determination for advanced credit will be made prior to entry into the program.

5. Program/Course Requirements

Course requirements are taken from the following lists of courses:

Seminar Courses: Actuarial Science 600, Biostatistics 600, Mathematics 600, Statistics 600

List A: Mathematics 601, 603, 605, 607

List B: Mathematics 617, 621, 625, 627, 631, 641, 661, 681, 685, Statistics 701

List C: Statistics 701, 703, 721, 631, 635, 641

List D: Actuarial Science 611, 617, 619, 627, 637, 639

For details about course requirements for the MSc and PhD with specialization in Biostatistics, see Interdisciplinary Specializations.

Master of Science (thesis-based)

All students must complete course work to the equivalent of an honours bachelor's degree plus at least 16.5 units at the graduate level. Course work must include:

a) For all specializations: completion of the seminar course (1.5 units) relevant to the specialization, in the first year of the program. In addition:

b) For the Mathematics specialization: two courses from List A.

c) For the Statistics specialization: at least three courses from List C, two of which must be Statistics 701 and 721.

d) For the Actuarial Science specialization: two courses from List C and two courses from List D.

Master of Science (course-based)

All students must complete 25.5 units of course work at the graduate level. Course work must include:

a) For all specializations: completion of the seminar course (1.5 units) relevant to the specialization in the first year of the program; and completion of a project resulting in a written report. In addition:

b) For the Mathematics specialization: two courses from List A.

c) For the Statistics specialization: at least three courses from List C, two of which must be Statistics 701 and 721.

d) For the Actuarial Science specialization: two courses from List C and two courses from List D.

Doctor of Philosophy

Course requirements for the Doctor of Philosophy beyond those for a master's degree are determined on an individual basis, but the following rules apply: doctoral students must complete 27 units of graduate-level course work in their total graduate program (MSc and PhD). PhD course work must include:

a) For all specializations: completion of the seminar course (1.5 units) relevant to the specialization, in the first or second year of the program. In addition:

b) For the Mathematics specialization: at least 15 units (2.5 full-course equivalents taken in the doctoral program at the University of Calgary. Two of these courses must come from List A and a third from List A or List B.

c) For the Statistics specialization: at least three courses from List C, two of which must be Statistics 701 and 721.

d) For the Actuarial Science specialization: Statistics 721 and at least one more course from List C and two more courses from List D.

Preliminary Examinations

Doctoral students must pass written Preliminary Examinations during first year but no later than 18 months from the beginning of their doctoral programs and before the oral Field of Study examination.

- Mathematics PhD students must pass Preliminary Examinations based on material for three courses, two of which must come from List A and the third from List A or List B. Preliminary examinations will be offered during the final examination period in those semesters during which the corresponding courses are offered.
- Statistics PhD students must pass two Preliminary Examinations, one in probability based on Statistics 701 and the other in statistics based on Statistics 721. These examinations are usually offered in May and/or in December.
- Actuarial Science PhD students must pass two Preliminary Examinations based on material for two courses from List C or D.
- Biostatistics PhD students must pass two Preliminary Examinations in Statistics based on material for two courses from List C.

6. Additional Requirements

All Mathematics PhD students are required to give three invited or contributed presentations during their doctoral degree, not including presentations that are required as part of a graduate course or the 600 seminar course.

7. Credit for Undergraduate Courses

Graduate-level credit may be given for courses taken below the 600-level. At least one half of a graduate student's course work must be at the 600 level or higher and only where appropriate to a student's program may credit be given for courses numbered 500–599.

8. Time Limit

The expected completion time for full-time master's students is two years. The maximum completion time allowed for a thesis-based master's program is four years, and for a course-based master's program is six years. The expected completion time for a doctoral student is four years, and the maximum completion time is six years.

9. Supervisory Assignments

The Graduate Program Director, Department of Mathematics and Statistics, assigns supervisors based upon the graduate student's proposed program admission.

10. Required Examinations

Candidacy

Doctoral students must complete a written thesis proposal and pass an oral Field of Study examination. For complete details of the examination format and other candidacy requirements, see Departmental Candidacy Requirements and Faculty of Graduate Studies Candidacy regulations.

Thesis Examination

In addition to the Faculty of Graduate Studies regulations for Thesis Examinations, the Department requires:

Final thesis oral examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program. However, it is strongly encouraged that whenever reasonable the Internal Examiner should be external to the home program.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Successful applicants may be offered departmental teaching assistantships and/or research stipends in their offer letter.

Military and Strategic Studies CMSS

Contact Information

Location: 8th floor, Social Sciences Building

Program number: 403.220.4038

Fax: 403.282.0594

Email address: cmss@ucalgary.ca

Web page URL: cmss.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Strategic Studies (MSS), course-based (including the co-operative education option) or thesis-based

2. Admission Requirements

In addition to the requirements of the Faculties of Graduate Studies and Arts, CMSS requires:

Master of Strategic Studies (MSS), course-based and thesis-based

a) A four-year bachelor's degree with a grade point average of at least 3.40 on a four-point scale.

b) A writing sample.

c) For applicants to the thesis-based program, an agreement to supervise by a potential supervisor.

d) For applicants to the thesis-based program, a research proposal.

e) English language proficiency: TOEFL with a minimum score of 97 (Internet-based test) or a minimum score of 580 (paper-based test), or 7.0 on the IELTS test, or 83 on the MELAB test, or 68 on the PTE test. The test must have been taken within the last two years. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

f) Two letters of reference.

Doctor of Philosophy

Applicants will be admitted only if the CMSS Graduate Committee is satisfied that adequate supervision is likely to be available for the duration of their studies. Successful applicants should be aware that admission to the program does not imply a Centre commitment to provide supervision for all research interests they may have. Students are also advised to consult the Faculty of Graduate Studies and the Academic Regulations section in this calendar.

Prerequisites for admission to the PhD program are:

a) A completed master's degree.

b) A GPA of 3.70 on a four-point scale over all completed graduate courses in the master's program; 3.40 in the undergraduate

program over the last 60 units (10 full-course equivalents) or two years of study.

c) A detailed statement of the proposed thesis research.

d) A representative piece of written work, normally a master's thesis chapter or major research paper.

e) A tentative agreement from a faculty member to supervise. Students need to contact potential supervisors at the beginning of the application process.

f) English language proficiency: TOEFL with a minimum score of 97 (Internet-based test) or a minimum score of 580 (paper-based test), or 7.0 on the IELTS test, or 83 on the MELAB test, or 68 on the PTE test. The test must have been taken within the last two years. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

g) Two letters of reference.

3. Application Deadline

Deadlines for the submission of complete applications are available on the Future Students website:

MSS (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/military-security-strategic-studies-master-strategic-studies-thesis-based.

MSS (course-based): ucalgary.ca/future-students/graduate/explore-programs/military-security-strategic-studies-master-strategic-studies-course-based.

PhD: ucalgary.ca/future-students/graduate/explore-programs/military-security-strategic-studies-doctor-philosophy-thesis-based.

4. Advanced Credit

In the course-based master's program, advanced credit may be given for a maximum of two courses (6 units or 1.0 full-course equivalent) at the senior undergraduate (500) level. The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to the required level for admission.

5. Program/Course Requirements

Master of Strategic Studies

In addition to Faculties of Graduate Studies and Arts requirements, the Centre for Military and Strategic Studies requires that all master's students complete core courses and areas of concentration courses:

a) Core Courses:

All master's students take, in any sequence, the following three core area courses:

- Strategic Studies/History 655 Classics of Strategy
- Political Science 681 Advanced Analysis of International Relations
- Political Science 685 Strategic Studies

All master's students will also take the following course in the Fall Block Week preceding their first term:

- Strategic Studies 603 Military and Strategic Studies: Questions and Methods

MSS students in the thesis stream are required to present their supervisor with a formal thesis proposal normally no later than the end of their second term (usually, the end of the Winter Term of their first year for students entering the program in the thesis stream; for students transferring from the course-based stream, where at all possible the same general timeline should apply).

b) Areas of Concentration:

In addition to the core courses in (a), thesis-based students must complete 9 units (1.5 full-course equivalents); course-based students must complete 27 units (4.5 full-course equivalents); and course-based Co-operative Education students must complete 18 units (3.0 full-course equivalents) from the courses listed below. With the approval of the Graduate Program Director, any graduate course pertinent to the student's studies may be taken. Consult the Program website (cmss.ucalgary.ca/node/1935) for a list of other recommended graduate courses. Courses can be completed in any sequence.

(1) Arctic Security

Strategic Studies 662 Advanced Studies in Canadian Arctic Security

(2) Canadian Military Studies

Strategic Studies 609 Canadian Military and the Second World War

Strategic Studies 611 Canadian Military Studies

Strategic Studies 613 Canada and the First World War

(3) U.S. Security Policy

Political Science 633 U.S. Security Policy

(4) Domestic Security/Hemispheric Security

(5) Ethics and Morality in Conflict

Political Science 619 War and Interpretation

Political Science 684 Human Rights and Humanitarianism

(6) Intelligence and Security

Strategic Studies 657 Intelligence, Information Operations and Command, Control, Communications and Computers

(7) Military Anthropology

Anthropology 641 Graduate Seminar in Civil Military Relations

(8) Sea Power

Strategic Studies 659 Sea Power

(9) Unconventional Warfare

Political Science 689 Unconventional Warfare

Political Science 675 Special Topics in Comparative Politics

(10) Causes of War

Strategic Studies 663 War – Causes and Aftermath

(11) Military History

History 637 Topics in Military History

(12) Special Topics in Military and Strategic Studies

Strategic Studies 649 Special Topics in Military and Strategic Studies

(13) With the approval of the Graduate Director, thesis-based students may take 3 units (0.5 full-course equivalent) from the following and either course-based students or course-based students with Co-operative Education may take one or more courses from the following:

Strategic Studies 651 Reading Seminar I

Strategic Studies 653 Research Seminar I

c) Co-operative Education: The Co-operative Education option is only available as part of the course-based MSS program. Students will complete an 8-month work placement during their second year, which will replace three other non-core courses. Thesis-based MSS students will be permitted to transfer to the course-based co-operative education option during their first year of study. For further information interested students should contact the CMSS faculty co-operative education advisor or the Centre website.

Doctor of Philosophy

a) Course Work:

Each student must normally take 18 units (3.0 full-course equivalents) including three core courses:

- Political Science 681: Advanced Analysis of International Relations
- Political Science 685: Strategic Studies
- Strategic Studies 655: Classics of Strategy.

All PhD students will also take the following course in the Block Week preceding their first term:

Strategic Studies 603 Military and Strategic Studies: Questions and Methods

For candidacy examinations, students will have two major fields of study. One of these will be strategic studies and the other the dissertation area. Students will be required to take at least 3 units (0.5 full-course equivalent) in each field, namely Political Science 685 and an appropriate elective.

b) Written and oral candidacy examination.

c) Doctoral thesis proposal.

d) Written doctoral thesis.

e) Oral thesis defence.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

With the approval of the Graduate Director, students enrolled in the thesis-based MSS program may apply to take one 500-level course for graduate credit, but will be required to complete additional requirements for the course. Students in the course-based program may apply to take one 500-level course for graduate credit, but will be required to complete additional requirements for each course.

8. Time Limit

Expected completion time for the thesis-based and course-based Master of Strategic Studies is two years. Maximum completion time is four years for the thesis-based Master of Strategic Studies and six years for the course-based Master of Strategic Studies.

Expected completion time for the PhD in Military and Strategic Studies is four years. Maximum completion time for the PhD in Military and Strategic Studies is six years.

9. Supervisory Assignments

Students must contact a possible supervisor before admission. Agreement from a supervisor must be included in the application package.

10. Required Examinations

In addition to the Faculty of Graduate Studies requirements, the program requires:

Candidacy

Doctoral students must pass oral and written Field of Study examinations. For complete details of candidacy requirements and examination format, see cmss.ucalgary.ca/phd/program_requirements.

Thesis Examination

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Doctoral students must complete a written Thesis Proposal, which is approved by their Supervisory Committee in a Thesis Proposal Meeting. See cmss.ucalgary.ca/phd/program_requirements for further information.

12. Financial Assistance

Not applicable.

Music MUSI

Contact Information

Location: Craigie Hall D 100

Program number: 403.220.5313

Fax: 403.282.6925

Email address: musicgs@ucalgary.ca

Web page URL: arts.ucalgary.ca/schools/creative-performing-arts/music/graduate

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Specializations:

- Composition
- Music Education
- Musicology
- Sonic Arts

Master of Arts (MA)

Specialization:

- Musicology

Master of Music (MMus) thesis-based

Specializations:

- Composition
- Conducting*
- Music Education
- Performance
- Sonic Arts

**Choral or band*

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, Music requires that all applicants submit:

a) One-page letter detailing their specific reasons for pursuing graduate study.

b) Two reference letters.

Other requirements are outlined below and based on the degree being pursued.

Master of Music (Performance)

a) A completed Bachelor of Music degree (or equivalent).

b) A live audition or video/audio recording. Repertoire for the audition must contain representative works from a variety of historical periods and must demonstrate an advanced level of technical accomplishment. Recordings should be approximately 20-30 minutes in length. Live auditions are scheduled for early February. Specific dates and times can be arranged by contacting the Graduate Program Administrator at 403.220.5422.

Master of Music (Conducting) - Choral or Band

a) A completed Bachelor of Music degree, including study in conducting.

b) Demonstrated ability in an audition, which can be met in two ways:

- A video of approximately fifteen minutes.
- A rehearsal of a University ensemble (during Fall and early Winter).

c) Demonstrated competence on a major instrument or voice.

Master of Music (Composition)

a) A completed Bachelor of Music degree (or equivalent), including study in composition.

b) A portfolio of at least three recent compositions, together with recordings (where available). Applicants wishing to specialize in electroacoustic composition must submit recordings.

Master of Music (Sonic Arts)

a) A completed Bachelor of Music degree (or equivalent) with a major, minor or concentration in Electroacoustic Music, Sonic Arts, Digital Audio Arts or similar field.

b) A portfolio of recent sonic arts creative and/or research projects.

c) A research paper.

Master of Music (Music Education)

a) A completed Bachelor of Music degree (or equivalent)

b) Normally, two years of successful teaching experience or equivalent professional involvement in music education.

c) An essay on a topic in Music Education prepared during or subsequent to the applicant's undergraduate work.

Master of Arts (Musicology)

a) A completed Bachelor of Music degree (or equivalent).

b) A research essay or paper of approximately 10-15 pages on a topic in music history or theory prepared during or subsequent to the applicant's undergraduate course work.

Doctor of Philosophy

a) A recognized master's degree or equivalent.

b) Composition - a portfolio of works, together with recordings, if available, and an extended research paper.

c) Musicology - one or two extended research essays of approximately 25 pages in length.

d) Music Education - one or two extended research essays.

e) Sonic Arts - a portfolio of sonic arts creative and/or research projects, and an extended research paper.

3. Application Deadline

The deadline for the submission of complete applications is available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/music-master-arts-thesis-based.

Master of Music: ucalgary.ca/future-students/graduate/explore-programs/music-master-music-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/music-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

Students should consult the Graduate Program Director before registering in courses.

In addition to Faculties of Graduate Studies and Arts requirements, Music, excluding qualifying courses, requires:

Master's Degrees

Master of Arts (Musicology): Music 631, 3 units (0.5 full-course equivalents) graduate-level course in Music Theory, Composition, Sonic Arts or Music History and Literature,and 18 units (3.0 full-course equivalents) approved graduate-level courses.

Master of Music (Composition): Music 613, 631, 641.01, 641.02 or 653 and 9 units (1.5 full-course equivalents) approved graduate-level courses.

Master of Music (Conducting): Music 631, Music Performance 632 or 634, 3 units (0.5 full-course equivalents) graduate-level

course in Music Theory, Composition, Sonic Arts or Music History and Literature, and 12 units (2.0 full-course equivalents) approved graduate-level courses.

Master of Music (Performance): Music 621, 623, 631, 6 units (1 full-course equivalent) graduate-level course in Music Theory and Composition, Sonic Arts or Music History and Literature, and 9 units (1.5 full-course equivalents) other approved course options.

Master of Music (Music Education): Music 631, 3 units (0.5 full-course equivalents) graduate-level course in Music Theory, Composition, Sonic Arts or Music History and Literature, and 18 units (3.0 full-course equivalents) approved graduate-level courses.

Master of Music (Sonic Arts): Music 631, 651, 653 and 9 units (1.5 full-course equivalents) approved graduate-level courses. Music 613 may be recommended.

Restrictions

No more than 6 units (1.0 full-course equivalent) for the Master of Music and Master of Arts degrees may be taken in an area other than Music.

Doctor of Philosophy

Students entering the PhD program will normally be required to complete at least 18 units (3.0 full-course equivalents). Music 631 is required unless this course or its equivalent has been completed as part of a master's degree.

PhD (Composition), (Musicology), (Music Education): An interdisciplinary course (3 units or 0.5 full-course equivalent) designed by the student and supervisor, and 15 units (2.5 full-course equivalents) additional approved graduate-level courses.

PhD (Sonic Arts): Music 751, 753 and 12 units (2.0 full-course equivalents) additional approved graduate courses. Music 613 may be recommended.

6. Additional Requirements

Diagnostic tests in music history and theory will be given to all entering master's students in order to determine if qualifying work in these areas is required. Qualifying work, if required, is normally completed in the first year of study.

Language

Master's Programs

Master of Arts (Musicology)

Applicants are required to demonstrate a reading knowledge of a language other than English—normally German. In practice, this requirement and any other linguistic competence that may be deemed necessary for the student's proposed research area must be met before the thesis topic will be approved.

Other Master's Programs

While there are no formal second-language requirements for the various programs of the Master of Music degree, students may be required to attain proficiency in a language other than English where this is deemed appropriate for the proposed thesis/project.

Doctor of Philosophy

Doctor of Philosophy (Musicology)

Candidates are required to demonstrate a reading knowledge of two languages other than English. German is recommended as one of the required languages.

Doctor of Philosophy (Composition), (Music Education), (Sonic Arts)

Candidates are required to demonstrate a reading knowledge of one language other than English.

Performance

Graduate students in the MMus Performance program are required to participate in one of the large ensembles for the duration of their degree and pianists are required to volunteer as accompanists. In lieu of the large ensemble requirement, pianists have the option to accompany two hours per week in a vocal or instrumental studio. Another option for pianists is to accompany a Junior or a Senior recital. The head of the performance area will make all ensemble or accompanying assignments. Students in graduate programs other than performance are not required to participate in an ensemble, although such participation is encouraged.

Thesis/Recital/Project

Master's Programs

All master's degree programs require a thesis or recital or project equivalent (see below), prepared under the guidance of a supervisor and approved by the Music Graduate Studies Committee.

Master of Music (Performance)

The thesis is interpreted to be two public recitals featuring solo performances and chamber music. At least one Canadian work should be included in one of the recitals. The examining committee will evaluate the candidate's performance in both of the recitals. Recital proposals are to be submitted to the Graduate Program Administrator for approval by the Graduate Committee at least two months before each performance.

Master of Music (Conducting) - Choral or Band

The thesis is interpreted to be two public performances, on or off campus, with University or community ensembles. At least one Canadian work should be included in one of the recitals. The examining committee will evaluate the candidate's performance in both of the recitals. Recital proposals are to be submitted to the Graduate Program Administrator for approval by the Graduate Committee at least two months before each performance.

Master of Music (Composition)

The thesis is interpreted to be either a substantial creative project and an accompanying descriptive essay related to the project, or a portfolio of creative work, the majority of which must have been created in the second year of residency, and an accompanying descriptive essay related to the portfolio. Normally, the project or portfolio will have been presented in a public recital prior to the thesis defence.

Master of Music (Sonic Arts)

The thesis is interpreted to be either a substantial sonic arts creative project with an accompanying research document or a portfolio of sonic arts creative work realized in the second year of study and an accompanying descriptive essay related to the portfolio. The project or portfolio of works will be performed or presented in public prior to the thesis defence.

Doctor of Philosophy

Doctor of Philosophy (Composition)

The thesis is interpreted to be a substantial creative project and an accompanying analytical/research paper approved by the supervisory committee.

Doctor of Philosophy (Sonic Arts)

The thesis is interpreted to be a cohesive sonic arts creative project with an accompanying research document approved by the supervisory committee. The project will be performed or presented in public prior to the thesis defence.

7. Credit for Undergraduate Courses

Not applicable.

8. Time Limit

Maximum completion time is five years for the Master of Music programs and four years for the Master of Arts (Musicology). Maximum completion time is six years for the doctoral program.

9. Supervisory Assignments

The Graduate Program Director will function as the interim supervisor for all newly admitted students during their first term. This arrangement will allow students to use their first term as an opportunity to meet with faculty and to secure a permanent supervisor.

10. Required Examinations

In addition to Faculty of Graduate Studies requirements, the program requires:

Master's Degrees

Master of Arts (Musicology), Master of Music (Composition), Master of Music (Music Education) and Master of Music (Sonic Arts)

A comprehensive oral examination encompassing all areas of the chosen field is required. This examination will take place following the completion of coursework and must be satisfactorily completed before the submission of the thesis/project. In (Sonic Arts) the exam questions will be based on a compiled bibliography (readings and works) relevant to the student's area of research.

Master of Music (Performance) and (Conducting)

A comprehensive oral examination based upon the literature of the instrument and more extensively upon the repertoire of the approved recital programs is required. This examination must be satisfactorily completed at least six weeks before the date of the second public performance required for the degree.

Doctor of Philosophy

Candidacy

Doctoral students must pass written Field of Study examinations and an Oral Examination on the Thesis Proposal. For complete details of the examination format and other candidacy requirements, see Music PhD Candidacy Policy.

Thesis Examination

In addition to Faculty of Graduate Studies requirements for Thesis Examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

Thesis examinations of written theses are open.

11. Research Proposal Requirements

Doctoral students must complete a written thesis proposal, approved by the supervisory committee. See Music PhD Candidacy Policy for further information about the proposal requirements and approval process.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar and the program's website.

Nursing NURS

Contact Information

Location: Professional Faculties Building, Room 2260

Program number: 403.220.6241

Fax: 403.284.4803

Email address: nursgrad@ucalgary.ca

Web page URL: nursing.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Nursing (MN), course-based or thesis-based

Integrated Master of Nursing/Nurse Practitioner (MN/NP)

Master of Nursing/Master of Business Administration (MN/MBA), course-based

Post-Master's Nurse Practitioner Diploma (PMNP)

The Doctor of Philosophy program is designed to educate professionals for excellence in nursing scholarship through original research related to specialized practice with identified client populations.

Master of Nursing programs prepare nurses for advanced practice in focused areas that may include direct clinical practice, education, or health policy/leadership. The thesis-based program offers a focused supervised research experience.

A Post-Master's Nurse Practitioner (PMNP) diploma program, with an adult health acute care focus, is offered. The PMNP can be achieved as a Post-Master's program or through an integrated Master of Nursing/ Nurse Practitioner (MN/NP) program. The Nurse Practitioner program or any of its courses will only be offered contingent on the availability of resources and a sufficient cohort of students. Further information on the integrated MN/NP program can be found at nursing.ucalgary.ca.

Master of Nursing/Master of Business Administration (MN/MBA) is a joint program offered with the Haskayne School of Business. MN/MBA must be completed full-time during the day.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, the Faculty of Nursing requires that an applicant must:

Master of Nursing

a) Be a Registered Nurse holding a baccalaureate degree, normally in nursing;

b) Be eligible for active nursing registration in Alberta (registrants in the program must provide proof of active CARNA registration or equivalent each year);

c) Hold CPR Certification at the Basic Rescuer or Basic Cardiac Life Support or "C" level;

d) Have successfully completed one undergraduate course (3 units or 0.5 full-course equivalent) in research methodology;

e) Have successfully completed one undergraduate course (3 units or 0.5 full-course equivalent) in statistics;

f) Applicants to the MN/NP and PMNP programs must have three years' (full-time or equivalent) clinical experience and must provide documentation from their employer confirming they have met the three years' experience (4,500 hours);

g) Submit two references, one from someone capable of assessing the applicant's academic and research ability, normally an academic, and one from someone who can attest to the applicant's nursing practice and expertise;

h) Submit a security/police clearance letter (Alberta Health Services require security clearance checks for nursing graduate students who will be doing a practicum or research in the region);

i) For applicants required to provide proof of proficiency in English, submit a minimum TOEFL score of 580 (paper-based) or 97 (Internet-based test); IELTS score of 7.0; MELAB score of 83; PTE score of 68; or complete Tier III of the International Foundations program (werklund.ucalgary.ca/ifp) with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III, and;

j) Have an interview(s) with a faculty member, if requested by the Faculty.

The practicum providers and public health authorities have determined that in order to participate in practicum it is mandatory for students to be immunized against/tested for a variety of communicable diseases. They also must be fit tested for a N95 mask. Further information is available on the Faculty of Nursing website. This is also applicable to those in the MN/NP and the PMNP programs;

A minimum of three years' (full-time or equivalent) Registered Nurse practice experience in the proposed area of study is required for applicants to the MN/NP or the PMNP. These applicants must also provide commitment from the Health Region for practicum placement availability for the final practicum of the NP program (Nursing 650).

Any graduate student requesting transfer to the integrated MN/NP program must consult with their current supervisor prior to application.

Applicants to the MN course-based program have the option of registering as a part-time student.

Master of Nursing/Master of Business Administration (MN/MBA)

Applicants to the combined MN/MBA program must be admitted to the MN program, and make a separate application for admission to the MBA program. Students must meet the admission requirements of the Faculty of Graduate Studies and those of the MN and MBA programs. The respective Combined Program Committee will review each application. Normally, only a full-time student in the Master of Nursing program may take a combined program. Please consult with the Faculty of Nursing Graduate Programs Office for more information.

Doctor of Philosophy

a) Normally be a Registered Nurse.

b) Normally hold CPR Certification at the Basic Rescuer or Basic Cardiac Life Support or "C" level.

c) Submit a study plan outlining the areas of proposed concentration, goals in undertaking doctoral work, initial intentions regarding course work, and a statement of the preliminary plans for thesis research.

d) Provide examples of the applicant's written scholarly work such as publications, research reports, course assignments, etc.

e) Provide a curriculum vitae.

f) Provide a letter of commitment from the identified supervisor indicating willingness to provide supervision throughout the program of studies and supporting the applicant's study plan.

g) For applicants required to provide proof of proficiency in English, submit a TOEFL score of 580 (paper-based) or 97 (Internet-based test); IELTS score of 7.0; MELAB score of 83; PTE score of 68; or complete Tier III of the International Foundations program (werklund.ucalgary.ca/ifp) with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehen-

sion & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

h) Have successfully completed one graduate-level course (3 units or 0.5 full-course equivalent) in quantitative methods, one graduate-level course (3 units or 0.5 full-course equivalent) in qualitative methods, plus one graduate-level course (3 units or 0.5 full-course equivalent) in statistics. Exceptions may be considered, but the onus will be on the applicant to provide sufficient evidence to warrant exception. Deficiencies must be successfully eliminated prior to or in the first year of the doctoral program.

i) Submit three references, one of which must be from the applicant's supervisor of their master's program.

j) Submit a security/police clearance letter (Alberta Health Services require security clearance checks for nursing graduate students who will be doing a practicum or research in the region).

The practicum providers and public health authorities have determined that in order to participate in practicum it is mandatory for students to be immunized against/tested for a variety of communicable diseases. They also must be fit tested for a N95 mask. Further information is available on the Faculty of Nursing website.

Academic Accommodation Policy for Students with Disabilities

It is important for students with documented disabilities, who have met the admission criteria, to note that the Academic Accommodation Policy does not require the University to lower or substantially modify standards in order to accommodate students with disabilities. Adaptive technology and/or academic accommodations are available to facilitate learning, but they do not relieve students of their responsibilities to develop the essential skills and abilities expected of all other students.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website:

PMNP Diploma: ucalgary.ca/future-students/graduate/explore-programs/nursing-diploma-course-based.

MN (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/nursing-master-nursing-thesis-based.

MN (course-based): ucalgary.ca/future-students/graduate/explore-programs/nursing-master-nursing-course-based.

MN/NP: ucalgary.ca/future-students/graduate/explore-programs/nursing-master-nursingnurse-practitioner-course-based.

PhD: ucalgary.ca/future-students/graduate/explore-programs/nursing-doctor-philosophy-thesis-based.

4. Advanced Credit

Applicants must include requests for advanced credit, accompanied by a rationale, when they apply for admission. For courses taken outside the University of Calgary, applicants must provide official transcripts and a copy of the course outline detailing the course description, objectives, assignments, readings, etc.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies' requirements, the Faculty of Nursing requires the following:

Master of Nursing Programs

The Master of Nursing Program is presently revising its curriculum to align with Faculty of Nursing strategic plan, and comply with changes required by the Nursing Education Program Approval Board (NEPAB). The Nurse Practitioner program, in particular, will be revising and shifting content and delivery of the program to meet the NEPAB standards. These standards will be in accordance with established University processes, but the implementation of the revised courses may be done outside the usual annual cycle.

Courses in the integrated Master of Nursing/Nurse Practitioner program and the Post-Master's Nurse Practitioner Diploma program (Nursing 642, 644, 646, 650, 661, 663, 665) are often scheduled outside the standard semester timelines, as permitted.

Master of Nursing (course-based)

a) Successful completion of the following core courses: Nursing 605, 611, 621, 627, 629, 633, 634, 683.

b) One graduate-level course (3 units or 0.5 full-course equivalent) in statistics (Nursing 609).

c) Two graduate-level course (3 units or 0.5 full-course equivalent) electives related to the student's focus of study.

Master of Nursing/Master of Business Administration (course-based)

Students admitted to the MN/MBA will focus on courses for the MBA during the first year and on MN courses in year two. Typically, the remaining courses required will be completed in year three. A total of 78 units (13 full-course equivalents) is required. Course requirements include:

a) MBA courses (51 units or 8.5 full-course equivalents):

- Accounting 601 and 603;
- Business and Environment 777;
- Business Technology Management 601;
- Entrepreneurship and Innovation 601;
- Finance 601;
- Management Studies 611, 613 and 715;
- Marketing 601;
- Operations Management 601;
- Organizational Behaviour and Human Resources 601 and 721;
- Strategy and Global Management 601;
- And three elective courses (3 units each) in the student's area of interest.

b) MN courses (27 units or 4.5 full-course equivalents):

- Nursing 605, 609, 611, 621, 627, 629, 633, 634 and 683.

Master of Nursing/Nurse Practitioner

a) Successful completion of the following core courses: Nursing 605, 611, 621, 627, 629, 633, 661, 663, 665, 683.

b) One graduate-level course (3 units or 0.5 full-course equivalent) in statistics (Nursing 609).

c) Successful completion of the following core NP courses: Nursing 642, 644, 646, 650.

Post-Master's Nurse Practitioner Diploma

a) Successful completion of prerequisite courses: Nursing 661, 663, 665.

b) Successful completion of the following core NP courses: Nursing 642, 644, 646, 650.

For the Nurse Practitioner practicum component of the integrated MN/NP and for the PMNP, there are additional requirements:

- Mandatory participation of NP students in all activities related to practicum courses. NP students' practicum experiences may be scheduled at various hours, including evenings, nights and weekends. Practicum experiences may also extend outside the normal academic term. Normally, a student will not be permitted to withdraw from a NP practicum course in order to avoid a failing grade in that course.
- Students in either the MN/NP or the PMNP will not be permitted to take Nursing 642 if their cumulative grade point average prior to commencing Nursing 642 is less than 3.00.

Master of Nursing (thesis-based)

a) At minimum successful completion of the following core courses: Nursing 605, 611, 621, 627, 629, 633, 683.

b) One graduate-level course (3 units or 0.5 full-course equivalent) in statistics (Nursing 609).

Evaluation of nursing practicum will be weighted at 40 per cent of the final grade across all of the practica in the MN course-based and MN thesis-based programs, with a weight of 60 per cent for the seminar component.

Doctor of Philosophy

a) For students prepared at the master's level in nursing a minimum of 18 units (3.0 full-course equivalents) is required: Nursing 705, 769, two courses in advanced research methods at the 700 level, and two doctoral thesis seminars (Nursing 711 and 733).

b) Students in the doctoral program normally are required to take advanced research methods courses at the 700 level in both qualitative and quantitative research approaches, one of which must be Nursing 721 or 783.

c) After completion of the student's course work and approval of the thesis research proposal, a candidacy examination with a written and an oral component is required. Baccalaureate and non-nursing master's prepared applicants must complete additional coursework beyond the six core courses listed in (a). Applicants are individu-

ally assessed. The number and types of additional courses required will vary according to the applicant's academic, research and practice background as well as the proposed research plan.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Under special circumstances, with the consent of the Faculty, students may take undergraduate courses, normally at the senior or 500-level, for the Master of Nursing degree.

8. Time Limit

Expected completion time for full-time students in the Master of Nursing program is two years. Maximum completion time is four years for the thesis-based program and six years for the course-based program including the MN/NP. The PMNP is one year, full-time study. Expected completion time for doctoral students is four years; maximum completion time is six years.

9. Supervisory Assignments

a) Students in any of the course-based routes of the Graduate Programs will be assigned a permanent supervisor throughout their program of study.

b) If co-supervision is sought for a Master of Nursing/Nurse Practitioner (MN/NP) student, the supervision for the MN component will consist of the faculty member as the supervisor, and the NP faculty member as the co-supervisor. When the student commences the first practicum in the NP component, the supervision will reverse in that the supervisor will now be the NP faculty member and the co-supervisor will be responsible for the MN comprehensive examination.

c) In addition to normal regulations for assignment of supervisors in the MN program, a supervisory committee must be struck for all MN thesis students no later than three months after the appointment of supervisor.

d) Normally the Faculty of Nursing supervisor for an MN/NP or PMNP student is a member of the Nurse Practitioner Committee.

e) Doctoral students require a Faculty of Nursing member to commit to their supervision as a condition of admission.

10. Required Examinations

In addition to Faculty of Graduate Studies requirements, the program requires:

Master of Nursing (course-based) examination

A final oral examination will occur after completion of all coursework, including a presentation of the student's scholarly project. The oral examination will be scheduled after the receipt of the Nursing 634 grade and will consist of an oral defense of the project.

For the Nurse Practitioner component of the integrated MN/NP, all courses, with the exception of Nursing 650, must be completed prior to the MN comprehensive examination. Students may not proceed to Nursing 650 if they have not successfully completed their MN comprehensive examination.

The final exam in the MN/NP and the PMNP includes an experiential practice component and an oral examination.

In case of a fail in Nursing 650, a student under appeal may not proceed to the Nurse Practitioner (NP) comprehensive exam.

Doctor of Philosophy

Candidacy

The doctoral candidacy examination has a written and an oral component. The written component focuses on three areas:

a) the theory that defines existing knowledge in the student's chosen area of nursing research.

b) the literature that defines existing knowledge in the student's chosen area of nursing research.

c) the proposed research method and data analysis/management strategy chosen for the thesis. The student has three weeks to complete the written component. The candidacy committee has approximately two weeks to review the written submission before the oral examination.

Students are expected to defend and extend their knowledge in these three areas. Questions about the student's proposed research may be asked.

New candidacy requirements are effective from September 1, 2015. See nursing.ucalgary.ca/graduate/program-information/policies-procedures.

Thesis Examination (Master of Nursing (thesis-based) and Doctor of Philosophy)

In addition to Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

The final thesis examination is open.

11. Research Proposal Requirements

Doctoral students must have their research proposals approved in principle by their supervisory committee prior to candidacy. Students must receive formal approval of their research proposals from the supervisory committee before proceeding to ethical review and implementation of the project. The approved proposal will be housed in the Research Office, Faculty of Nursing.

Students whose research involves human subjects must receive ethics approval from the University of Calgary Conjoint Health Research Ethics Board.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar. Scholarship application packages will be available on the Faculty of Nursing Website prior to each competition deadline. The application deadline for internal scholarships is February 1. Students admitted to the doctoral program are highly encouraged to seek external funding to support their studies and research. Please note that the deadlines for external funding applications may not coincide with the February 1 deadline.

Philosophy PHIL

Contact Information

Location: Social Sciences Building, Room 1248

Program number: 403.220.5533

Fax: 403.289.5698

Email address: philgrad@ucalgary.ca

Web page URL: phil.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based and course-based

The course-based Master of Arts degree may be completed on a full-time or a part-time basis.

Specializations*:

- History and Philosophy of Science (MA only)
- Philosophy of Religion (MA only)

**These two specializations are offered in co-operation with the Departments of History and Classics and Religion respectively. Selecting a specialization is not mandatory.*

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) Applicants hold a four-year undergraduate degree with honours or a major in philosophy; however, applicants with a degree in a related academic field will be considered.

b) Three letters of reference, and a sample of written work, such as a recent essay, written in English. Applications will not be considered without a sample of written work.

c) A minimum grade point average (GPA) of 3.50 or higher on a four-point scale over the last 60 units (10 full-course equivalents) and/or the last two years of study in their degree.

d) For applicants required to prove proficiency in English, a minimum TOEFL score of 580 (paper-based test), 97 (Internet-based test), a MELAB score of 83 or an IELTS score of 7.0 must be submitted.

Students can also meet this requirement by successfully completing Tier III of the University of Calgary International Foundations Program (werklund.ucalgary.ca/ifp) and achieving a minimum grade of "B" in the Academic Writing & Grammar III, Reading Comprehension & Proficiency III and Listening Comprehension & Oral Fluency III.

3. Application Deadline

The deadline for submitting complete applications is available on the Future Students website:

Master of Arts (course-based): ucalgary.ca/future-students/graduate/explore-programs/philosophy-master-arts-course-based.

Master of Arts (thesis-based): ucalgary.ca/future-students/graduate/explore-programs/philosophy-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/philosophy-doctor-philosophy-thesis-based.

4. Advanced Credit

The Department does not normally give advanced credit for courses taken previously. However, in special circumstances, a request for advanced credit may be considered if it is made as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to raise the grade point average to a level required for admission. Normally, advanced credit may be given for a maximum of 9 units (1.5 full-course equivalents).

5. Program/Course Requirements

Incoming students determine course work in consultation with the Graduate Program Director.

Note: Normally, in both master's and doctoral programs, no more than 3 units (0.5 full-course equivalent) of Directed Reading can be taken to satisfy the minimum course requirement.

Master of Arts (thesis-based)

a) A minimum of 18 units (3.0 full-course equivalents). Philosophy 603 is a required course and is normally taken in the first year in program.

b) In the specializations History and Philosophy of Science or Philosophy of Religion, courses taken in History or Religious Studies, may, with departmental approval, count as fulfilling course requirements for the degree.

Master of Arts (thesis-based) with Specialization in the History and Philosophy of Science

a) Six units (1.0 full-course equivalent) (two terms) in the philosophy of science.

b) Six units (1.0 full-course equivalent) (two terms) in the history of science.

c) Six units (1.0 full-course equivalent) (two terms) in the history and philosophy of science.

d) Proficiency in a second language or logic, depending on the department of enrolment.

Master of Arts (course-based)

a) A minimum of 30 units (5.0 full-course equivalents), including at least 6 units (1.0 full-course equivalent) in the History of Philosophy and 6 units (1.0 full-course equivalent) in 20th Century or Contemporary Philosophy. Philosophy 603 is a required course and is normally taken in the first year in program.

b) Students to remedy background deficiencies, if any, in a certain area or areas of philosophy by taking course work below the 500-level.

c) Students must complete at least 3 units (0.5 full-course equivalent) in each annual registration period.

Doctor of Philosophy

a) Normally, a minimum of 18 units (3.0 full-course equivalents) for students with a Master of Arts degree, or a minimum of 36 units (6.0 full-course equivalents) for students entering directly from an honours undergraduate program. Philosophy 603 is a required course and is normally taken in the first year in program.

b) In addition, all students must show competence in logic. This requirement may be met by passing Philosophy 677 or equivalent. If taken, Philosophy 677 is considered over and above the required number of graduate courses for completion of a degree.

6. Credit for Undergraduate Courses

Normally, undergraduate courses will not be credited towards completion of course requirements in a graduate program.

7. Time Limit

Expected completion time for full-time students is two years in a master's thesis program, three years in a master's course-based program, and four years in a doctoral program. Maximum completion time is four years for a master's thesis program, and six years for a master's course-based or doctoral program.

8. Supervisory Assignments

Students are assigned an interim advisor until they have an opportunity to become acquainted with members of the faculty. Each student must have an assigned supervisor by the end of the second regular academic session after first registration (April for September registrants and December for January registrants). The choice of supervisor must be by mutual arrangement between the student and faculty member concerned, and approved by the Department.

A supervisory committee at the master's level is not normally appointed. When such a committee is deemed necessary, the Dean's approval must be obtained.

A doctoral student shall be under the general supervision of a supervisory committee. After consultation with the student, the supervisor will submit a list of possible members of the supervisory committee to the Graduate Studies Committee for approval. The supervisory committee should be established as soon as possible and no later than three months after the supervisor's appointment.

9. Required Examinations

In addition to Faculty of Graduate Studies regulations for candidacy and thesis examinations, the program requires:

Candidacy (Doctor of Philosophy)

Doctoral students must complete two Field of Study papers, a Field of Study Oral Examination, a written thesis proposal and an oral examination on the thesis proposal. For complete details of the candidacy requirements, see phil.ucalgary.ca/grad/phd.html.

Thesis Examination (Master of Arts (thesis-based) and Doctor of Philosophy)

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

Master of Arts (course-based)

The course-based Master of Arts has a research component. This component is to be satisfied by passing both the written and oral parts of the Final Master's Examination.

A Final Master's Examination of overall competency is required after completion of all course work, consisting of written and oral components. The examination policy is available in the Philosophy Graduate Handbook at phil.ucalgary.ca/grad/macourse.html.

10. Financial Assistance

Most thesis students admitted to the program receive some level of financial support from the Department. Suitably qualified master's students may be given a guarantee of financial support from September of their first year to the end of April of their second year. All doctoral students receive a guarantee of financial support for the four years of their program.

For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the Department by January 15.

Satisfactory academic progress in the student's program is required for funding.

Satisfactory Academic Progress:

Thesis-based and Full-time Course-based MA Students

a) Must complete at least 15 units (2.5 full-course equivalents) in their first two terms, and maintain a GPA of at least 3.60 in all courses taken. This GPA is computed at the end of the first week of June each year. In any case no more than one grade of "B-" or lower is acceptable during the course of their program.

b) Are expected to complete their degree by May of their second year in the program. (Equivalent requirements apply to students who register at times other than September.)

Doctoral Students

a) Must complete at least 15 units (2.5 full-course equivalents) in their first two terms, and maintain a GPA of at least 3.60. This GPA is computed at the end of the first week

of June each year. In any case no more than one grade of "B-" or lower is acceptable during the course of their program.

b) Must pass all Departmental Field of Study examinations within 20 months of first registration (for those without an MA, the period will be determined by the Graduate Studies Committee).

c) Must take the Thesis Proposal Examination within eight months of the completion of the Field of Study Examinations and pass this examination no later than twenty-eight months after the date of the student's first registration in the program (for those without an MA, thirty-six months after first registration in graduate studies in philosophy).

Physics and Astronomy PHAS

Contact Information

Location: Science B, Room 605

Program number: 403.220.3617

Fax: 403.289.3331

Email address: gradinfo@phas.ucalgary.ca

Web page URL: phas.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), course-based and thesis-based

The PhD and MSc degree may be completed on a full-time or a part-time basis.

Specializations:

- Astrophysics
- Medical Physics
- Physics
- Radiation Oncology Physics*
- Space Physics
- Medical Imaging* (see Interdisciplinary Specializations for further information)

**Radiation Oncology Physics and Medical Imaging are not offered to the course-based MSc degree.*

Diplomas and Certificates:

- Postdoctoral Diploma in Radiation Oncology Physics
- Postdoctoral Certificate in Radiation Oncology Physics

2. Admission Requirements

In addition to Faculty of Graduate Studies and Faculty of Science requirements, the Department requires:

a) A University of Calgary Honours background in Physics, Engineering Physics, Astronomy/Astrophysics, or equivalent.

b) For some applicants, a satisfactory score on the Advanced Physics Graduate Record Examination.

c) All applicants for whom English is not their first language must also submit a Test of English as a Foreign Language (TOEFL) score or an International English Language Testing System (IELTS) score. The minimum acceptable TOEFL score is 560 on the paper-based exam, or 86 on the Internet-based exam. For the IELTS examination (academic version), the minimum acceptable score is 6.5. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "C" on Reading Comprehension & Proficiency III, and "C" on Listening Comprehension & Oral Fluency III.

d) Two reference letters.

Master of Science

Applicants to the Master of Science program, whose background does not include the equivalent of an undergraduate honours degree in the proposed area of study, may require additional make-up courses. Such applicants should consult with the department regarding their admission status.

Postdoctoral Diploma in Radiation Oncology Physics

For the Postdoctoral Diploma program, applicants must possess a PhD from a CAMPEP accredited graduate program or equivalent and an appointment as an Associate Medical Physicist by the Alberta Health Services.

Postdoctoral Certificate in Radiation Oncology Physics

In addition to Faculty requirements, the Department requires a PhD in Physics, Medical Physics, Biophysics, Biomedical Engineering. Applicants with PhDs in sciences other than those listed above may consult with the department regarding possible admission. A minimum GPA of 3.50 over an applicant's last 60 units (10 full-course equivalents) of course work is required before an applicant may be considered for admission; however, exceptional students with extenuating circumstances may be considered.

3. Application Deadline

Application deadlines are available on the Future Students website.

Master of Science (course-based): http://www.ucalgary.ca/future-students/graduate/explore-programs/physics-astronomy-master-science-course-based.

Master of Science (thesis-based): http://www.ucalgary.ca/future-students/graduate/explore-programs/physics-astronomy-master-science-thesis-based.

Doctor of Philosophy: http://www.ucalgary.ca/future-students/graduate/explore-programs/physics-astronomy-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

Postdoctoral Certificate in Radiation Oncology Physics: Credit for a maximum of 3 units (0.5 full-course equivalent) may be given for a course taken as part of previous graduate and/or undergraduate (minimum 600-level courses) degree. Coursework content will be reviewed on a case-by-case basis. This course must be deemed equivalent to those offered by the program and have been taken within the past 5 years. Oral examination may be required.

5. Program/Course Requirements

In addition to Faculty of Graduate Studies and Faculty of Science requirements, the Department requires:

That all students, with the exception of registrants in the Postdoctoral Diploma program, in Radiation Oncology Physics and the Postdoctoral Certificate in Radiation Oncology Physics, register in the Graduate Seminar, Physics 691, during Fall and Winter Terms of the first two years in program.

Master of Science (thesis-based)

a) For students specializing in Astrophysics, Physics, or Space Physics, 12 units (2.0 full-course equivalents), including at least two of Physics 609, 611, 613, and one of Physics 615 or 617, plus two elective courses at the 500 or 600 level, as approved by the Graduate Chair.

b) For students specializing in Medical Physics, 15 units (2.5 full-course equivalents), including Medical Physics 623, 625, at least two of Physics 609, 611, 613, and one of Physics 615 or 617, plus one elective courses at the 500 or 600 level, as approved by the Graduate Chair.

c) For students specializing in Radiation Oncology Physics, 24 units (4.0 full-course equivalents), including Medical Physics 623, 625, 633, 637, 638, 639, two of Physics 609, 611, 613, and one of Physics 615 or 617, and 1.5 units (0.25 full-course equivalent), Medical Physics 632.

Master of Science (course-based)

This program may be taken part-time or full-time.

a) That the student choose one of the three broad areas of specialization: astrophysics, physics, or space physics. Medical physics and Radiation Oncology Physics are not available as a course-based degree.

b) Thirty units (5.0 full-course equivalents) are required. In addition to Physics 603, 605, 609, 611, 613, and one of Physics 615 or 617, twelve units (2.0 full-course equivalents) will be within the area of specialization:

Astrophysics – Astrophysics 699 plus 9 units (1.5 full-course equivalents) labelled ASPH (two of these may be at the 500 level). Physics 629 and Space Physics 679 may be taken instead of Astrophysics courses.

Physics – Physics 699 plus 6 units (1.0 full-course equivalent) labelled ASPH, PHYS, or SPPH (these may be at the 500 level) plus 3 units (0.5 full-course equivalent) labelled PHYS, at the 600 level or above.

Space Physics – Space Physics 699 plus 9 units (1.5 full-course equivalents) labelled SPPH, at the 600 level or above. Physics 509 may replace a SPPH course.

d) A comprehensive examination with a written and oral component.

Doctor of Philosophy

a) A minimum of 6 units (1.0 full-course equivalent) at the 600 level or higher for students who hold a master's degree.

b) A minimum of 18 units (3.0 full-course equivalents) at the 600 level or higher for those entering the doctoral program without a master's degree.

c) For students specializing in Radiation Oncology Physics who do not hold an accredited MSc degree in Radiation Oncology Physics, Medical Physics 623, 625, 632, 633, 637, 638, 639, and two courses from Physics 609, 611, 613, and Physics 615 or 617.

Postdoctoral Diploma in Radiation Oncology Physics

Twenty-four units (4.0 full-course equivalents) including Medical Physics 711, 712, 721, 722, 731, 741 and two of Organizational Behaviour and Human Resources 793, 741 or Strategy and Global Management 797.01.

Postdoctoral Certificate in Radiation Oncology Physics

The Department of Physics and Astronomy offers a postdoctoral certificate in Radiation Oncology Physics. This certificate program is a two-term program for students with PhDs in Physics wishing to transition to a career in clinical radiation oncology physics. Students will acquire a broad background in medical physics including radiation physics, radiobiology, radiation safety, medical imaging and the modern practice of radiation oncology, through intensive coursework and hands-on experience. The program is designed to meet all the recommendations in Report 197S of the American Association of Physicists in Medicine. At the completion of this program students will be well-prepared to begin a residency in medical physics. Potential candidates for this program must hold a PhD in Physics or a related discipline.

The program requirements consists of six courses (Medical Physics 623, 625, 633, 637, 638, 639) and one quarter-course equivalent (Medical Physics 632). The semester schedule below is for full-time students:

Fall

Medical Physics 623 Radiological Physics and Radiation Dosimetry

Medical Physics 638 Imaging for Radiation Oncology Physics

Medical Physics 639 Radiobiology and Radiation Safety for Medical Physicists

Winter

Medical Physics 625 Radiation Oncology Physics

Medical Physics 632 Clinical Rotation in Radiation Oncology Physics

Medical Physics 633 Radiation Oncology Physics Laboratory

Medical Physics 637 Anatomy and Statistics for Medical Physicists

Ethics and Errors – offered not for credit

No substitutions accepted.

Graduation requires successful completion of all required courses with a minimum grade of "B".

6. Additional Requirements

Postdoctoral Certificate in Radiation Oncology Physics: Regular attendance at Radiation Oncology Rounds, Grand Rounds and non-credit training sessions such as the Ethics and Errors course (winter term) – offered not for credit.

7. Credit for Undergraduate Courses

Credit for a maximum of 6 units (1.0 full-course equivalent) may be given for courses taken at the 500 level.

Postdoctoral Certificate in Radiation Oncology Physics: No credit will be given for undergraduate-level courses.

8. Time Limit

Expected completion time is two years for full-time students in a thesis master's program, three years in a course-based program, four years in a doctoral program, and two years in the Postdoctoral Diploma program. Maximum completion time is four years for a thesis master's program, and six years for a course-based master's or a doctoral program. Expected completion time is 8 months (two terms) for a student in the Postdoctoral Certificate in Radiation Oncology Physics program.

9. Supervisory Assignments

Newly admitted students will normally be supervised by the Graduate Director or an interim supervisor in their field of interest during the first 8 months in program. During this time students will normally complete all of the course work and have an opportunity to become acquainted with the research of potential supervisors within the department. Students are responsible for securing a permanent supervisor from among the researchers in the department within the first four months in program. Registrants in the Postdoctoral Diploma program are supervised by the Director of Medical Physics or designate, Tom Baker Cancer Centre.

The MSc program has a supervisory committee requirement which follows the same requirements and rules as the PhD.

Postdoctoral Certificate in Radiation Oncology Physics: All students will be supervised by the Postdoctoral certificate co-ordinator or delegate co-ordinator for the duration of their program.

10. Required Examinations

Master of Science (course-based)

Two weeks before the comprehensive oral examination, students must write a three-hour, closed-book comprehensive examination, prepared by the Departmental Graduate Affairs Committee in collaboration with the supervisor.

Master of Science (thesis-based)

Thesis Examination

In addition to Faculty of Graduate Studies regulations for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

The thesis examination is open.

Doctor of Philosophy

Candidacy

Doctoral students must complete a written thesis proposal and an oral Field of Study examination. For complete details of the candidacy requirements, see phas.ucalgary.ca/graduate/programs/doctoral_phd_thesis_based/candidacy_exam.

Thesis Examination

In addition to Faculty of Graduate Studies regulations for Thesis Examinations, the Department requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

The thesis examination is open.

Postdoctoral Certificate in Radiation Oncology Physics

Students are evaluated through assignments and course-based examinations.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, please see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the Department by January 15.

Registrants in the Postdoctoral Diploma program must hold an Associate Medical Physicist position, which is a paid appointment.

Political Science POLI

Contact Information

Location: Social Sciences Building, Room 756

Program number: 403.220.5921

Fax: 403.282.4773

Email address: poligrad@ucalgary.ca

Web page URL: poli.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

The MA and PhD programs in Political Science are offered as full-time programs only.

2. Admission Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) A minimum grade point average of 3.40 on a four-point scale over the last ten full-course equivalents taken in the applicant's undergraduate program.

b) Normally a four-year BA in Political Science or a strong background in Political Science of at least 5.0 full-course equivalents in Political Science. Special consideration may be given to those who have not achieved this background.

c) All students whose primary language is not English are required to take a language proficiency test: TOEFL with a minimum score of 600 (paper-based), or 105 (Internet-based); IELTS with a minimum score of 7.5; MELAB with a minimum score of 86; or PTE with a minimum score of 75. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

d) Two reference letters.

e) A statement of research interests.

f) Sample of written work, preferably a paper submitted for a Political Science course.

g) Email confirmation from a potential supervisor who is interested in supervising your work.

Doctor of Philosophy

a) A minimum grade point average of 3.70 on a four-point scale over a Master's degree.

b) Normally a Master of Arts in Political Science or a strong background in Political Science. Special consideration may be given to those who have not achieved this background.

c) All students whose primary language is not English are required to pass a language proficiency test: TOEFL with a minimum score of 600 (paper-based), or 105 (Internet-based); IELTS with a minimum score of 7.5; MELAB with a minimum score of 86; or PTE with a minimum score of 75. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

d) Two reference letters.

e) A statement of research interests.

f) Sample of written work, preferably a paper submitted for a Political Science course.

g) Email confirmation from a potential supervisor who is interested in supervising your work.

3. Application Deadline

Deadline for the submission of completed applications is available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/political-science-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/political-science-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not normally be given for course work taken as part of another completed degree/diploma. If graduate-level courses are taken as post-BA courses, the Graduate Program Director may allow the student to claim up to 6 units (1.0 full-course equivalent) at our graduate level.

5. Program/Course Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department normally requires the following:

Master of Arts

a) Master of Arts students must complete a minimum of 15 units (2.5 full-course equivalents):

- At least 9 units (1.5 full-course equivalent) must be taken in the Political Science Department at the University of Calgary.
- At least 6 units (1.0 full-course equivalent), and no more than 9 units (1.5 full-course equivalents) will be in the student's Primary Field. The student's Primary Field will be one of Canadian Politics, Comparative Politics, International Relations, or Political Thought.
- A maximum of 6 units (1.0 full-course equivalent) can be a reading course.
- MA students must demonstrate (normally through previous course work) a basic knowledge of research methods equivalent to Political Science 399. Students who cannot do so must take Political Science 691. If students are required to take Political Science 691, it will be included in these 15 units (2.5 full-course equivalents). Students who have an equivalent of Political Science 691 will still be required to take 15 units (2.5 full-course equivalents).

b) A written thesis.

c) Thesis Oral Examination.

Doctor of Philosophy

a) Doctoral students must complete a minimum of 18 units (3.0 full-course equivalents):

- At least 12 units (2.0 full-course equivalents) must be taken in the Political Science Department at the University of Calgary.
- At least 6 units (1.0 full-course equivalent) must be taken in each of the student's chosen Primary Field and at least 6 units (1.0 full-course equivalent) must be taken in the student's chosen Secondary Field. A student's Primary and Secondary Fields will consist of any two of Canadian Politics, Comparative Politics, International Relations, or Political Thought.
- A maximum of 6 units (1.0 full-course equivalent) may be reading courses.
- PhD Students must demonstrate (normally through previous course work) a basic knowledge of research methods equivalent to Political Science 399. Students who cannot do so must take Political Science 691. If students are required to take Political Science 691, it will be included in these 18 units. Students who have an equivalent of Political Science 691 will still be required to take 18 units (3.0 full-course equivalents).

b) Field of Study Written Examinations.

c) Field of Study Oral Examination.

d) Thesis Proposal and Meeting.

e) Language Requirement (if applicable).

f) Written Thesis.

g) Thesis Oral Examination.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

The department does not give graduate credit for courses taken below the 600-level, except in special cases.

8. Time Limit

Maximum completion time is four years for a master's program and six years for a doctoral program.

The Department of Political Science encourages completion of the master's within two years and the doctorate within four.

9. Supervisory Assignments

Master of Arts

An incoming student must have a proof of agreement to supervise from one or more faculty members in the student's proposed area of thesis research. Admission will not be granted without proof that adequate supervision is available during the applicant's studies. The selection of an eligible Permanent Supervisor is made by mutual agreement between the student, the faculty member, and the Graduate Program Director. A permanent Supervisor should normally be appointed by the end of April of the first year of registration. At the time of appointment, the Permanent Supervisor should be currently active in research in an area related to the student's interest.

Doctor of Philosophy

An incoming student must have a proof of agreement to supervise from one or more faculty members in the student's proposed area of thesis research. Admission will not be granted without proof that adequate supervision is available during the applicant's studies. The selection of an eligible Permanent Supervisor is made by mutual agreement between the student, the faculty member, and the Graduate Program Director. A permanent Supervisor should normally be appointed by the end of April of the first year of registration. At the time of appointment, the Permanent Supervisor should be

currently active in research in an area related to the student's interest.

The Supervisory Committee should be appointed as quickly as possible after the appointment of the Permanent Supervisor.

10. Required Examinations

See "V. Doctoral Program: Candidacy Regulations" in the Political Science Graduate Program Handbook at poli.ucalgary.ca/graduate – "Program Rules and Policies".

Doctoral Field of Study Examinations

Political Science doctoral students must successfully complete two Field of Study (FoS) written examinations: (i) one written FoS examination in their chosen Primary Field; and, (ii) a second written FoS examination in their chosen Secondary Field. In addition, students must successfully complete a single oral FoS examination which treats both their Primary and Secondary Fields.

Thesis Examinations (MA and PhD)

Scheduling of the Examination

All members of the Supervisory Committee (if applicable) must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Doctoral students must complete a written Thesis Proposal, which is approved by their Supervisory Committee in a Thesis Proposal Meeting.

See "V. Doctoral Program: Candidacy Regulations" in the Political Science Graduate Program Handbook at poli.ucalgary.ca/graduate – "Program Rules and Policies".

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the Department by January 15.

For Department funding information, refer to: "II. Funding & Resource Guidelines & Policies for All Graduate Students" in the Political Science Graduate Program Handbook at poli.ucalgary.ca/graduate – "Program Rules and Policies".

Psychology PSYC

Contact Information

Location: Administration Building, Room 255

Program number: 403.220.5659

Fax: 403.282.8249

Email address: psycgrad@ucalgary.ca

Web page URL: psychology.ucalgary.ca

The Department of Psychology offers graduate work leading to the Master of Science and Doctor of Philosophy degrees in psychology and in clinical psychology. These degree programs are described separately in the links below.

Psychology (PSYC) Program

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

The Department accepts applicants who plan to remain full-time to the completion of their degree. The program does not offer a part-time option.

Specializations:

- Industrial/Organizational Psychology
- Medical Imaging (See the Calendar section on Interdisciplinary Specializations for further information)

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

a) A four-year undergraduate degree in Psychology or related discipline.

b) A minimum admission grade point average of 3.40 on a four-point scale over the last 60 units (10 full-course equivalents).

c) An undergraduate course in statistics/experimental design.

d) An acceptable score on the Graduate Record Examination (Verbal, Quantitative, and Analytical) for students with an undergraduate degree in Psychology. Students not having an undergraduate degree in Psychology must also write the Psychology Subject Test.

e) For applicants required to provide proof of proficiency in English, a TOEFL score of 600 (paper-based test), or 105 (Internet-based test), an IELTS score of 7.5, a MELAB score of 86, or a PTE score of 75. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

f) Two reference letters.

3. Application Deadline

Deadlines for the submission of completed applications are available on the Future Students website:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/psychology-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/psychology-doctor-philosophy-thesis-based.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Science

Master's students must take no fewer than 18 units (3.0 full-course equivalents), 6 units (1.0 full-course equivalent) of which must come from Psychology 607, 611, 613, 615, 617, or 619; and at least 6 units (1.0 full-course equivalent) of which must come from Psychology 601, 620, 630, 639, 700, 710, 720, 730, or 739 over their 24-month program (courses other than Psychology 601 may be repeated for credit). A student may take seminar courses from other departments instead of courses in the second list above, upon approval of their supervisor and the Graduate Program Director.

Doctor of Philosophy

Doctoral students shall take no fewer than 18 units (3.0 full-course equivalents) while in the program. The Supervisor and the Director of Graduate Studies, Department of Psychology, must approve all courses. Incoming doctoral students must demonstrate that they have an adequate background in statistics and methodology (including computer applications). Those needing remedial work may be required by the Department of Psychology to take particular courses.

Industrial Organizational Specialization

I/O students in the MSc program are required to take 24 units (4.0 full-course equivalents) with 6 units (1.0 full-course equivalent) in research methods and statistics, 12 units (2.0 full-course equivalents) in I/O Psychology (639, 739), and 6 units (1.0 full-course equivalent) outside the I/O area.

I/O students in the PhD program are required to take 12 units (2.0 full-course equivalents) in I/O Psychology (739), and 6 units (1.0 full-course equivalent) outside of I/O Psychology that were not completed during the MSc program.

Medical Imaging Specialization

The specialization is open to students interested in pursuing research in cognitive and clinical neuroscience. This specialization requires completion of a course sequence in Medical Imaging (see the MEDI section for further details). MSc students must take a minimum of two courses (the core and a foundational course). PhD students would take three courses (including the core, a foundational and an elective course). PhD students previously completing the MSc Specialization in Medical Imaging will be required to complete one elective course in medical imaging.

These requirements are in addition to the core requirements of the Psychology graduate program. The Medical Imaging courses would count towards Psychology graduate program elective courses.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Credit may be given for 500-level undergraduate courses.

8. Time Limit

Expected completion time is two years for the Master of Science program and three years for the doctoral program. (Particular circumstances can be taken in to account).

9. Supervisory Assignments

An interim supervisor is assigned to each student at the time of admission. In no case will a student be admitted if an appropriate supervisor is not expected to be available. The shift from interim to permanent supervisor formally takes place at the end of the first year. The Director of Graduate Studies, Department of Psychology, must approve the permanent supervisor.

Master's level students must have a supervisory committee consisting of the supervisor plus two other faculty members.

10. Required Examinations

Candidacy Examinations

Doctoral students must pass oral and written Field of Study examinations. For complete details of the examination format and other candidacy requirements, see Psychology Candidacy Requirements.

Thesis Examination

In addition to Faculty of Graduate Studies regulations for Thesis Examinations, the program requires the following:

Thesis oral examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

Core faculty members in the Psychology and Clinical Psychology programs are not eligible to serve as Internal Examiner; however, adjunct faculty members are eligible to serve in this capacity.

11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from the appropriate departmental or University Ethics Review Committee before beginning data collection.

All Master of Science students must formally present a thesis proposal not more than 14 months after admission to the program. The proposal must be typed and 10 to 30 double-spaced pages (12 pt font, reference list extra). Students must consult with their supervisors. The supervisory committee must approve the thesis proposal.

Doctoral students must submit a written thesis proposal, which is approved by their Supervisory Committee in a Thesis Proposal Meeting. For further information see Psychology Candidacy Requirements.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships are advised to submit their applications to the Department by January 15.

Clinical Psychology (CPSY) Program

Contact Information

Location: Administration, Room 255

Program number: 403.220.5659

Fax: 403.282.8249

Email address: psycgrad@ucalgary.ca

Web page URL: psyc.ucalgary.ca/graduate-program/program-clinical-psychology

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

The purpose of the graduate program in Clinical Psychology is to prepare students for careers as doctoral-level clinical psychologists in research, academic, and applied settings. In the course of doctoral training students also are required to complete the Master of Science (MSc) degree. However, consistent with its goal of doctoral training, the program only admits students who wish to pursue the doctoral degree.

Students registered in Master's thesis-based and doctoral programs will be considered full-time. The program does not offer a part-time option.

2. Admission Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the program requires:

a) An honours degree in psychology (or equivalent) with a minimum grade point average of 3.60 on a four-point scale in the last 60 units (10 full-course equivalents) to be considered for entry, although competition for the program is such that higher grade point averages are typical of students who are admitted.

b) Graduate Record Examination (GRE) General Test Scores. Please note that students with scores less than the 50th percentile on the Verbal and Quantitative subtests will not normally be admitted.

c) Graduate Record Examination (GRE) Subject Test in Psychology Scores.

d) A statement of research and professional interests, including the specification of prospective research supervisors from among current Program faculty.

e) For applicants required to provide proof of proficiency in English, a TOEFL score of 600 (paper-based test), or 105 (Internet-based) test, or an IELTS score of 7.5, or a MELAB score of 86, or a PTE score of 75. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

f) Two reference letters.

3. Application Deadline

The deadline for complete applications is available on the Future Students website:

Master of Science: ucalgary.ca/future-students/graduate/explore-programs/clinical-psychology-master-science-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/clinical-psychology-doctor-philosophy-thesis-based.

4. Advanced Credit

Advanced credit may be given for up to 12 units (2.0 full-course equivalents) of graduate work, if this work is consistent with the program's requirements.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

The Program outline is as follows:

Year 1

Psychology 650, 651, 659, 660, 671, 673, 615, thesis work

Year 2

Psychology 601, 650, 681, 683, plus a graduate-level Psychology Statistics course or Methodology course (Psychology 617 or equivalent), completion of the thesis

Year 3

Psychology 750, 760, a graduate-level breadth course, the Candidacy Examination, thesis work

Year 4

Psychology 750, 762, thesis work

Year 5

Pre-Doctoral Clinical Internship Psychology 798, and completion of thesis oral and written requirements

Breadth course requirements may be satisfied through Psychology 750, courses offered by the Department of Psychology, or by obtaining advanced credit for undergraduate courses. Please see program handbook for details.

The prerequisite for all Clinical Program courses (unless otherwise noted) is consent of the Program.

Successful completion of years one and two, plus the Master of Science thesis, constitute the requirements of the Master of Science degree. Program students must formally apply and be approved by the program and the Faculty of Graduate Studies for admission to the doctoral program upon completion of Master of Science requirements.

6. Additional Requirements

Clinical suitability and professional conduct.

7. Credit for Undergraduate Courses

Credit for breadth courses may be given if the applicant has two senior undergraduate courses in that area. Credit for Psychology 601 may be given if the applicant has a senior undergraduate course in History and Systems of Psychology.

8. Time Limit

It is expected that students will complete the MSc thesis within two years. Students in the MSc program must complete all requirements within four registration years. Students who have taken three years to complete all requirements for the master's degree will normally not be admitted into the doctoral program. It is expected that students will complete the doctoral program within 5 years. Maximum time to completion for the MSc is 4 years and for the doctoral program is 6 years.

9. Supervisory Assignments

Program students must have a research supervisor at all times. Supervisors are arranged by mutual consent of student and faculty member, and are consistent with the focus of the student's research work. Master's level students must have a supervisory committee consisting of at least three members, with at least one who is a member of the core clinical faculty. Doctoral candidates must have a supervisory committee of at least three members.

10. Required Examinations

In addition to Faculty of Graduate Studies requirements, the program requires:

Candidacy

Doctoral students must complete a written thesis proposal and pass oral and a written Field of Study examinations. For complete details of the examination format and other candidacy requirements, see psyc.ucalgary.ca/graduate-program/program-clinical-psychology.

Thesis Examination

Final thesis oral examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled

Composition of the Committee

The Internal Examiner must be external to the home program.

Core faculty members in the Psychology and Clinical Psychology programs are not eligible to serve as Internal Examiner; however, adjunct faculty members are eligible to serve in this capacity.

11. Research Proposal Requirements

Students in the program must complete both a Master's thesis and doctoral thesis, according to the criteria set by the Faculty of Graduate Studies. These research projects typically involve the design of a research question and research project, the collection, analysis and interpretation of original data, and the preparation of a written document consistent with good scholarship. Students whose research involves human subjects must receive approval from the appropriate departmental or University Ethics Review Committee before beginning data collection.

13. Financial Assistance

Financial assistance may be available to qualified students. Applicants and program students are strongly encouraged to apply for internal and external awards. For information on Awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the Department by January 15.

14. Other Information

The program subscribes to the scientist-practitioner model of clinical training as described in the Canadian Psychological Association's requirements for program accreditation, and emphasizes the integration of course work, research, and clinical training. The program has been fully accredited by CPA for six years (2011-2017).

Public Policy PPOL

Contact Information

Location: School of Public Policy

Downtown Campus

906 8th Avenue SW

5th Floor

Calgary, Alberta

T2P 1H9

Program number: 403.210.3802

Fax: 403.210.6939

Email address: mpp@ucalgary.ca

Web page URL: policyschool.ca

1. Degrees and Specializations Offered

Master of Public Policy (MPP), course-based

Master of Business Administration/Master of Public Policy (MBA/MPP), combined degree, course-based

Juris Doctor/Master of Public Policy (JD/MPP), combined degree, course-based

MPP

The MPP is a 12-month professional degree program offered for full-time study with limited seats for part-time study (Director approval required).

Combined MBA/MPP

The MBA/MPP program is normally restricted to full-time study. It allows students to obtain both degrees in a significantly shorter time frame than if they are taken separately.

Combined JD/MPP

The JD/MPP program is normally restricted to full-time study. It allows students to obtain both degrees in a significantly shorter time frame than if they are taken separately.

2. Admission Requirements

Master of Public Policy

In addition to the Faculty of Graduate Studies requirements, the School requires:

a) A minimum 3.30 grade point average (on the four-point scale) in the last two years of program or over the last 60 units (10 full-course equivalents).

b) A current resume.

c) A personal statement outlining the applicant's career goals and how the applied-for program would help achieve those goals.

d) For students required to prove proficiency in English, a minimum TOEFL score of 600 (paper-based test) or 105 (Internet-based test) or a score of 7.5 on the IELTS. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "A" on Academic Writing & Grammar III, "A" on Reading Comprehension & Proficiency III, and "A" on Listening Comprehension & Oral Fluency III.

Combined MBA/MPP

Students must meet the admission requirements for the Faculty of Graduate Studies and those for the MBA and MPP programs. Please consult the MBA Admissions Officer or the MPP Graduate Program Strategist for more information.

A separate application for the MPP and for the MBA is required for the combined MPP/MBA program. See deadlines for each program.

Combined JD/MPP

Students must meet the admission requirements for the Faculty of Graduate Studies and those for the JD and MPP programs. Please consult the JD Student Services Co-ordinator or the MPP Graduate Program Strategist for more information.

A separate application for the MPP and for the JD is required for the combined JD/MPP program. See deadlines for each program.

3. Application Deadline

Deadline for the submission of completed applications for the MPP program is available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/public-policy-master-public-policy-course-based.

A separate application for the MPP and for the MBA is required for the combined MBA/MPP program and a separate application for the MPP and for the JD is required for the combined MPP/JD program. See deadlines for each program.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not normally be given for course work taken as part of another completed degree/diploma. If graduate-level courses are taken as post-BA courses and not used as credit towards another degree, the School may allow the student to claim up to 6 units (1.0 full-course equivalent) at our graduate level towards the MPP requirements should

the student be admitted into the MPP program.

5. Program/Course Requirements

In addition to the Faculty requirements, the School requires that all students complete the following:

Master of Public Policy

Please note: All Public Policy courses are restricted to Master of Public Policy students. Students outside of the Master of Public Policy program must obtain permission to register in courses through the School of Public Policy. Core courses are held evenings throughout the academic year. Some exceptions may apply.

a) Two preparatory/foundation courses (Public Policy 601 and 603) during August and during Fall Block Week prior to the start of the Fall Term. Satisfactory performance in these courses is required for continuation in the MPP program. Exemptions will normally be given for these two preparatory/foundation courses to those who have completed courses with a grade of "B" or better in economics, mathematics, and statistics offered by a recognized undergraduate program within the past five years.

b) An effective writing and research course (Public Policy 613) during the September Block Week.

c) The following eight core courses:

Public Policy 605: Markets and Public Policy

Public Policy 607: Politics and Collective Choice

Public Policy 609: Decision Analysis

Public Policy 615: Public Finances

Public Policy 617: Regulation and the Law

Public Policy 619: Governance, Institutions and Public Policy

Public Policy 621: Communicating Policy

Public Policy 623: Capstone Project (Note: Credit/Fail – The capstone project is not included in final grade point calculation)

d) Two elective courses:

The elective courses must be selected from graduate-level courses offered at the University of Calgary. In selecting electives students need to be aware that they must satisfy the prerequisites for those courses. The two elective courses should be related in such a way that they form a concentration in an area of public policy. The choice of elective courses must in all cases be approved by the Academic Director.

e) Public Policy 611. Independent Study. Various sections of this independent study course covering different topic areas are typically offered. These are reserved for Master of Public Policy students. School of Public Policy permission required for all other students. Please refer to the online course listings for details on topics covered each term.

Combined MBA/MPP

Students admitted to the MBA/MPP will normally focus mostly on courses for the MBA during the first year and mostly on MPP courses in year two. Typically, the remaining courses required will be completed in the first term of year three. Please consult the MBA Admissions Officer or the MPP Program Manager for more information.

Combined JD/MPP

In the first year of the combined program students would complete all of the first year compulsory courses in Law. During the Summer Term of year 1, students in the joint program would complete the two MPP Foundation courses in economics and empirical methods (these may be waived for students with adequate academic backgrounds in these areas). In the second year of the Joint Program, students would focus on completing the compulsory core Law courses and five Public Policy core courses. The latter will vary depending on the student's area of specialization but would typically include: Public Policy 605, 607, 609, 615 and 619. Up to two elective (non-core) Public Policy courses may be substituted with approval of the JD/MPP program committee, consisting minimally of the program directors of the two programs. In the Summer period (including Spring Intersession) between years 2 and 3 students would complete Public Policy 621 and 623. In year 3, students would complete the upper level JD compulsory course(s) and required International and Writing requirements, along with enough approved Law or Public Policy electives. It is expected that most students will complete in less than three and one-half calendar years by attending courses every session. Please consult the MPP Program Manager or the JD Student Services Coordinator for more information.

Copyediting

The School of Public Policy does not allow copyediting on students' work.

6. Additional Requirements

The School hosts a variety of Community Outreach events year-round that attract global policy experts and practitioners. As a feature of the MPP program, The School also puts on a Speaker Series specifically for students in the program. These talks feature prominent policy figures in an interactive environment.

The School's event series represents a tremendous opportunity for students to network with policy experts from business and government. For this reason, students are expected to attend as many events as possible throughout the academic year.

7. Credit for Undergraduate Courses

The School does not give graduate credit for courses taken below the 600-level, except in special cases.

8. Time Limit

Maximum completion time for the MPP is four years.

9. Supervisory Assignments

All MPP students in the program will be guided by faculty holding appointments to the School.

10. Required Examinations

No additional examinations outside of the courses are required.

11. Research Proposal Requirements

No additional research requirements outside of the courses are required.

12. Financial Assistance

Students admitted to the MPP program will automatically be considered for financial awards from the School of up to $15,000 per student. Other financial assistance may be available to qualified students. For information on awards, see the website for the School and the Awards and Financial Assistance section of this Calendar.

Religious Studies RELS

Contact Information

Location: Social Sciences Building, Room 558

Program number: 403.220.4831

Fax: 403.210.9191

Email address: relsgrad@ucalgary.ca

Web page URL: clare.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

Specializations:

- Eastern Religions
- Nature of Religion
- Western Religions

Feasibility of areas within these specializations depends on available research resources and faculty expertise; refer to section 15 of this entry for more information.

2. Admission Requirements

In addition to the Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) An admission grade point average of 3.30 or higher on a four-point scale and a minimum of 36 units (6.0 full-course equivalents) in Religious Studies (or their equivalents), usually including at least 6 units (1.0 full-course equivalent) from each of the three streams (Eastern, Western, Nature), as determined by the graduate committee.

b) A reading knowledge of a modern language other than English or of a classical language appropriate to the thesis research. The language requirement normally should be met before admission to the master's program. If this is not the case, the language requirement should be met during the students' course of study in the master's program.

c) Two reference letters.

d) Applicants must include in their application package a sample of written work (e.g. a recent research essay).

Doctor of Philosophy

a) A degree comparable to the University of Calgary Religious Studies Master of Arts with a minimum grade point average of 3.50 on a four-point scale.

b) Two reference letters.

c) Applicants must include in their application package a sample of written work (e.g. a recent research essay).

Students with an Honours Bachelor of Arts degree in Religious Studies, a grade point average of 3.70 or higher, and evidence of competence in the required languages may be admitted directly into the doctoral program or may be considered for transfer to the doctoral program after the first year of the master's program. Such applicants must include in their application package a detailed statement (10 pages) of the purpose, field, and course of study to be pursued in the program.

3. Application Deadline

Deadline for the submission of complete applications is available on the Future Students website.

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/religious-studies-master-arts-thesis-based.

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/religious-studies-doctor-philosophy-thesis-based.

4. Advanced Credit

Any requests for advanced credit must be made when applying for admission. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission. Graduate course work completed before admission and not counted toward satisfying undergraduate degree requirements will be assessed by the Departmental Graduate Committee to determine course requirements.

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department normally requires:

Master of Arts (thesis-based)

a) Five courses (in addition to individualized requirements that may be set by the Departmental Graduate Committee at the time of admission).

- Religious Studies 601 – Studies in Western Religions
- Religious Studies 603 – Studies in Eastern Religions
- Religious Studies 605 – Studies in the Nature of Religion
- Religious Studies 607 – Supervised Master's Thesis Inquiry
- Religious Studies 609 – Critical Discourses in the Study of Religion

b) A thesis proposal to be presented to the Graduate Studies Committee for evaluation and approval before the second annual registration.

Doctor of Philosophy

a) For students with a Master of Arts in Religious Studies, five courses are required (in addition to individualized requirements that may be set by the Departmental Graduate Committee at the time of admission):

- Religious Studies 701 – Studies in Western Religions
- Religious Studies 703 – Studies in Eastern Religions
- Religious Studies 705 – Studies in the Nature of Religion
- Religious Studies 707 – PhD Departmental Colloquium
- Religious Studies 709 – Advanced Critical Discourses in the Study of Religion

b) For students with a BA Honours or for students transferring from the master's program, eight courses are required (in addition to individualized requirements that may be set by the Departmental Graduate Committee at the time of admission):

- Religious Studies 601 – Studies in Western Religions
- Religious Studies 603 – Studies in Eastern Religions
- Religious Studies 605 – Studies in the Nature of Religion
- Religious Studies 701 – Studies in Western Religions
- Religious Studies 703 – Studies in Eastern Religions
- Religious Studies 705 – Studies in the Nature of Religion
- Religious Studies 707 – PhD Departmental Colloquium
- Religious Studies 709 – Advanced Critical Discourses in the Study of Religion

6. Additional Requirements

PhD Language Requirements

Before the written candidacy examination, doctoral students must demonstrate a reading knowledge of at least two languages other than English. At the discretion of the Department and upon recommendation of the Graduate Director, competency in additional languages may be required. The foreign language requirement may be satisfied in two ways:

a) Successful completion (final grade of "B" or higher) at some stage of the student's university program of at least 12 units (2.0 full-course equivalents) in a first language other than English, and 6 units (1.0 full-course equivalent) in a second language; or

b) Successful completion (grade of "B" or higher) of a language examination administered by the Department of Classics and Religion or by another department on behalf of the Department of Classics and Religion. When the test is administered by another department, it will consist of a passage or passages selected by the supervisor and/or any requirements that the other department may deem necessary; the test will be graded by the examiner(s) of the other department. When members of the Department of Classics and Religion administer the test, the examination questions will be determined, administered, and graded by two members of the Department (one of whom normally will be the supervisor) who have expertise in the language under consideration. In the event that a second person with expertise in the required language is not available, the Department Head may seek an expert from outside the department.

7. Credit for Undergraduate Courses

Credit for undergraduate courses will be given only upon approval of the Departmental Graduate Committee.

8. Time Limit

Expected completion time for full-time students is two years in the master's program and four years in the PhD program. Maximum completion time is four years in the master's program and six years in the doctoral program.

9. Supervisory Assignments

The Departmental Graduate Committee assigns an advisor (interim supervisor) when an applicant is recommended for admission to the Faculty of Graduate Studies. A regular supervisor must be assigned by the beginning of the second registration year.

10. Required Examinations

Candidacy

Doctoral students must complete language requirements, a written thesis proposal, and Field of Study examinations: two written and one oral. For complete details of the candidacy requirements, see clare.ucalgary.ca/graduate/phd-candidacy-policies.

Thesis Examination

In addition to the Faculty of Graduate Studies requirements for Thesis Examinations, the Department requires:

Final thesis oral examinations are open.

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar or inquire of the Department.

Students applying for scholarships must submit their applications to the Department by February 1.

Social Work SOWK

Contact Information

Web page URL: fsw.ucalgary.ca.

Locations

Calgary:

Professional Faculties Building, Room 3256

Program number: 403.220.5942; 403.220.6208; 1.877.220.6945

Fax: 403.282.7269

Email address: fswgrad@ucalgary.ca

Edmonton:

3-250, 10230 Jasper Avenue

Edmonton, AB

T5J 4P6

Program number: 780.492.3888; 1.888.492.2083

Fax: 780.492.5774

Email address: fswcnar@ucalgary.ca

Lethbridge:

4401 University Drive

Lethbridge, AB

T1K 3M4

Program number: 403.329.2794

Fax: 403.329.2787

Email address: fswsar@ucalgary.ca

Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Social Work (MSW), thesis-based

Specializations:

- Clinical Social Work Practice
- International and Community Development

Master of Social Work (MSW), course-based

Specializations:

- Clinical Social Work Practice
- International and Community Development
- Leadership in the Human Services

Combined degree program: MBA/MSW, course-based

Applications to this program are suspended as of January 1, 2018.

Graduate Certificates in Social Work:

- Post-baccalaureate Certificate in Advanced Social Work Practice
- Post-baccalaureate Certificate in Clinical Social Work Practice
- Post-baccalaureate Certificate in Leadership in the Human Services
- Post-baccalaureate Certificate in International and Community Development

Post-Baccalaureate Certificate and Diploma in Mental Health and Addictions (applications are not currently being accepted)

Doctor of Philosophy (PhD)

Contact Information

Web page URL: fsw.ucalgary.ca

Program Number: 1.877.220.6208

Email Address: fswgrad@ucalgary.ca

1. Degree Offered

The PhD in Social Work is a research-based degree and is intended to produce highly qualified social work researchers and teachers. The aim of developing such advanced scholarly and research skills is to equip doctoral students for future roles as leaders of the social work profession.

The Faculty of Social Work operates from campuses in Calgary, Edmonton, and Lethbridge. Please check the faculty's website to determine the program location for the year that you apply.

2. Admission Requirements

Students are responsible for meeting the admission requirements as established by the Faculty of Graduate Studies. In addition to Faculty of Graduate Studies requirements for Admission, the Faculty of Social Work requires the following:

a) A Master of Social Work or equivalent graduate degree with a minimum grade point average of 3.50 on a four-point scale.

b) A study plan outlining the applicant's educational goals, career expectations, research proposal and research experience.

c) Substantial professional experience.

d) A sample of written work including, for example, published and/or unpublished scholarly papers and/or professional reports.

e) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based test) or 97 (Internet-based test); or IELTS score of 7.0; or MELAB score of 83; or Tier III on the International Foundations Program (werklund.ucalgary.ca/ifp) with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

f) Three reference letters.

3. Application Deadline

Deadlines for submission of complete applications is available on the Future Students page: ucalgary.ca/future-students/graduate/explore-programs/social-work-doctor-philosophy-thesis-based.

4. Advanced Credit

Request for advanced credit must be made as part of the application process. Credit will not be given for coursework taken as part of another completed degree/diploma or for courses taken to raise the grade point average for admission consideration. For all Faculty of Social Work graduate programs, advanced credit may be granted for not more than the equivalent of 9 units (1.5 full-course equivalents).

5. Program/Course Requirements

Please note that not all programs/courses are offered every semester. Students should consult the timetables and program curriculum plans located on the web for sequence and availability of courses: fsw.ucalgary.ca.

In addition to Faculty of Graduate Studies requirements, the Faculty of Social Work requires:

a) Course work

A minimum of 27 units (4.5 full-course equivalents). Required core courses include:

- Social Work 741
- Social Work 743
- Social Work 745
- Social Work 747
- Social Work 721

Note: Social Work 721 can only be taken once all other required (core and elective) courses have been completed.

Twelve units (2.0 full-course equivalents) options relevant to the student's area of specialization. Option courses may be taken outside of the Faculty of Social Work, depending on the student's needs and course availability. All courses taken external to the Faculty of Social Work must have prior approval from the student's supervisor and the PhD co-ordinator in the Faculty of Social Work.

b) A thesis research proposal

c) Candidacy Examinations

For more information, see section 10 below.

d) PhD Thesis Examination

For more information, see section 10 below.

Please note that not all courses are offered every semester. Students should consult the timetables and program curriculum plans located on the web for sequence and availability of courses: fsw.ucalgary.ca.

6. Additional Requirements

Participation in Orientation Sessions held prior to the start of the Fall term is strongly recommended for incoming students.

7. Credit for Undergraduate Courses

Credit for undergraduate courses will not be awarded.

8. Time Limit

As established by the Faculty of Graduate Studies (see Time Limits), maximum completion time is six years for a doctoral program. The expected completion time is four 12-month years for a PhD.

9. Supervisory Assignments

PhD students are initially assigned an interim supervisor. Before the end of April of the first year, each student must designate a faculty member as permanent supervisor. The supervisor and student must then select a supervisory committee within three months of the appointment of the permanent supervisor. Doctoral supervisory committees typically consist of the supervisor and two other members, one of whom may be external to the Faculty of Social Work.

Within the first two months of working together, PhD students and their interim and/or permanent supervisors are required to complete and submit to Student Services in the Faculty of Social Work the signed Student-Supervisor Checklist. The Student-Supervisor Checklist becomes part of the student's permanent record. If a change occurs in supervision, a new checklist must be

completed, signed and submitted to Student Services within two months of the change.

10. Required Examinations

Candidacy

Doctoral students must successfully complete the following candidacy requirements within 28 months of commencement of the program:

- Coursework;
- Thesis proposal;
- Portfolio of student's work in the program;
- Written Field of Study (FoS) Examination;
- Oral Field of Study (FoS) Examination.

For complete details of candidacy requirements, see the Faculty of Social Work's Doctoral Candidacy Requirements.

PhD Thesis Examination

For the Faculty of Graduate Studies regulations, see Thesis Examinations. In addition, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the Faculty of Social Work.

11. Research Proposal Requirements

Doctoral students construct a written thesis proposal, which must be approved by the Supervisory Committee no later than 3 months prior to the Field of Study examination. See the Faculty of Social Work's Doctoral Candidacy Requirements for further information about the proposal requirements and approval process.

Students whose research involves human subjects must complete the Tri-Council's Course on Research Ethics (CORE), and receive approval from the University of Calgary Conjoint Faculties/Health Research Ethics Board before beginning data collection. A copy of the proposal becomes part of the student's record within the Faculty of Social Work.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see Awards and Financial Assistance section, search the Graduate Awards Database (grad.ucalgary.ca/awards), and consult with the Student Services Office in the Faculty of Social Work.

13. Other Information

All students in the Faculty of Social Work are expected to be proficient in and have access to email, Internet searching, and word processing computer programs. Videoconferencing, web-based tools, discussion boards, and chat rooms may be used in addition to or in lieu of class time.

Master of Social Work (Thesis-Based)

1. Degree and Specializations Offered

Master of Social Work (MSW) - thesis-based

Specializations:

- Clinical Social Work Practice (CSWP)
- International and Community Development (ICD)

The program is available for both BSW graduates and graduates from other disciplines. The thesis-based route may be appropriate for students who intend to proceed to doctoral studies and/or anticipate a career requiring advanced program evaluation or research skills. The program is available in Calgary, Edmonton and Lethbridge.

In Calgary, MSW thesis students are admitted annually and choose one of two Specializations: Clinical Social Work Practice or International and Community Development. BSW graduates are admitted directly into the two-year, full-time Clinical Social Work Practice (CSWP) and International and Community Development (ICD) specializations. Students without an undergraduate degree in social work are admitted to a three-year full-time CSWP and ICD programs.

In Edmonton, the Faculty of Social Work offers the Clinical Social Work Practice Specialization to MSW thesis students. Students with a BSW complete the Clinical Specialization program in three years. Students with undergraduate degrees in other disciplines complete the Foundation courses followed by the Clinical Specialization courses, requiring a total of five years of study. Admission occurs in odd-numbered years.

In Lethbridge, the Faculty of Social Work offers the Clinical Social Work Practice Specialization to MSW thesis students with a BSW. Students complete the program in three years. Admission occurs in odd-numbered years.

Program Delivery

In Edmonton, program delivery blends on-site and web-based formats. On-site courses are offered on Friday evenings and Saturdays, four times per term, and week-long intensives at the beginning of every fall term and some winter terms. Students may continue working while registered in the program but must ensure they are available for full-time, weekday practica when scheduled.

In Lethbridge, program delivery blends web-based and on-site formats, allowing students from across Canada to continue working while pursuing graduate education. Courses are scheduled on weekends, in week-long intensives and/or in online format.

2. Admission Requirements

Students are responsible for meeting the admission requirements as established by the Faculty of Graduate Studies. In addition to Faculty of Graduate Studies requirements for Admission, the Faculty of Social Work requires the following:

a) In Calgary and Edmonton, a Bachelor of Social Work degree, or a four-year bachelor's degree from another discipline. In Lethbridge, a Bachelor of Social Work degree.

b) A minimum GPA of 3.00 (on the University of Calgary four-point system). This is based on the last two-years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

c) The equivalent of two years of full-time paid or volunteer work in the human services field.

d) A study plan outlining the applicant's educational goals and career expectations. (If applying to the Calgary program, the study plan must indicate the applicant's intended area of Specialization: Clinical Social Work Practice, or International and Community Development).

e) An additional statement providing a rationale for selecting the thesis route and a preliminary research proposal. Students considering applying to the thesis route are strongly encouraged to discuss this option with the Thesis Program Co-ordinator if applying to Calgary, the Associate Director, Academic if applying to Edmonton, or the MSW Co-ordinator if applying to Lethbridge, prior to completing the application process.

f) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based test) or 97 (Internet-based test); or IELTS score of 7.0; or MELAB score of 83; or Tier III of the International Foundations Program (werklund.ucalgary.ca/ifp) with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

g) Two reference letters.

3. Application Deadlines

Deadlines for submission of complete applications are available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/social-work-master-social-work-thesis-based.

4. Advanced Credit

Request for advanced credit must be made as part of the application process. Credit will not be given for coursework taken as part of another completed degree/diploma or for courses taken to raise the grade point average for admission consideration. For all Faculty of Social Work graduate programs, advanced credit may be granted for not more than the equivalent of 9 units (1.5 full-course equivalents).

Advanced credit will not normally be granted for the Master of Social Work degree. Students who wish to explore the possibility of Advanced Credit should contact the Student Advisor in the program location to which they are applying (Calgary, Edmonton or Lethbridge).

5. Program/Course Requirements

For Students with a BSW:

Nine specialization courses (27 units or 4.5 full-course equivalents) and the MSW thesis. Courses include:

a) Five core courses (see specific courses listed by specialization, below).

b) Social Work 655: Thesis Research.

c) One option course (option course requirements and offerings vary by year, program and location).

d) Social Work 696 Advanced Practicum (525 hours; 6 units or 1.0 full-course equivalent)

e) Thesis

For students with a Bachelor degree in a discipline other than social work:

Nine foundation courses (27 units or 4.5 full-course equivalents), as follows. Foundation courses must be completed before students advance to specialization courses.

- Social Work 621
- Social Work 625
- Social Work 627
- Social Work 629
- Social Work 632
- Social Work 637
- Social Work 641
- Social Work 645
- Social Work 633 (426 hours)

Nine specialization courses (27 units or 4.5 full-course equivalents) and the MSW thesis.

Courses include:

a) Five core courses (see specific courses listed by Specialization, below).

b) Social Work 655: Thesis Research.

c) One option course (option course requirements and offerings vary by year, program and location).

d) Social Work 696: Advanced Practicum (525 hours; 6 units or 1.0 full-course equivalent).

Specialization Courses:

Clinical Social Work Practice Specialization (offered in Calgary, Edmonton and Lethbridge)

Required core courses:

- Social Work 651
- Social Work 653
- Social Work 657
- Social Work 659
- Social Work 697

International and Community Development Specialization (offered in Calgary only)

Required core and option courses:

- Social Work 671
- Social Work 673
- Social Work 675 OR 699.22
- Social Work 677
- Social Work 697
- Social Work 699.21

Please note that not all courses are offered every semester. Students should consult the timetables and program curriculum plans located on the web for sequence and availability of courses: fsw.ucalgary.ca.

6. Additional Requirements

Participation in Orientation Sessions held prior to the start of the Fall term is strongly recommended for incoming students.

7. Credit for Undergraduate Courses

Credit for undergraduate courses will not be awarded.

8. Time Limit

As established by the Faculty of Graduate Studies (see Time Limits), maximum completion time is four years for a thesis-based MSW.

Expected completion time in Calgary is two 12-month years for a thesis-based MSW student with a BSW; three 12-month years for MSW student without a BSW.

Expected completion time in Edmonton is three 12-month years for a thesis-based MSW student with a BSW; five 12-month years for a thesis-based MSW student without a BSW.

9. Supervisory Assignments

MSW thesis students are initially assigned an interim supervisor. Before the end of April of the first year, each student must designate a faculty member as permanent supervisor.

Within the first two months of working together, MSW thesis students and their interim and/or permanent supervisors are required to complete and submit to Student Services in the Faculty of Social Work the signed Student-Supervisor Checklist. The Student-Supervisor Checklist becomes part of the student's permanent record. If a change occurs in supervision, a new checklist must be completed, signed and submitted to Student Services within two months of the change.

10. Required Examinations

MSW Thesis Examination

The final examination for the thesis-based MSW involves an oral defence of the thesis. The thesis examination is conducted by the student's examining committee, which must be designated at least one month before the oral examination.

In addition to the Faculty of Graduate Studies regulations for Thesis Examinations, the program requires:

Composition of the Committee

The MSW examining committee includes the thesis supervisor, a faculty member from the Faculty of Social Work, an Internal Examiner, and a neutral chair. The Internal Examiner must be external to the Faculty of Social Work.

11. Research Proposal Requirements

Calgary

Students should complete all coursework prior to having their proposal approved by their supervisor. Once coursework has been completed and the proposal approved, students can proceed with completing the Tri-Council's Course on Research Ethics (CORE) and apply for ethics certification. A copy of the proposal becomes part of the student's record within the Faculty of Social Work.

Edmonton and Lethbridge

Normally, thesis-based MSW students in Edmonton and Lethbridge complete the Tri-Council's Course on Research Ethics (CORE) and apply for research ethics certification in the summer following their admission to the Clinical Specialization, after their thesis proposal has been approved by their supervisor. A copy of the proposal becomes part of the student's record within the Faculty of Social Work.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Faculty of Graduate Studies Calendar, search the Graduate Awards Database, and consult with the Student Services Office in the Faculty of Social Work.

13. Other Information

All students in the Faculty of Social Work are expected to be proficient in and have access to email, Internet searching, and word processing computer programs. Videoconferencing, web-based tools, discussion boards, and chat rooms may be used in addition to or in lieu of class time.

The Master of Social Work program is accredited by the Canadian Association of Social Work Education. Information on the Faculty of Social Work and its programs is available online at fsw.ucalgary.ca.

Master of Social Work (Course-Based)

1. Degree and Specializations Offered

Master of Social Work (MSW) - course-based

The Master of Social Work program is accredited by the Canadian Association of Social Work Education.

The objective of the Master of Social Work (MSW) program is to prepare students for advanced professional practice in social work. The program is available for both BSW graduates and graduates from other disciplines. The course-based program is appropriate for students who intend to provide direct service in the field. The program is available in Calgary, Edmonton and Lethbridge.

Specializations:

- Clinical Social Work Practice (CSWP)
- International and Community Development (ICD)
- Leadership in the Human Services (LHS)

Program Delivery

For Fall 2018 intake, MSW courses will be offered face-to-face at the University of Calgary campus.

For Spring 2019 intake and onward, the MSW courses will be offered through a blended delivery model, which includes both face-to-face and online learning. The face-to-face components of the blended model may be offered in specific locations either in block format or on evenings and / or weekends.

Combined degree program: Master of Social Work/Master of Business Administration (MSW/MBA)

Applications to this program are suspended as of January 1, 2018.

2. Admission Requirements

Students are responsible for meeting the admission requirements as established by the Faculty of Graduate Studies. In addition to Faculty of Graduate Studies requirements, the Faculty of Social Work requires the following:

a) A Bachelor of Social Work degree or a four-year bachelor's degree from another discipline.

b) A minimum GPA of 3.00 (on the University of Calgary four-point system). This is based on the last two-years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

c) The equivalent of two years of full-time paid or volunteer work in the human services field.

d) A study plan outlining the applicant's educational goals and career expectations.

e) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based test) or 97 (Internet-based test); or IELTS score of 7.0; or MELAB score of 83; or Tier III of the International Foundations Program (werklund.ucalgary.ca/ifp) with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

f) Two references.

3. Application Deadlines

For application deadlines, see the Future Students webpage at ucalgary.ca/future-students/graduate/explore-programs/social-work-master-social-work-course-based.

4. Advanced Credit

Advanced credit will not normally be granted for the Master of Social Work degree. Students who wish to explore the possibility of Advanced Credit should contact a Faculty of Social Work Student Advisor.

5. Program Requirements

5.1 Foundation Course Requirements

For students with a bachelor's degree in a discipline other than social work.

Nine foundation courses (27 units or 4.5 full-course equivalents), as follows:

- Social Work 621
- Social Work 625
- Social Work 627
- Social Work 629
- Social Work 632
- Social Work 637
- Social Work 641
- Social Work 645
- Social Work 633 (426 hours)

Foundation courses must be completed before students advance to Specialization specific courses and Advanced Practicum (Social Work 696).

5.2 MSW Course Requirements (Fall 2018 Intake)

For students who have a BSW or completed foundation courses.

Ten specialization courses (30 units or 5.0 full-course equivalents) and the MSW Capstone in the following configuration:

Clinical Social Work Practice Specialization (offered in Calgary, Edmonton and Lethbridge)

Seven core courses and three option courses.

Required core courses:

- Social Work 651
- Social Work 653
- Social Work 657
- Social Work 659
- Social Work 697
- Social Work 696 (525 hours; 6 units or 1.0 full-course equivalent)

International and Community Development Specialization (offered in Calgary only)

Nine core courses and one option course. Required core courses:

- Social Work 671
- Social Work 673
- Social Work 675
- Social Work 677
- Social Work 697
- Social Work 699.21
- Social Work 699.22
- Social Work 696 (525 hours, usually completed outside of Canada in the Spring/Summer semester following completion of core courses; 6 units or 1.0 full-course equivalent).

Leadership in the Human Services (LHS) Specialization (blended delivery program; administered from Calgary)

Required core courses:

- Social Work 665
- Social Work 667
- Social Work 669
- Social Work 693
- Social Work 697
- Social Work 696 (525 hours; 6 units or 1.0 full-course equivalent)

In the LHS Specialization, option courses are predetermined, as follows:

- Social Work 695
- Social Work 679.10
- Social Work 679.18

5.3 MSW Course Requirements (Spring 2019 Intake and Onward)

For students who have a BSW or completed foundation courses.

A total of 36 units (6 full-course equivalents) of course-work, as follows:

a) 12 units (2 full-course equivalents) of Advanced Social Work Practice core courses.

b) 12 units (2 full-course equivalents) of Specialization courses (topics may vary from year to year and by location).

c) 12 units (2 full-course equivalents) of integrated Practicum, Seminar, Research and Exit Requirement.

a) Advanced Social Work Practice Core Courses:

Social Work 600: Topics in Advanced Social Work Practice I (3 units)

Social Work 602: Advanced Social Work Practice and Research Integration I (3 units)

Social Work 604: Topics in Advanced Social Work Practice II (3 units)

Social Work 606: Advanced Social Work Practice and Research Integration II (3 units)

b) Specialization Course Requirements:

Clinical Social Work Practice (CSWP) Specialization

Social Work 610: Advanced Topics in Clinical Social Work I (3 units)

Social Work 612: Advanced Topics in Clinical Practice and Research I (3 units)

Social Work 614: Advanced Topics in Clinical Social Work II (3 units)

Social Work 616: Advanced Topics in Clinical Practice and Research II (3 units)

The four courses in each CSWP Specialization Topic area address a particular subject within the broader field of Clinical Social Work Practice. Students must complete all four courses in the selected topic area.

International and Community Development (ICD) Specialization

Social Work 620: Advanced Topics in International and Community Development I (3 units)

Social Work 622: Advanced Topics in Practice and Research in International and Community Development I (3 units)

Social Work 624: Advanced Topics in International and Community Development II (3 units)

Social Work 626: Advanced Topics in Practice and Research in International and Community Development II (3 units)

The four courses in each ICD Specialization Topic area address a particular subject within the broader field of International and Community Development. Students must complete all four courses in the selected topic area.

Leadership in the Human Services Specialization

Social Work 640: Advanced Topics in Leadership in the Human Services I (3 units)

Social Work 642: Advanced Topics in

Practice and Research in Leadership in the Human Services I (3 units)

Social Work 644: Advanced Topics in Leadership in the Human Services II (3 units)

Social Work 646: Advanced Topics in Practice and Research in Leadership in the Human Services II (3 units)

The four courses in each Leadership in the Human Services Specialization Topic area address a particular subject within the broader field of Leadership in Human Services. Students must complete all four courses in the selected topic area.

The four courses within each Specialization are offered in a prescribed sequence and deviation from the curriculum plan is not normally allowed.

Please note that not all Specialization Topic areas are offered every year. Students should consult the timetables and program curriculum plans located on the web for sequence and availability of Specialization topics: fsw.ucalgary.ca.

c) Integrated Practicum, Seminar, Research and Exit Requirement

Social Work 660: Advanced Practicum and Seminar I (3 units)

Social Work 660: Advanced Practicum and Semi Social Work 662: Advanced Practicum and Seminar II (3 units)

Social Work 664: Field and Research Integration Seminar I (3 units)

Social Work 668: Field and Research Integration Seminar II (3 units)

MSW Pathways

MSW 12-month Pathway: This pathway consists of 36 units of course work including the Practicum and Exit requirement. It is available to BSW graduates or students with a degree from another discipline who have completed the foundation year.

MSW 24-month Pathway: This pathway consists of 36 units of course work including the Practicum and Exit requirement. It is available to BSW graduates or students with a degree from another discipline who have completed the foundation year.

MSW Laddering Pathway: This pathway, intended for BSW graduates, consists of a three stage laddering structure. Students who choose this pathway must successfully complete the Post-Baccalaureate Certificate in Advanced Social Work Practice (12 units) and one of the Specialization Certificates in either order (12 units), as well as the MSW Practicum and Exit Requirement (12 units).

See Graduate Certificates in Social Work section of this Calendar for more information.

6. Additional Requirements

Participation in Orientation Sessions held prior to the start of the program is mandatory for students.

7. Credit for Undergraduate Courses

Credit for undergraduate courses will not be awarded.

8. Time Limits

Expected completion time varies based on the MSW pathway chosen by the student at the time of the application.

Fall 2018 Intake and Prior

Expected completion times in the Calgary-based MSW in CSWP and ICD Specializations are:

- 12 months for full-time students with a BSW
- 24 months for full-time students without a BSW.

Expected completion times in LHS Specialization (Summer 2018 intake and prior) are:

- 24 months for full-time students with a BSW
- 36 months for full-time students without a BSW.

Maximum completion time for all students is six years.

Spring 2019 Intake and Onward

- MSW 12-month Pathway: The expected completion time is 12 months for BSW graduates and 24 months for full-time students without a BSW.
- MSW 24-month Pathway: The expected completion time is 24 months for BSW graduates and 36 months for full-time students without a BSW.
- MSW Laddering Pathway: Expected completion time is 36 months by BSW graduates.

Maximum completion time for all students is six years.

9. Supervisory Assignments

Students are assigned a faculty advisor/specialization co-ordinator upon entry into the program. A change of advisor, initiated by the student or the faculty member, can occur at any time during the student's enrolment in the program.

10. Required Examinations

Fall 2018 Intake and Prior

Students are required to complete a capstone at the end of their coursework and practicum.

11. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see Awards and Financial Assistance for Graduate Students, the Graduate Awards Database grad.ucalgary.ca/awards, and consult with the Student Services Office in the Faculty of Social Work.

12. Other Information

All students in the Faculty of Social Work are expected to be proficient in and have access to email, Internet searching, and word processing computer programs. Videoconferencing, web-based tools, discussion boards, and chat rooms may be used in addition to or in lieu of class time.

Graduate Certificates in Social Work

1. Certificates Offered

Post-baccalaureate Certificate in Advanced Social Work Practice

Post-baccalaureate Certificate in Clinical Social Work Practice

Post-baccalaureate Certificate in Leadership in the Human Services

Post-baccalaureate Certificate in International and Community Development

Post-Baccalaureate Certificate and Diploma in Mental Health and Addictions

Applications are not currently being accepted.

Post-Baccalaureate Certificates in Social Work serve as stand-alone credentials for practicing social workers who seek formal professional development opportunities in their field, or provide practicing social workers a flexible option to pursue the MSW degree.

Laddering from Graduate Certificates to MSW

Students who complete the Post-Baccalaureate Certificate in Advanced Social Work Practice and one of the Certificates in a Specialization area (e.g., Clinical Social Work Practice, International and Community Development, or Leadership in the Human Services), may receive credit for the 24 units (4 full-course equivalents) of coursework completed in the two certificate programs, if they are subsequently accepted to the Master of Social Work (course-based) program. Students must apply to the course-based MSW degree within five years from the beginning of their first post-baccalaureate certificate in Social Work.

Program Delivery

The certificate courses are offered through a blended delivery model, which includes both face-to-face and online learning. The face-to-face components are offered either in block format or on evenings and /or weekends. This allows working professionals the flexibility to complete the Graduate Certificates and consequently the MSW program while maintaining full-time employment. It also provides the flexibility for learners in rural and remote areas to continue living in their home communities while working toward a graduate credential.

2. Admission Requirements

In addition to the Faculty of Graduate Studies' admission requirements, all applicants must meet the following requirements:

a) A Bachelor of Social Work degree from an accredited/recognized institution.

b) A minimum GPA of 3.00 (on the University of Calgary four-point system). This is based on the last two years of the undergraduate degree consisting of a minimum of 60 units (10 full-course equivalents).

c) The equivalent of two years of full-time paid or volunteer work in the human services field.

d) A study plan outlining the applicant's educational goals and career expectations.

e) For applicants required to provide proof of proficiency in English: a minimum TOEFL score of 580 (paper-based) or 97 (Internet-based test); or IELTS score of 7.0; or MELAB score of 83; or Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

3. Application Deadlines

Deadlines are available on the Future Students webpage at ucalgary.ca/future-students/graduate/explore-programs.

Students who wish to use the certificates as a pathway to "ladder" into the MSW (course-based) degree program must apply at each stage and upon successful completion of each program receive a credential.

4. Advanced Credit

Normally, advanced credit is not awarded toward a post-baccalaureate certificate.

5. Course Requirements

Post-Baccalaureate Certificate in Advanced Social Work Practice

The Certificate requires 12 units of coursework:

- Social Work 600: Advanced Social Work Theory, Policy and Practice I (3 units)
- Social Work 602: Advanced Practice, Research and Evaluation in Social Work I (3 units)
- Social Work 604: Advanced Social Work Theory, Policy and Practice II (3 units)
- Social Work 606: Advanced Practice, Research and Evaluation in Social Work II (3 units)

Post-Baccalaureate Certificate in Clinical Social Work Practice

The Certificate requires 12 units of course work:

- Social Work 610: Advanced Topics in Clinical Social Work I (3 units)
- Social Work 612: Advanced Topics in Clinical Practice and Research I (3 units)
- Social Work 614: Advanced Topics in Clinical Social Work II (3 units)
- Social Work 616: Advanced Topics in Clinical Practice and Research II (3 units)

Post-Baccalaureate Certificate in International and Community Development

The Certificate requires 12 units of course work:

- Social Work 620: Advanced Topics in International and Community Development I (3 units)
- Social Work 622: Advanced Topics in Practice and Research in International and Community Development I (3 units)
- Social Work 624: Advanced Topics in International and Community Development II (3 units)
- Social Work 626: Advanced Topics in Practice and Research in International and Community Development II (3 units)

Post-Baccalaureate Certificate in Leadership in the Human Services

The Certificate requires 12 units of course work:

- Social Work 640: Advanced Topics in Leadership in the Human Services I (3 units)
- Social Work 642: Advanced Topics in Practice and Research in Leadership in the Human Services I (3 units)
- Social Work 644: Advanced Topics in Leadership in the Human Services II (3 units)
- Social Work 646: Advanced Topics in Practice and Research in Leadership in the Human Services II (3 units)

6. Credit for Undergraduate Courses

The Faculty of Social Work does not normally accept undergraduate courses for credit towards graduate certificates.

7. Time Limit

The expected completion time is eight months for any of the post-baccalaureate certificates. Maximum completion time is two years.

Students taking Graduate Certificates as part of the laddered pathway to the MSW (course-based) degree program must apply to ladder into the MSW (course-based) within five years from the start of their first graduate certificate in the laddering sequence.

8. Supervisory Assignments

A Graduate Certificate Co-ordinator is assigned to each cohort-based Certificate.

9. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Sociology SOCI

Contact Information

Location: Social Sciences Building, Room 956

Program number: 403.220.6501

Fax: 403.282.9298

Email address: socigrad@ucalgary.ca

Web page URL: soci.ucalgary.ca

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Arts (MA), thesis-based

The MA and PhD programs in Sociology are offered as full-time programs only.

2. Admission Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) A grade point average of 3.5 on a four-point scale over the last two years of coursework or 60 units (10 full-course equivalents).

b) Demonstrated competence, normally through course work, in classical and contemporary sociological theory, social research methods, and social statistics.

c) A written statement of intent.

d) A sample of written work.

e) Two reference letters.

Doctor of Philosophy

a) A grade point average of 3.5 on a four-point scale over a master's program.

b) Demonstrated competence in sociological theory, social methodology, and social statistics, in addition to a substantive interest.

c) A written statement of intent.

d) A sample of written work.

e) Two reference letters.

3. Application Deadline

Deadlines for submission of completed applications is available on the Future Students website:

Master of Arts: ucalgary.ca/future-students/graduate/explore-programs/sociology-master-arts-thesis-based

Doctor of Philosophy: ucalgary.ca/future-students/graduate/explore-programs/sociology-doctor-philosophy-thesis-based

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

Master of Arts – Credit may be allowed for up to two 600-level Sociology courses (6 units or 1.0 full-course equivalent).

Doctor of Philosophy – Credit may be allowed for up to three 600- or 700-level courses (9 units or 1.5 full-course equivalents).

5. Program/Course Requirements

In addition to Faculties of Graduate Studies and Arts requirements, the Department requires:

Master of Arts

a) Competence in sociological statistics, methods of sociological research, and sociological theory demonstrated by completing Sociology 611; 613 or 615; and 631.

b) Completion of 6 units (1.0 full-course equivalent) electives at the 600 or 700 level; at least 3 units (0.5 full-course equivalent) elective must be a Sociology Department offering in a substantive area.

c) Completion of Sociology 602 - Training in Professional Sociology and successful preparation and completion of a thesis prospectus.

d) Completion of the MA Thesis requirement.

Doctor of Philosophy

a) Course requirements:

- Sociology 611 (students who have completed this or an equivalent graduate-level statistics course may substitute any other 600- or 700-level course);
- Sociology 702 and 731;
- 6 units (1.0 full-course equivalent) of methodology courses at the 700 level;
- 6 units (1.0 full-course equivalent) electives at the 600 or 700 level selected from Sociology Department offerings on substantive topics.
- Students who have taken one of the required courses in a previous degree may substitute any other 600- or 700-level course.

b) Successful completion of a thesis prospectus, normally within fourteen months of initial registration in the doctoral program. Successful completion of the prospectus means that the Supervisory Committee has approved the thesis project, and a written copy of the prospectus is filed with the Sociology Department Student Administrator.

c) A Field of Study examination with a written and an oral component, normally completed within twenty months of initial registration in the doctoral program.

d) Completion of the PhD Thesis requirement.

Copyediting Policy

Students may hire an editor to copyedit their theses. The student, supervisor and editor must abide by the following regulations:

1. Prior to hiring a copy editor, permission from the supervisor(s) must be obtained. An agreement outlining the permitted scope of editing must be signed by the student and the supervisor(s).

2. A disclosure statement is required in the thesis (e.g., a sentence in the preface or acknowledgment stating that the thesis has been professionally edited).

3. Under no circumstances should the copyediting alter the content, structure or contribution of the thesis.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

None.

8. Time Limit

Expected completion time is 20 months for the Master of Arts and four years for the Doctor of Philosophy degree. Maximum completion time is four years for the Master of Arts and six years for the doctoral program.

9. Supervisory Assignments

An interim supervisor is assigned to all incoming students. MA students, after one term in the program, will make supervisory arrangements with a faculty member in the chosen area of research. PhD students, after two terms in the program, will make supervisory arrangements with a faculty member in the chosen area of research. In the case of PhD students, the supervisor and student will select two other faculty members to serve on the student's supervisory committee.

10. Required Examinations

Doctoral Candidacy Examinations

Doctoral students must pass oral and written Field of Study examinations. For complete details of the examination format and other candidacy requirements, see soci.ucalgary.ca/graduate/phd-program.

Thesis Examinations

Thesis examinations are open. In addition to Faculty of Graduate Studies regulations for thesis examinations, the program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's draft thesis document before an examination can be scheduled.

Composition of the Committee

The Internal Examiner may be internal to the home program.

11. Research Proposal Requirements

Students whose research involves human subjects must receive approval from University of Calgary Conjoint Faculties Research Ethics Board or the Conjoint Health Research Ethics Board (if applicable) before beginning data collection.

Master of Arts students are required to prepare a thesis prospectus within nine months of the date of entry into the program.

Doctoral students must complete a written thesis proposal, approved by the supervisory committee. See soci.ucalgary.ca/graduate/phd-program for further information about the proposal requirements and approval process.

12. Financial Assistance

Financial assistance may be available to qualified students. Information on departmental funding is available in the online **Graduate Student Handbook** at soci.ucalgary.ca/graduate. For further information on awards, please see the Awards and Financial Assistance section of this Calendar.

Students applying for Graduate Award Competitions through the Faculty of Graduate Studies must submit their applications to the Department by January 15.

Sustainable Energy Development SEDV

Contact Information

Location: Scurfield Hall, Room 453

Program number: 403.220.2013

Fax: 403.282.0095

Email address: sedv@ucalgary.ca

Web page URL: ucalgary.ca/sustainableenergy

1. Degrees and Specializations Offered

Master of Science (MSc), course-based

The MSc degree in Sustainable Energy Development (SEDV) is a multidisciplinary offering by the Haskayne School of Business, the Schulich School of Engineering and the Faculties of Law and Environmental Design.

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, the SEDV Program requires:

a) Letter of intent addressing the following four points, in your own words, as clearly and concisely as possible – only the first 250 words in the answer to each question will be read:

- Describe how, considering your career progress to date, an MSc in Sustainable Energy Development fits in with your future career goals.
- Expand on the above by describing the strengths, ambitions and experience you will bring to the program.
- A capstone project is a requirement of this program. The work must be interdisciplinary, reflecting a minimum of three areas of study, with energy and environment as the two anchors. What new and innovative ways will your project contribute to current knowledge?
- Describe your ability to work in a team atmosphere and its contribution to your success.

b) A current curriculum vitae.

c) Two years of professional work experience after graduation.

d) Two reference letters.

Please refer to our website for detailed instructions and templates.

3. Application Deadline

Deadlines for submission of complete applications are available on the Future Students website: ucalgary.ca/future-students/graduate/explore-programs/sustainable-energy-development-master-science-course-based.

4. Advanced Credit

The SEDV Program does not grant advanced credit for courses completed prior to the admission.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies requirements, SEDV requires:

a) Successful completion of 13 Sustainable Energy Development graduate-level courses (39 units or 6.5 full-course equivalents).

b) Completion of the capstone project (3 units or 0.5 full-course equivalent). The capstone project course is offered as a series of three courses that must be taken immediately after each other. The project work must be interdisciplinary, reflecting a minimum of 3 areas of study, with energy and environment as the two anchors.

c) Attendance and participation in seminars, upgrade workshops and field trips.

6. Credit for Undergraduate Courses

The SEDV program does not grant advanced credit for undergraduate courses.

7. Time Limit

The SEDV program has commences annually in May, which is the only intake. As a cohort-based program, the expectation is for students to complete courses as timetabled for their cohort.

The expected completion time is 16 months for full-time studies; however, the maximum permitted time is 6 years.

8. Financial Assistance

For information on graduate funding, please see the Faculty of Graduate Studies' website ucalgary.ca/future-students/graduate/finance.

Veterinary Medical Sciences VMS

Contact Information

Location: Teaching Research and Wellness (TRW) Building, Room 2D09

Program number: 403.210.8764

Fax: 403.210.6628

Email address: vmgrad@ucalgary.ca

Web page URL: vet.ucalgary.ca/graduate

1. Degrees and Specializations Offered

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Note: All students are registered full-time.

2. Admission Requirements

In addition to the Faculty of Graduate Studies requirements, the Veterinary Medical Sciences program requires:

a) A minimum of a baccalaureate degree (or its equivalent, or a BVSc, DVM or MD degree) with course work appropriate for VMS graduate training from a recognized institution, with a minimum admission grade point average of 3.00 on a four-point scale or equivalent in the last two years (60 units or 10 full-course equivalents) of undergraduate study.

b) For applicants required to provide proof of proficiency in English, a minimum TOEFL score of 580 (paper-based), or 97 (Internet-based test), a minimum IELTS score of 7.0, or a minimum MELAB score of 83. This requirement can also be met by completing Tier III of the International Foundations Program with a minimum grade of "B" on Academic Writing & Grammar III, "B" on Reading Comprehension & Proficiency III, and "B" on Listening Comprehension & Oral Fluency III.

c) Two reference letters.

d) Curriculum Vitae.

e) A Letter of Understanding signed by the prospective student and supervisor with a statement outlining the supervisor's commitment to the training of the student, as well as their commitment to fund the student in accordance with the minimum VMS guidelines.

3. Application Deadline

For the MSc application deadlines, see ucalgary.ca/future-students/graduate/explore-programs/veterinary-medicine-master-science-thesis-based.

For the PhD application deadlines, see ucalgary.ca/future-students/graduate/explore-programs/veterinary-medicine-doctor-philosophy-thesis-based.

4. Advanced Credit

Advanced credit may be given for course work completed prior to entry into the program. The applicant must make requests for advanced credit as part of the application for admission.

5. Program Requirements

In addition to Faculty of Graduate Studies requirements, all MSc and PhD students must complete:

a) Veterinary Medicine 601;

b) Veterinary Medicine 605 or Veterinary Medicine 610*;

**A suitable entry-level biostatistics course may be taken as an alternative to Veterinary Medicine 605 or 610, with permission from the Graduate Program Director.*

c) MSc students must take at least one additional course, and PhD students must take at least two additional graduate-level courses that are appropriate to their field of study and have been approved by their Supervisory Committee; and

d) MSc students are required to give one public seminar to the Faculty of Veterinary Medicine community prior to scheduling the thesis examination; PhD students are required to give one public seminar the Faculty of Veterinary Medicine community prior to completing the admission to candidacy process, and are required to give a second public seminar prior to scheduling the thesis examination.

6. Additional Requirements

All individuals working with humans or animals must have appropriate certification. In accordance with Canadian Council on Animal Care guidelines and the University of Calgary VPR office, all individuals who work with animals must register with the Institutional Animal User Training Program (ucalgary.ca/animalhealth/home/institutional-animal-user-training-iautp) to complete the relevant U of C IAUTP online training modules and to determine what additional training is required as determined by their research program and any previous animal use training they may have. No animal work will be permitted until all training has been completed. The IAUTP online training modules can be accessed prior to arrival to the U of C once the student's UCID is assigned, however, the associated written quiz and live training sessions must be completed after arrival.

In accordance with Tri-Council guidelines, all students performing research involving humans must have the CORE tutorial certificate prior to applying for ethics certification (ucalgary.ca/research/researchers/ethics-compliance/tcps2-core-tutorial) and must receive ethics certification prior to working with human subjects.

7. Credit for Undergraduate Courses

The student's Supervisory Committee may recommend credit for undergraduate courses provided they are relevant to the area of study. Final approval is required by the Graduate Program Director.

8. Time Limit

In accordance with the FGS regulation, students in full-time study are expected to complete an MSc in two years, with a maximum time of four years; students in PhD programs are expected to complete their degree in four years, with a maximum time of six years.

9. Supervisory Assignments

Students will normally have identified a permanent supervisor at the time of admission.

In consultation with the student's supervisor(s), a Supervisory Committee will be selected that includes a minimum of two additional faculty members for MSc degrees, or three additional faculty members for PhD degrees. In PhD committees, one member will be named from outside the VMS graduate program. The appointment of a supervisory committee shall be completed within three months after starting the program. The Graduate Program Director will approve the composition of the committee.

Co-supervision may be required. See academic regulations for Appointment of Co-Supervisor.

10. Required Examinations

Candidacy

Admission to candidacy for VMS PhD students is completed with the successful completion of all required coursework, a written examination of a research proposal, and an oral field-of-study examination. Students with a first registration after August 2015 are governed by the candidacy policy described at: vet.ucalgary.ca/files/vet/vetmed-candidacy-requirements-approved.pdf. Briefly, the written research proposal is graded by an examination committee (including an external reader) ordinarily by 20 months, and an oral field-of-study examination is evaluated by an examination committee (including an external examiner) is completed by 24 months after initial registration.

Thesis Examination

The thesis examination for MSc and PhD degrees will consist of a public seminar immediately followed by an open oral examination. In the thesis examination, the supervisor is a full voting member of the examination committee.

Effective September 1, 2014, in addition to the Faculty of Graduate Studies thesis examination requirements, the Veterinary Medical Sciences program requires:

Scheduling of the Examination

All members of the Supervisory Committee must have reviewed the student's research, including a relevant written sample of the materials related to the thesis, before an examination can be scheduled.

Composition of the Committee

The Internal Examiner must be external to the home program.

11. Research Proposal Requirements

The VMS Graduate Program requires all master's and doctoral students to present a Research Proposal to their supervisory committee. A copy of the final version of the proposal will be kept in the student's file.

For VMS master's students, the research proposal must be accepted by one year after initial registration in the program. For VMS doctoral students, the research proposal is part of their admission to candidacy. For research proposal requirements, see vet.ucalgary.ca/files/vet/vetmed-candidacy-requirements-approved.pdf.

12. Financial Assistance

Full-time graduate students in the VMS Graduate Program will be offered a stipend of at least $20,000 per year (normally two years for MSc and four years for PhD students). Funding, secured by the student and supervisor, may come from a variety of sources, including grants, external salary awards, and UCVM scholarships. Admission to the Program is conditional on demonstration of internal or external studentship support. Further information on funding opportunities can be found at vet.ucalgary.ca/graduate_awards_scholarships.

13. Other Information

Outstanding students enrolled in the MSc program may request a change of registration status and transfer to the PhD program. The request must be done within the first 18 months of the program and supported in writing by the supervisor and formally recommended by the Supervisory Committee to the Graduate Program Director. The student will be required to present their thesis proposal, appropriate for a PhD project, within six months of transferring as part of their doctoral admission to candidacy.

Interdisciplinary Specializations

Biological Anthropology BANT

Contact Information

Location: Earth Sciences 852

Program number: 403.220.2665

Fax: 403.282.9562

Email address: wwilson@ucalgary.ca

Web page URL: bioanth.ucalgary.ca

1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Biological Anthropology to students registered in an existing graduate program. The student will receive the degree offered by the home program:

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Arts (MA), thesis-based

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, all applicants must meet the minimum standards of the home program. Admission to the specialization requires:

a) A Bachelor of Arts or Bachelor of Science degree (and Master of Arts degree for admission to the PhD program) in Anthropology, Archaeology, Biology, Zoology, Ecology, or Health Sciences with a GPA of at least 3.30 on a four-point scale in the last two years of program or over the last 60 units (10 full-course equivalents).

b) An example of the applicant's written work: a term paper, research paper, Master of Arts, or honours thesis that the applicant considers representative of their best work. Published work authored by the applicant is also acceptable provided the applicant is the sole or senior author.

c) A concise statement setting forth the applicant's academic interests and reasons for wishing to pursue graduate work in the specialization. The area of thesis research should also be specified.

d) An up-to-date curriculum vitae.

3. Application Deadline

The deadlines for the submission of complete application is January 15 for September admission and funding.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

In addition to Faculty of Graduate Studies and the home program requirements, the Specialization requires:

Master of Arts / Master of Science

1. Fifteen units (2.5 full-course equivalents), which shall include:

a) Archaeology 617 (Theory and its Application in Biological Anthropology).

b) Anthropology 603 (Thesis Development).

c) Any two of the following: Medical Science 755 (Human Gross Anatomy), Archaeology 613 (Analysis of Human Skeletal Remains), Anthropology 635 (Primatological Theory), or Anthropology 605 (Professional Skills for Anthropologists), Anthropology 613 (Current Issues in Methodology in Primatology).

d) One optional course relevant to the proposed research topic.

e) All students are expected to have proficiency in statistics. The supervisor and two other faculty members of the specialization, in concert with the applicant, will determine if additional course work is needed in statistics, depending upon the applicant's background and proposed research area.

2. A season of field work offering appropriate experience for the proposed research (for example, primate field study, archaeological excavation, or field research in human biology), to be approved by the supervisor. However, students specializing in laboratory-based topics (for example, morphological studies or bone chemistry) may substitute an approved program of laboratory work for the field work requirement.

Doctor of Philosophy

1. Course Requirements:

If students entering the PhD specialization have completed the master's specialization in Biological Anthropology, or if they have completed equivalent courses in another master's program, they will not be required to repeat those courses. Rather, additional courses will be determined at the discretion of the student's supervisory committee. Normally, 18 units (3.0 full-course equivalents), which shall include (unless completed previously):

a) Archaeology 617 (Theory and its Application in Biological Anthropology).

b) Anthropology 701 (Independent Studies).

c) Any two of the following: Medical Science 755 (Human Gross Anatomy), Archaeology 613 (Analysis of Human Skeletal Remains), Anthropology 635 (Primatological Theory) or Anthropology 605 (Professional Skills for Anthropologists), Anthropology 613 (Current Issues in Methodology in Primatology).

d) Two courses relevant to the proposed research topic.

The number of courses required of each student may vary according to their particular needs as determined by the Supervisory Committee. Statistics will be required in the event the student's committee deems it necessary. The courses will be selected based on the student's previous statistics training and the type of data analyses to be conducted in the research.

2. Two seasons of fieldwork offering appropriate experience for the proposed research topic (for example, primate field study, archaeological excavation, or field research in human biology), to be approved by the supervisor. Fieldwork may have been undertaken before entry into the specialization and may be counted toward the fieldwork requirement. Students specializing in laboratory-based topics (for example, morphological studies or bone chemistry) may substitute an approved specialization of laboratory work for the fieldwork requirement.

3. Submission to the supervisory committee of a paper that demonstrates an ability to research and write a paper at a professional level.

4. Proficiency in a second language.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Students may apply for no more than one 500-level course for graduate credit, subject to the approval of the Program Director. Graduate students taking a 500-level course for graduate credit will be required to complete additional assignments.

8. Time Limit

Expected completion time for the MA and MSc is two years and maximum completion time is four years.

Expected completion time for the PhD is four years and maximum completion time is six years.

9. Supervisory Assignments

Students will be assigned a supervisor upon admission.

10. Required Examinations

Final thesis oral examinations are open.

Oral Candidacy Examinations

Following the completion of all course work, the research paper and the language requirement, doctoral students sit the Candidacy Examination. In the Biological Anthropology Graduate Specialization, the Candidacy Examination consists of two parts in sequence, as follows: (1) a written component and (2) an oral component.

The oral candidacy examination is required by University regulations and must be held no later than twenty-eight months following initial registration as a full-time graduate student in a PhD program. Students entering the doctoral program with a bachelor's degree, or transferring into a doctoral program from a master's program before the master's program is completed, must attempt the candidacy examinations no later than 36 months after initial registration in the Faculty of Graduate Studies.

The Candidacy Examination in the Biological Anthropology Graduate Specialization consists of a written plus an oral examination administered by the Candidacy Examination Committee, composed of the Supervisory Committee plus two additional members, one of whom must be external to the Specialization if the External is not already a member of the Supervisory Committee.

The Candidacy Examination is an examination of the student's knowledge and abilities to reason, utilize the relevant literature, and to solve problems within the three fields or areas which have been set out.

In consultation with the student, the Supervisory Committee will determine three areas of knowledge for which the student will be responsible in their Candidacy Examination. These topics will be communicated (in writing) to the student, with copies to other members of the Supervisory Committee.

These topics will also be communicated to the two other members of the Candidacy Examination Committee, who must be selected no later than eight weeks prior to the oral examination.

Members of the Candidacy Examination Committee will each submit one or two questions, so that there are at least two questions within each of the three areas. The supervisor will select six questions from those submitted, and provide them to the student at least five weeks prior to the Oral Candidacy Examination. The student will select one question from each of the three areas for a total of three questions. The student will have two weeks in which to prepare answers to these questions as a take-home, open-book exam. Each answer should be approximately 6000 words. Copies of the completed examination will be distributed to all members of the Examination Committee. The Committee will assess the written exam on a Pass/Fail basis. The oral examination is conducted in accordance with Faculty of Graduate Studies regulations.

In the oral component of the Candidacy Examination, the written examinations will serve as the basis from which the examination shall proceed, but examiners are not limited to the written component in framing the questions asked, and questioning may range into cognate areas, at the discretion of the Neutral Chair.

Students must pass both the written and oral exams in order to pass the candidacy exam.

11. Research Proposal Requirements

Within twenty months of entering the program, the student, with the supervisor's advice, develops a thesis research proposal. This is then transmitted to the student's supervisory committee for agreement and to the Graduate Program Director of the student's home program for approval and placed on file.

12. Financial Assistance

Financial assistance may be available to qualified students. For information on awards, see the Awards and Financial Assistance section of this Calendar.

Students applying for scholarships must submit their applications to the home program by January 2.

13. Other Information

Given the limited resources, the specialization may, in any year, admit fewer applicants than those who are qualified to undertake graduate studies.

Biostatistics BIST

Contact Information

Department of Mathematics and Statistics:

Location: Math Sciences Building, Room 462

Program number: 403.220.6299

Fax: 403.282.5150

Email address: gradapps@math.ucalgary.ca

Web page URL: math.ucalgary.ca/graduate

Department of Community Health Sciences:

Location: Health Sciences Centre, Room G345C

Program number: 403.210.7051

Fax: 403.210.8109

Email address: chsgrad@ucalgary.ca

Web page URL: ucalgary.ca/communityhealthsciences

1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Biostatistics at the master's and doctoral levels through the following Faculties and graduate programs:

- Cumming School of Medicine; Community Health Sciences
- Faculty of Science; Mathematics and Statistics

The student will receive the degree offered by the home program:

- Master of Science in Mathematics and Statistics (thesis-based)
- Master of Science in Community Health Sciences (thesis-based)
- PhD in Mathematics and Statistics
- PhD in Community Health Sciences

2. Admission Requirements

In addition to the home program requirements, all applicants must meet the following requirements:

- In the case of the MSc Biostatistics Specialization, a bachelor's degree in statistics, or its equivalent, is usually required.
- In the case of the PhD Biostatistics Specialization, a master's degree in statistics, or its equivalent, is usually required.
- Students must also have a letter from a faculty member in the home program indicating an agreement to supervise the applicant. Students are strongly encouraged to approach potential supervisors in advance of applying for entry into the home program and Biostatistics specialization.

3. Application Deadline

The deadlines for applying for admission into the Biostatistics Specialization are those of the home graduate program. See Mathematics and Statistics or Community Health Sciences program descriptions.

4. Advanced Credit

The applicant should make requests for advanced credit at the time of application, as part of the admissions process. See Advanced Credit for further information.

5. Program Requirements

MSc (thesis-based)

- Community Health Sciences 600: Introduction to Community Health Sciences (3 units);
- Community Health Sciences 640: Fundamentals of Epidemiology (3 units);
- Statistics 721: Statistical Inference (3 units);
- Electives: A minimum of 9 units (1.5 full-course equivalents) from List A or B, with at least 3 units from each of A and B;
- And Biostatistics 600: Research Seminar course (1.5 units).

Doctor of Philosophy

- Community Health Sciences 600: Introduction to Community Health Sciences (3 units);
- Community Health Sciences 640: Fundamentals of Epidemiology (3 units);
- Statistics 721: Statistical Inference (3 units);
- Statistics 641 Statistical Learning (3 units) or STAT 631 Computational Statistics (3 units);
- Electives: A minimum of 9 units (3 HCEs) from List A or B, with at least 3 units from each of A and B;
- And Biostatistics 600: Research Seminar course (1.5 units).

In addition, PhD students in the Mathematics and Statistics program must pass two Preliminary Examinations in Statistics based

on material for two of the following courses: Statistics 701, 721, 631, 635, 641.

N.B. PhD required courses (or equivalents) are based on courses taken across graduate studies; i.e., if the student has taken equivalent courses in an MSc program, they are not required to retake these courses. However, the elective requirements cannot be waived.

List A: Epidemiology and Health

- Community Health Sciences 641: Introduction to Clinical Trials
- Community Health Sciences 643: Research in Healthcare Epidemiology and Infection Control
- Community Health Sciences 644: Surveillance I: Data Handling for Infection Control
- Community Health Sciences 647: Clinical Epidemiology
- Community Health Sciences 649: Epidemiology of Infectious Diseases
- Community Health Sciences 661: Health Economics I
- Community Health Sciences 662: Economic Evaluation
- Community Health Sciences 663: Decision Analysis in Health Economics
- Community Health Sciences 664: Administrative Data Analysis Methodology
- Community Health Sciences 681: Health Research Methods
- Community Health Sciences 740: Advanced Epidemiology
- Community Health Sciences 741: Systematic Reviews and Meta-analysis.

Relevant topics courses and directed study courses may be approved by the graduate program director in consultation with the supervisor.

List B: Biostatistics / Statistics

- Community Health Sciences 611: Models for Health Outcomes (Biostatistics II)
- Community Health Sciences 612: Models for Repeated Measures Studies and Time-to-Event Studies (Biostatistics III)
- Statistics 619: Bayesian Statistics
- Statistics 625: Multivariate Analysis
- Statistics 633: Survival Analysis
- Statistics 635: Generalized Linear Models
- Statistics 637: Non-linear regression
- Statistics 631: Computational Statistics
- Statistics 641: Statistical Learning
- Statistics 701: Theory of Probability I
- Statistics 723: Theory of Hypothesis Testing.

Relevant topics courses and directed study courses may be approved by the graduate program director in consultation with the supervisor.

6. Additional Requirements

Students in the Community Health Sciences program must attend all CHS departmental seminars.

7. Credit for Undergraduate Courses

See requirements of home program.

8. Time Limit

Expected completion time is two years for full-time students in a thesis-based master's program and four years in a doctoral program.

The maximum completion time allowed for a thesis-based master's program is four years. The maximum completion time allowed for a doctoral program is six years.

9. Supervisory Assignments

See requirements of home program.

10. Required Examinations

See requirements of home program (Mathematics and Statistics or Community Health Sciences), and the Faculty of Graduate Studies (Academic Regulations).

11. Financial Assistance

See home program.

12. Faculty Members / Research Interests

Faculty members associated with the Biostatistics specialization have wide-ranging research interests. A non-exhaustive list of research areas available to work in is given by:

- Statistical learning
- Data science and "big data" problems
- Computational statistics and Monte Carlo methodology
- Clinical trials
- Population health/ecology
- Statistical genetics
- Bioinformatics infectious disease modeling
- Disease surveillance
- Longitudinal data analysis
- Survival analysis
- Experimental design
- Bayesian statistics
- Spatial and spatio-temporal data analysis.

Research topics for thesis-based MSc and PhD applicants should be decided in discussion with supervisors.

Clinical Research CRES

Applications for this interdisciplinary specialization are not currently being accepted.

Energy & Environmental Systems EESS

THIS SPECIALIZATION IS NOT ACCEPTING APPLICATIONS FOR 2018/2019 ACADEMIC YEAR.

1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Energy and Environmental Systems to students registered in an existing graduate program currently offered through one of the following Faculties that are affiliated with the Institute for Sustainable Energy, Environment and Economy (ISEEE):

- Faculty of Arts
- Faculty of Environmental Design
- Haskayne School of Business
- Faculty of Law
- Faculty of Science
- Schulich School of Engineering

In cases where the student's proposed research area cannot be supported through a single academic program, and which would necessitate the combination of at least two academic areas, they may seek admission and earn the EES specialization through the Interdisciplinary Graduate Program (IGP) of the Faculty of Graduate Studies.

2. Admission Requirements

In addition to the Faculty of Graduate Studies' requirements, all applicants must meet the minimum admission requirements of the home graduate program and ISEEE. To apply for the specialization, students must complete an online EES specialization application form: http://science.ucalgary.ca/iseee/student/apply-now.

When applying to the EES specialization, students must have already applied to a home graduate program, faculty, or department and must already have a supervisor. Successful candidates must be approved for admission by both the home graduate program as well as by EES. Admission to a degree program does not guarantee entrance to the EES specialization. Likewise, admission to the EES specialization does not guarantee entrance to a degree program.

3. Application Deadline

There are no deadlines for applying for admission into the EES Specialization; however; students will only be admitted into the EES Specialization on January 1, May 1 and September 1. Students who are already enrolled in a graduate program at the University of Calgary are able to apply to the EES Specialization.

4. Advanced Credit

Requests for advanced credit must be made at the time of application. Credit will not be granted for course work taken as part of another completed degree/diploma or for courses taken to bring the admission GPA to the required level.

5. Program/Course Requirements

In addition to the Faculty of Graduate Studies and the home graduate program's requirements, students undertaking the EES specialization must successfully complete the following:

EES Specialization at the Master's Level

Students in the EES specialization are required to complete four courses, which include:

- Energy and Environmental Systems 601: Introduction to Energy and Environmental Systems
- Energy and Environmental Systems 607: Tools for System Analysis
- The remaining two courses must be electives approved by the EES Graduate Studies Committee. These courses are intended to bolster a student's background in energy and environmental systems and/or interdisciplinary research methods, and may be taken in other faculties, schools, or departments at the University of Calgary.

Master's students must also comply with the requirements of their home graduate program. In addition to these course requirements, students must conduct research that takes an interdisciplinary approach to a real-world problem in the area of energy and environmental systems. Students must also actively partake in EES seminars and activities, and contribute meaningfully to the interdisciplinary culture of the specialization.

EES Specialization at the Doctoral Level

Students who have previously earned a master's degree with the EES specialization cannot enrol into the EES specialization as a PhD student. Doctoral students are required to take the same EESS core courses that are required at the master's level and two electives in the area of energy and environment. Doctoral students must also comply with requirements of their home graduate program.

EES Specialization with MGIS Degree (course-based)

Students enrolled in the Master of Geographic Information Systems degree program who wish to earn the EES specialization will need to take three of the EES courses (Energy and Environmental Systems 601, 603, and one other). Students are not required to take Geography 683, but must take the other core courses in the MGIS program (Geography 647, 633, 639, and 681). Finally, students will still be required to fulfill the 30 units (5.0 full-course equivalents) requirement of the MGIS program, and can select the remaining three courses from Geography optional courses or EES related courses. It is not recommended that students required to complete the MGIS upgrade courses undertake the EES specialization.

EES Specialization with the Interdisciplinary Graduate Program (IGP)

The course curriculum for IGP students will be determined at the IGP admission seminar. Course requirements will typically include the EES core courses, but may also include other courses to ensure adequate coverage of the relevant disciplines involved. Changes to the student's curriculum after the admission seminar will require the approval of the Supervisory Committee, IGP Director, and the Faculty of Graduate Studies.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Students are allowed to take only one 500-level course for graduate credit, subject to the approval of the EES Graduate Studies Committee. Graduate students taking a 500-level course for graduate credit will be required to complete additional assignments.

8. Time Limit

Expected completion time for a master's degree is two years and the maximum completion time is four years.

Expected completion time for the PhD degree is four years and the maximum completion time is six years.

9. Supervisory Assignments

Students must meet supervisory requirements of home department.

10. Required Examinations

Final thesis orals follow the requirements of the Faculty of Graduate Studies and the home graduate program. Students in doctoral programs must fulfill the written candidacy examination requirement of the home graduate program. All doctoral students must complete the candidacy oral examination in accordance with Faculty of Graduate Studies' regulations.

11. Research Proposal Requirements

If a research proposal is required by the home department, then a copy of the proposal must be submitted to the EES Graduate Studies Committee and will be placed on file.

12. Special Registration Information

None.

13. Financial Assistance

Financial assistance may be available on a competitive basis to all qualified full-time graduate students enrolled in the EES specialization. Students are also encouraged to seek funding opportunities through the Faculty of Graduate Studies' Open Scholarship Competition (contact the home program for application deadlines), as well as external funding agencies.

14. Other Information

Given limited resources, the specialization may, in any year, admit fewer applicants than those who are qualified to undertake graduate studies.

Engineering, Energy & Environment ENEE

Contact Information

Location: Engineering Building, Room ENA206B

Program number: 403.220.2881

Fax: 403.210.9892

Email address: ceere@ucalgary.ca

Web page URL: schulich.ucalgary.ca/CEERE

The Centre for Environmental Engineering Research and Education (CEERE) in the Schulich School of Engineering (SSE) has the overall responsibility for the co-ordination and delivery of a comprehensive post-graduate program specialization in the multi-disciplinary field of energy & environment. All five engineering departments participate in delivering this SSE-wide specialization.

Applications for admission to the Faculty of Graduate Studies should be submitted to the engineering department that best matches the applicant's undergraduate and/or postgraduate academic training.

1. Degrees and Specializations Offered

Degrees with an interdisciplinary specialization in Energy & Environment:

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng), thesis-based and course-based

Only the Master of Engineering degree is available for part-time enrolment.

2. Admission Requirements

In addition to the Faculty of Graduate Studies, SSE, and home department requirements, the Energy & Environment specialization requires:

Master of Engineering and Master of Science

A bachelor's degree in engineering.

Note: Applicants with applied science degrees may be considered, but additional undergraduate engineering courses may be required.

Doctor of Philosophy

A master's degree in engineering.

Note: Transfer to the doctoral program without completing the master's degree may be approved for exceptional students.

3. Application Deadline

See departmental and program sections in this Calendar for deadlines regarding submission of complete applications for students with international transcripts or with Canadian and U.S. transcripts.

4. Advanced Credit

See "Engineering Programs".

5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements and to the course requirements described below, students should consult their "home" department in the Schulich School of Engineering for any additional program or course requirement(s).

Master of Engineering (Course-based Route)

Thirty units (5.0 full-course equivalents) of which a minimum of 18 units (3.0 full-course equivalents) must be at the graduate level. Environmental Engineering 671 is required, together with at least four other courses selected from a list of courses related to Energy & Environment available from CEERE.

Note: Students with applied science undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

Master of Engineering (Thesis-based Route)

A minimum of 12 units (2.0 full-course equivalents) graduate courses. Environmental Engineering 671 is required, together with at least one course selected from a list of courses related to Energy & Environment available from CEERE.

Note: Students with applied science undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

Master of Science

A minimum of 12 units (2.0 full-course equivalents) graduate courses. Environmental Engineering 671 is required, together with at least one course selected from a list of courses related to Energy & Environment available from CEERE.

Note: Students with applied science undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

Doctor of Philosophy

For applicants with Bachelor of Science and Master of Science degrees in Engineering:

A minimum of 6 units (1.0 full-course equivalent) graduate courses. Environmental Engineering 671 is required. In case Environmental Engineering 671, or its equivalent, has already been completed, at least one course must be selected from a list of courses related to Energy & Environment available from CEERE.

For applicants with a bachelor's degree in Engineering, but without a completed master's degree:

A minimum of 18 units (3.0 full-course equivalents) graduate courses. Environmental Engineering 671 is required, together with at least two courses selected from a list of courses related to Energy & Environment available from CEERE.

Note: Students with applied science undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Not applicable.

8. Time Limit

Expected completion time is two years for the Master of Science degree, and three years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Science and Master of Engineering (Thesis) degrees and six years for the Master of Engineering (Courses Only) and Doctor of Philosophy degrees.

9. Supervisory Assignments

All students are required to have a thesis supervisor before the second annual registration. For students in the Master of Science and Doctor of Philosophy degree programs, a supervisor is normally appointed at the time of admission.

10. Required Examinations

Final thesis oral examinations follow the requirements of the Faculty of Graduate Studies and the home graduate program.

11. Research Proposal Requirements

None.

12. Financial Assistance

See "Engineering Programs".

13. Other Information

See "Engineering Programs".

Environmental Engineering ENEN

Contact Information

Location: Engineering Building, Room ENA206B

Program number: 403.220.2881

Fax: 403.210.9892

Email address: ceere@ucalgary.ca

Web page URL: schulich.ucalgary.ca/CEERE

The Centre for Environmental Engineering Research and Education (CEERE) in the Schulich School of Engineering (SSE) has the overall responsibility for the coordination and delivery of a comprehensive postgraduate program specialization in the interdisciplinary field of environmental engineering. All five engineering departments participate in delivering this SSE-wide environmental engineering specialization.

Applications for admission to the Faculty of Graduate Studies should be submitted to the engineering department that best matches the applicant's undergraduate and/or postgraduate academic training.

Note: Students applying to the MEng (course-based) with a specialization in Environmental Engineering must submit their applications to either: a) the Department of Chemical and Petroleum Engineering; or b) the Department of Civil Engineering.

1. Degrees and Specializations Offered

Degrees with an interdisciplinary specialization in Environmental Engineering:

Doctor of Philosophy (PhD)

Master of Science (MSc), thesis-based

Master of Engineering (MEng), thesis-based and course-based

2. Admission Requirements

In addition to the Faculty of Graduate Studies, SSE, and home department requirements, the Environmental Engineering specialization requires:

Master of Engineering and Master of Science

A bachelor's degree in engineering.

Note: Applicants with applied science undergraduate degrees may be considered, but additional undergraduate engineering courses may be required.

Doctor of Philosophy

A master's degree in engineering, preferably in environmental engineering or equivalent.

Note: Transfer to the doctoral program without completing the master's degree may be approved for exceptional students.

3. Application Deadline

See departmental and program sections in this Calendar for deadlines regarding submission of complete applications for students with international transcripts or with Canadian and US transcripts.

4. Advanced Credit

See "Engineering Programs" in this Calendar.

5. Program/Course Requirements

In addition to Faculty of Graduate Studies requirements and the course requirements described below, students should consult their "home" department in the Schulich School of Engineering for any additional program or course requirement(s).

Master of Engineering (course-based route) in Chemical and Petroleum Engineering and Civil Engineering, with a specialization in Environmental Engineering

All Master of Engineering (course-based) students in the Environmental Engineering specialization will be required to complete 30 units (5.0 full-course equivalents) as follows:

A. 12 units (2.0 full-course equivalents) of Core Engineering Courses:

1. Engineering 681 Engineering Tools (3 units)
2. Engineering 682 Sustainability (3 units)
3. Engineering 683 Innovation and Entrepreneurship (3 units)
4. Engineering 684 Introduction to Project Management (3 units)

B. 18 units (3.0 full-course equivalents) of Environmental Engineering Specialization Courses from the list below.

Any variations in required courses will be with the approval of the Department.

- Environmental Engineering 603 Principles of Environmental Engineering (3 units)
- Environmental Engineering 605 Environmental Chemistry and Microbiology (3 units)
- Environmental Engineering 620 Water Quality (3 units)
- Environmental Engineering 627 Contaminant Transport (3 units)
- Environmental Engineering 641 Air Pollution Control Engineering (3 units)
- Environmental Engineering 651 Solid Waste Engineering (3 units)

- Environmental Engineering 653 Contaminated Soil Remediation (3 units)
- Environmental Engineering 663 Biological Processes for Wastewater Treatment (3 units)
- Environmental Engineering 665 Wastewater Issues for the Oil and Gas Industry (3 units)
- Environmental Engineering 693 Life Cycle Assessment (3 units)

Courses attempted but failed (with a grade of "C+" or lower) must be successfully repeated with a grade of at least a "B-" in each course. Any course deficiency must be cleared at the next available opportunity. If a student is unable to register for a course or withdraws from a course for valid reasons, the student may substitute a similar course from the courses approved for the graduate thesis-based program with the approval of the Department.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

Master of Engineering (Thesis-based Route)

A minimum of 12 units (2.0 full-course equivalents). Environmental Engineering 603 or 605 is normally required, together with at least one of Environmental Engineering 621, 623, 625, 627 or 635, and at least one other Environmental Engineering course.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

Master of Science

A minimum of 12 units (2.0 full-course equivalents). Environmental Engineering 603 or 605 is normally required, together with at least one of Environmental Engineering 621, 623, 625, 627 or 635, and at least one other Environmental Engineering course.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

Doctor of Philosophy

For applicants with Bachelor of Science and/or Master of Science degrees in Environmental Engineering:

A minimum of 6 units (1.0 full-course equivalent). One of Environmental Engineering 621, 623, 625, 627 or 635 is normally required.

For applicants with Bachelor of Science and Master of Science degrees in Engineering, but not in Environmental Engineering:

A minimum of 9 units (1.5 full-course equivalents). Environmental Engineering 603 or 605 is normally required, together with at least one of Environmental Engineering 621, 623, 625, 627 or 635.

For applicants with a bachelor's degree in Engineering, but without a completed master's degree:

A minimum of 18 units (3.0 full-course equivalents). Environmental Engineering 603 and 605 are normally required, together with at least one of Environmental Engineering 621, 623, 625, 627 or 635, and at least one other Environmental Engineering course.

Students with non-engineering undergraduate degrees may be required to take additional prerequisite courses at the undergraduate level.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

Not applicable.

8. Time Limit

Expected completion time is two years for the Master of Science degree, and three years for the Doctor of Philosophy. Maximum completion time is four years for the Master of Science and Master of Engineering (thesis-based) degrees and six years for the Master of Engineering (course-based) and Doctor of Philosophy degrees.

Master of Engineering (course-based) students in are expected to enroll in full-time studies and to complete the program according to the schedule and normally within 8 months.

9. Supervisory Assignments

All students are required to have a thesis supervisor before the second annual registration. For students in the Master of Science and Doctor of Philosophy degree programs, a supervisor is normally appointed at the time of admission.

10. Required Examinations

Final thesis oral examinations follow the requirements of the Faculty of Graduate Studies and the home graduate program.

11. Research Proposal Requirements

None.

12. Financial Assistance

See "Engineering Programs".

13. Other Information

See "Engineering Programs".

Medical Imaging MEDI

Contact Information

Location: FMC ST 1105

Program number: 403.944.4336

Email address: i3t@ucalgary.ca

Web page URL: ucalgary.ca/i3t

1. Degrees and Specializations Offered

A Graduate Specialization in Medical Imaging is offered in conjunction with the following graduate programs:

- Biomedical Engineering,
- Electrical and Computer Engineering,
- Medical Sciences,
- Neurosciences,
- Physics and Astronomy
- Psychology

The specialization is offered at the MSc and PhD level.

2. Admission Requirements

Admission into a graduate program that offers the Graduate Specialization in Medical Imaging and submission and approval of a written request to join the Specialization. Specialization admission forms are available at ucalgary.ca/i3t. Program is open to both Canadian and international students.

3. Application Deadline

Not applicable. Students must first apply to a graduate program offering the specialization. See ucalgary.ca/i3t for a current listing of graduate programs offering the Graduate Specialization in Medical Imaging.

4. Advanced Credit

Credit may be granted for appropriate courses to count towards the specialization with approval of the Graduate Specialization in Medical Imaging.

Students Currently Enrolled in Participating Graduate Programs

Have completed (or are completing) at least one graduate-level course in medical imaging and plan to complete at least one more graduate course. Typically, these courses would consist of the core and one of the foundational courses. Upon request, an approved Medical Imaging elective course may be accepted to meet the foundational course requirement.

- Be attending the Advanced Imaging Seminar Series, and as part of their request for admission into the Graduate Specialization have given (or are scheduled to give) an appropriate presentation in this series.
- Undertake a Medical Imaging-related research thesis under the supervision of a Specialization-participating graduate supervisor, and
- Enrolment in the specialization would also need to be approved by their Graduate Program.

5. Program/Course Requirements

The Specialization requirements will consist of completion of:

1. at least two graduate-level courses in medical imaging for MSc and three medical imaging courses for PhD (as described below),
2. the Professional Skills Workshop Program,
3. a Medical Imaging-related research thesis, and
4. attendance and annual presentation in the Advanced Imaging Seminar Series (ucalgary.ca/i3t/AISS).

In addition, participation in an International or Industrial Exchange of approximately two to four months in duration, by PhD trainees will be strongly encouraged.

The Specialization requires completion of a course sequence in Medical Imaging, in addition to requirements of the specific graduate program. MSc students must take a min-

imum of two graduate courses (the core and a foundational course). PhD students take at least three graduate courses (including the core, a foundational and an elective course). PhD students previously completing the MSc Specialization in Medical Imaging will be required to complete one elective course in Medical Imaging. PhD students may elect to take the second foundational course as an elective course. These requirements are in addition to the core requirements of a specific participating graduate program. In most programs, the medical imaging graduate courses would count towards graduate program elective courses. In some graduate programs, participation in the Specialization may require students to take an additional graduate course or courses.

Students in the Medical Imaging Specialization should choose between the Technology and Application Streams. The Technology Stream would typically include students enrolled in engineering or physics graduate programs. Application Stream would typically include students in the biological, psychological or medical sciences.

Core required course (MSc and PhD students):

- Medical Science 689.01 - Medical Imaging Techniques

Select one of the following two foundational graduate courses (MSc and PhD students):

- Medical Science 689.10 - Medical Imaging Theory (for students in the Technology Stream)
- Medical Science 689.11 - Medical Imaging Applications and Analysis (for students in the Application Stream)

In consultation with your supervisor and supervisory committee (if appropriate), please select at least one elective course from the following list (PhD students):

- Electrical Engineering 697 - Digital Image Processing
- Mechanical Engineering 619.36 - Computer Measurement for BME
- Medical Science 689.02 - Advanced Magnetic Resonance Imaging
- Medical Science 689.03 - Advanced Image Processing
- Medical Science 689.04 - Advanced Molecular Imaging (offered alternate years)
- Medical Science 689.05 - Advanced Neuro-imaging (offered alternate years)
- Medical Science 689.10 - Medical Imaging Theory
- Medical Science 689.11 - Medical Imaging Applications and Analysis
- Medical Science 689.99 - Special Projects in Medical Imaging (with consent of Specialization)
- Neuroscience 5850 - Neuro-imaging Techniques - offered at The University of Lethbridge
- Other Medical Imaging-related graduate courses with prior approval of specialization and graduate program

6. Additional Requirements

Satisfactory completion of all graduate program and specialization requirements is required for awarding of the "Specialization in Medical Imaging" designation.

7. Credit for Undergraduate Courses

Credit (in the Specialization) will not be given for 500-level courses.

8. Time Limit

As per graduate program requirements.

9. Supervisory Assignments

As per graduate program requirements.

10. Required Examinations

As per graduate program requirements.

11. Research Proposal Requirements

Research proposal must be on a Medical Imaging topic and fit into a research area broadly defined by the Specialization (see ucalgary.ca/i3t):

1. Image Acquisition and Reconstruction - Development of algorithms suitable for accurate imaging using existing technologies (e.g., MR, CT) and emerging methods (e.g., microwaves).
2. Signal Processing for Information Synthesis - Development of robust strategies for the assessment of brain and other organ function via advanced signal processing.
3. Quantitative Imaging and Analysis - Development of software engineering approaches, validation and testing for the creation of resilient methods for quantitative imaging.

A copy of the proposal must be provided to the Specialization office. Other requirements are as per the graduate program requirements. Typically this proposal is to be provided within 12 months of starting the program.

In programs that do not require submission of a research proposal, a suitable proposal should be developed by the student within 12 months of starting the specialization, approved by the supervisor and supervisory committee (where appropriate), and submitted to the Specialization office.

12. Financial Assistance

As per graduate program requirements. Additional funding may be available through the Specialization or other University sources for well-qualified students.

Reservoir Characterization RSCH

Contact Information

Geoscientists should contact the Department of Geoscience and engineers should contact the Department of Chemical and Petroleum Engineering for further information.

Department of Chemical and Petroleum Engineering

Location: Schulich School of Engineering, Room B202

Program number: 403.220.4802

Fax: 403.284.4852

Email Address: chemandpetenggrad@ucalgary.ca

Web page URL: schulich.ucalgary.ca/departments/chemical-and-petroleum-engineering

Department of Geoscience

Location: Earth Sciences 118

Program number: 403.220.3254

Fax: 403.284.0074

Email Address: geosciencegrad@ucalgary.ca

Web page URL: geoscience.ucalgary.ca

1. Degrees and Specializations Offered

The University offers an interdisciplinary specialization in Reservoir Characterization to students registered in an existing course-based master's program in the Departments of Chemical and Petroleum Engineering or Geoscience. The program integrates reservoir engineering, geology, geophysics, and reservoir characterization. The student will receive the degree offered by the home program:

Master of Engineering in Chemical and Petroleum Engineering (MEng)

Master of Science in Geology or Geophysics (MSc)

All students will normally be considered to have full-time status. In exceptional circumstances part-time status may be considered and must be approved by the Graduate Director.

2. Admission Requirements

In addition to Faculty of Graduate Studies requirements, all applicants must meet the minimum standards of the home program.

Acceptance into the Master of Engineering program would normally require the completion of the equivalent of the Bachelor of Science in Oil and Gas Engineering degree offered by the University of Calgary. However, individuals with more diverse background and industry experience may be considered for admission.

Acceptance into the Master of Science program requires the completion of a Bachelor of Science in Geoscience plus a course in Well Logging and Formation Evaluation, Petroleum Engineering 507 at the University of Calgary, or equivalent.

Applicants with an undergraduate degree in geology must demonstrate acceptable proficiency in mathematics. It is an asset for geologists to have taken additional mathematics courses as technical electives during their undergraduate degree.

3. Application Deadline

See departmental listings for the deadlines for the submission of completed applications.

4. Advanced Credit

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree/diploma or for courses taken to bring the grade point average to a required level for admission.

5. Program/Course Requirements

To address the broad background of students entering the Reservoir Characterization Interdisciplinary Specialization, there are three streams for completion: Geology, Geophysics and Engineering.

All students must take at least six courses at the 600 and/or 700 level.

Students in the engineering stream are required to take:

Geophysics 559 – Geophysical Interpretation

Chemical Engineering 621 – Reservoir Simulation

Chemical Engineering 661 – Geostatistics for Reservoir Characterization OR Geology 697 – Advanced Geostatistics

Chemical Engineering 698/Geology 698** – Reservoir Characterization for Field Development (RCFD)

Organizational Behaviour and Human Resources 789 – Seminar in the Management of Human Resources

and select four from the following list, two of which MUST be geoscience:

Petroleum Engineering 543 – Geological Characterization of Oil and Gas Reservoirs

Chemical Engineering 619.63 – Advanced Formation Evaluation

Chemical Engineering 649 – Naturally-Fractured Reservoirs

Chemical Engineering 657 – Advanced Reservoir Engineering

Geology 655 – Unconventional Gas Reservoir Characterization and Evaluation

Geophysics 667 – Introduction to Microseismic Methods

Geophysics 671 – Inverse Theory and Applications I

Students in the geology stream are required to take:

Petroleum Engineering 523 – Introduction to Reservoir Engineering

Chemical Engineering 621 – Reservoir Simulation

Chemical Engineering 661 – Geostatistics for Reservoir Characterization OR Geology 697 – Advanced Geostatistics

Chemical Engineering 698/Geology 698** – Reservoir Characterization for Field Development (RCFD)

Organizational Behaviour and Human Resources 789 – Seminar in the Management of Human Resources

and select four from the following list, two of which MUST be engineering:

Engineering 407 – Numerical Methods in Engineering

Petroleum Engineering 513* – Flow in Porous Media

Petroleum Engineering 525 – Waterflooding and Enhanced Oil Recovery

Petroleum Engineering 533 – Petroleum Production Engineering

Petroleum Engineering 543 – Geological Characterization of Oil and Gas Reservoirs

Chemical Engineering 619.63 – Advanced Formation Evaluation

Chemical Engineering 629 – Secondary and Tertiary Recovery

Chemical Engineering 649 – Naturally-Fractured Reservoirs

Chemical Engineering 657 – Advanced Reservoir Engineering

Geophysics 559 – Geophysical Interpretation

Geophysics 667 – Introduction to Microseismic Methods

Geology 613* – Flow in Porous Media

Geology 655 – Unconventional Gas Reservoir Characterization and Evaluation

Students in the geophysics stream are required to take:

Petroleum Engineering 523 – Introduction to Reservoir Engineering

Chemical Engineering 621 – Reservoir Simulation

Chemical Engineering 661 – Geostatistics for Reservoir Characterization OR Geology 697 – Advanced Geostatistics

Chemical Engineering 698/Geology 698** – Reservoir Characterization for Field Development (RCFD)

Organizational Behaviour and Human Resources 789 – Seminar in the Management of Human Resources

and select four from the following list, two of which MUST be engineering:

Engineering 407 – Numerical Methods in Engineering

Petroleum Engineering 513* – Flow in Porous Media

Petroleum Engineering 525 – Waterflooding and Enhanced Oil Recovery

Petroleum Engineering 533 – Petroleum Production Engineering

Petroleum Engineering 543 – Geological Characterization of Oil and Gas Reservoirs

Chemical Engineering 619.63 – Advanced Formation Evaluation

Chemical Engineering 629 – Secondary and Tertiary Recovery

Chemical Engineering 649 – Naturally-Fractured Reservoirs

Chemical Engineering 657 – Advanced Reservoir Engineering

Geophysics 667 – Introduction to Microseismic Methods

Geology 613* – Flow in Porous Media

Geology 655 – Unconventional Gas Reservoir Characterization and Evaluation

**Choose only one (1) of Petroleum Engineering 513 or Geology 613.*

***To be taken in the final semester of study.*

The RCFD course is a team-based experience with each team required to analyse and integrate various data (e.g., seismic, logs, and production) from a real field. Each member of the team is expected to have proficiency on the software packages for geophysical interpretation, geological mapping, geostatistical modelling and reservoir flow modelling. The reservoir characterization will require the development and assessment of a geostatistical model of the field that will be used for a history match and to propose future development. The project will conclude with a formal presentation to experts from both academia and industry.

6. Additional Requirements

None.

7. Credit for Undergraduate Courses

The applicant must make advanced credit requests as part of the admission process. Credit will not be given for course work taken as part of another completed degree or diploma program, or for courses taken to bring the grade point average to the required level for admission.

8. Time Limit

Expected completion time is two years and maximum completion time is six years.

9. Supervisory Assignments

Supervisors will be approved by the specialization Graduate Program Director.

10. Required Examinations

After the conclusion of the Capstone Project, there will be a comprehensive oral examination of each student before an examining committee that includes a faculty member from each of the three disciplines. Each student will be expected to express in-depth knowledge in their area of expertise (engineering, geology, geophysics), and to have a comprehensive knowledge of the significance of the other two areas in successful reservoir characterization.

11. Research Proposal Requirements

None.

12. Financial Assistance

For information on awards, see the Awards and Financial Assistance section of this Calendar.

Courses of Instruction

How to Use

This section contains the descriptions of courses offered at the University of Calgary. The courses are arranged in alphabetical order by course title not by abbreviation. In order to better understand the notations used throughout this section, an illustrated example of a course description is provided.

All courses listed are not necessarily offered every year and students should consult the Schedule of Classes for an official listing of those courses that will be offered in a given term.

Since this Calendar is published a considerable time before the opening of the academic year, the University reserves the right to make whatever changes circumstances may require including the cancellation of a particular course.

Note: Access to graduate level courses (numbered 600 and above) for Visiting and Exchange students is limited to those admitted to a graduate program. For Open Studies and other students, access to graduate courses is restricted to those with adequate preparation, normally an undergraduate degree or the equivalent. Permission for an Open Studies or other student to register in any graduate level course must be obtained from the Faculty of Graduate Studies office.

Sample Course Description

See numbered footnotes for explanations of the information commonly provided in a course description.

Geology 609[1] **3 units; H(3-3)**[2]

Advanced Contaminant Hydrogeology

An advanced treatment of topics covered in Geology 505.

Prerequisite:[3] Consent of the Department.

Antirequisite:[4] Credit for Geology 609 and 505 will not be allowed.

Notes[5]:

Some Courses may include the notations:

MAY BE REPEATED FOR CREDIT[6]

NOT INCLUDED IN GPA[7]

[1]**Course Numbers: e.g. Geology 609 (GLGY 609)**

The number of the course indicates the level of the course:

Supplementary study for degree: courses labelled in the 100s

Junior level: 200s

Senior level: 300s and 400s

Upper level undergraduate: 500s

Graduate level: 600s and 700s

To understand course acronyms, refer to the section "Courses of Instruction by Faculty".

[2]**Course Hours: e.g. 3 units; H(3-3)**

Fees and graduation are determined using "units". The unit weight of the course is indicated in the calendar by the first part of the course hours, e.g. "3 units; H".

The hours of instruction expected per week are indicated by the numbers contained in the brackets. The first number represents the number of lecture hours per week and the second number represents the number of lab hours per week. For example, (3-0) would indicate 3 hours of lectures per week and no labs. For (2-3), there would be 2 hours of lectures per week, along with 3 hours of lab per week.

A course labelled (3-3/2) means that there are 3 hours of lecture per week and 3 hours of lab every other week.

A course may also have tutorial and/or seminar hours assigned. These are indicated with an "S" or a "T", e.g., 3-2T or 3-1S.

To calculate the total hours of expected instruction given the weekly course hours provided in the calendar, one should take the total expected weeks of instruction and multiply by the number of weekly hours in the brackets. For example, Geology 609 (3-3), the total expected lecture hours are 3 (hours) x 12 (weeks) = 36 hours, and similarly 3 x 12=36 lab hours. A course designated 6 units; F(3-0) would be 3 (hours) x 24 (weeks) = 72 hours, which may be taught over the course of two terms or entirely in one term, provided total hours equal 72. Courses may be taught during block week, in 3 week approved sessions, 6 week approved sessions, 12 week terms, over 24 weeks or 2 terms, or for approved non-standard dates. Whatever the duration of the course, the total instructional hours should remain the same.

Courses that use blended learning teaching formats, may meet the required instructional hours using alternate methods such as online instruction. Courses indicated as independent study or independent research include an hourly designation expected of the student to full-fill their independent work and may not have scheduled instruction time. Practicum and field study courses may indicate the total hours of instruction in the brackets instead of a weekly designation used by other courses. For example, Nursing 650 has 6 units; F(16S-292 within 8-week block) listed as the course hours.

To calculate the total hours of expected instruction given the weekly course hours provided in the calendar, one should take the total expected weeks of instruction and multiply by the number of

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(continued on next page...)

weekly hours in the brackets. For example, Biology 241 (3-3), the total expected lecture hours are 3 (hours) x 13 (weeks) = 39 hours, and similarly 3 x 13=39 lab hours. A course designated 6 units; F(2-0) would be 2 (hours) x 26 (weeks) = 52 hours, which may be taught over the course of two terms or entirely in one term, provided total hours equal 52. Courses may be taught during block week, in 3 week approved sessions, 6 week approved sessions, 13 week terms, over 26 weeks or 2 terms, or for approved non-standard dates. Whatever the duration of the course, the total instructional hours should remain the same.

Courses that use blended learning teaching formats, may meet the required instructional hours using alternate methods such as online instruction. Courses indicated as independent study or independent research include an hourly designation expected of the student to full-fill their independent work and may not have scheduled instruction time. Practicum and field study courses may indicate the total hours of instruction in the brackets instead of a weekly designation used by other courses. For example, Nursing 289 has 6 units; F(247 hours) listed as the course hours.

[3]**Prerequisites:** Courses that must be completed or currently registered in before a student may be able to register in this course.

Corequisites: Must be completed at the same time as this class.

[4]**Antirequisites:** Certain courses carry the notation "Not open to students with credit in course number XXX" or "Credit for course number XXX and course number XXX will not be allowed." Students may take these courses if they wish, but credit for both courses will not be granted towards their degree.

Some antirequisites may include cross-listed courses such as Biology 603 and Medical Science 603 or Veterinary Medicine 610 and Community Health Sciences 610. These courses are listed under two faculties and can only be taken for credit from one faculty, but not both. The credit is determined by the student's registration in either class.

[5]**Notes:** This contains any information that may be helpful regarding enrolment in the course. Some examples are: "A supplementary fee will be assessed to cover additional costs associated with this course", or "This course occurs in rugged field conditions and varying weather, for which participants must be prepared and equipped".

[6]**May Be Repeated for Credit**

Some courses are decimalized in order to accommodate different unique topics of study e.g. 612.01, 612.02. If this notation is present, students are allowed to take multiple topics belonging to one course number.

[7]**Not Included in GPA**

A course with this notation is graded as CR (Completed Requirements) or F (Fail). The course is not included in the calculation of the grade point average.

Courses of Instruction by Faculty

Faculty of Arts

Anthropology ANTH
Archaeology ARKY
Art ART
Art History ARHI
Communication and Media Studies COMS
Dance DNCE
Drama DRAM
Economics ECON
English ENGL
Fine Arts FINA
French FREN
Geography GEOG
German GERM
Greek GREK
Greek and Roman Studies GRST
History HTST
Languages, Literatures and Cultures LLAC
Latin LATI
Linguistics LING
Music MUSI
Music Education MUED
Music Performance MUPF
Philosophy PHIL
Political Science POLI
Psychology PSYC
Religious Studies RELS
School of Creative and Performing Arts SCPA
Sociology SOCI
Spanish SPAN
Strategic Studies STST

Cumming School of Medicine

Community Health Sciences MDCH
Medical Graduate Education MDGE
Medical Science MDSC

Faculty of Environmental Design

Environmental Design EVDS
Environmental Design Architecture EVDA
Environmental Design Landscape EVDL
Environmental Design Planning EVDP

Haskayne School of Business

Accounting ACCT
Business and Environment BSEN
Business Technology Management BTMA
Entrepreneurship and Innovation ENTI
Finance FNCE
Management Studies MGST
Marketing MKTG
Operations Management OPMA
Organizational Behaviour and Human Resources OBHR
Real Estate Studies REAL
Risk Management and Insurance RMIN
Strategy and Global Management SGMA

Faculty of Kinesiology

Kinesiology KNES

Faculty of Law

Law LAW

Faculty of Nursing

Nursing NURS

Schulich School of Engineering

Biomedical Engineering BMEN
Chemical Engineering ENCH
Civil Engineering ENCI
Electrical Engineering ENEL
Engineering ENGG
Environmental Engineering ENEN
Geomatics Engineering ENGO
Manufacturing Engineering ENMF
Mechanical Engineering ENME
Petroleum Engineering ENPE
Software Engineering for Engineers ENSF

Faculty of Science

Actuarial Science ACSC
Astrophysics ASPH
Biochemistry BCEM
Biology BIOL
Biostatistics BIST
Cellular, Molecular and Microbial Biology CMMB
Chemistry CHEM
Computer Science CPSC
Ecology ECOL
Geology GLGY
Geophysics GOPH
Information Security ISEC
Marine Science MRSC
Mathematics MATH
Medical Physics MDPH
Physics PHYS
Plant Biology PLBI
Science SCIE
Space Physics SPPH
Statistics STAT
Zoology ZOOL

Faculty of Social Work

Social Work SOWK

Faculty of Veterinary Medicine

Veterinary Medicine VETM

Werklund School of Education

Educational Psychology EDPS
Educational Research EDER

Collaborating Faculties

Community Rehabilitation (MD, SW) CORE
Computational Media Design (AR, EV, SC) CMDA
Data Science (MD, HA, SC) DATA
Interprofessional Health Education (KN, NU, SW) IPHE
Language (AR, ED) LANG
Software Engineering (EN, SC) SENG
Sustainable Energy Development (EN, EV, LA, HA) SEDV

Other

Energy and Environmental Systems EESS
International Foundations Program IFPX
International Foundations Program Engineering IFPE
Internship INTE
Public Policy PPOL
University UNIV

Course Descriptions

Accounting ACCT

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Accounting 601 **3 units; H(3-0)**

Introductory Financial Accounting
Introduction to accounting for business organizations. Reporting of financial results of operations and financial position to investors, managers, and others. Emphasis on the use of accounting information for decision-making.

Accounting 603 **3 units; H(3-0)**

Management Accounting
Break-even analysis, activity-based costing and management, budgeting, productivity measures, and other tools and techniques that are part of a planning and control system that will help the manager make better economic decisions.

Prerequisite(s): Accounting 601.

Accounting 641 **3 units; H(3-0)**

Intermediate Financial Accounting I
Provides detailed coverage of the Generally Accepted Accounting Principles (GAAP) primarily related to assets. Emphasizes the theory behind the methods, the strengths and weaknesses of such methods and the need for sound professional judgment

Prerequisite(s): Accounting 601 and 603; or consent of the Haskayne School of Business.

Accounting 643 **3 units; H(3-0)**

Intermediate Financial Accounting II
Builds on Intermediate Financial Accounting I with coverage of the Generally Accepted Accounting Principles (GAAP) primarily related to liabilities and owners' equity. Emphasizes the theory behind the methods, the strengths and weaknesses of methods and the need for sound professional judgment.

Prerequisite(s): Accounting 641.

Accounting 661 **3 units; H(3-0)**

Cost Accounting
Provides intermediate level discussions to the production and analysis of costs used for pricing, production and investment decisions, revenue analysis, performance evaluation, management incentive systems and strategy analysis

Prerequisite(s): Accounting 603.

Accounting 721 **3 units; H(3-0)**

Taxation
Discusses the core concepts, regulations, and interpretations underlying the Canadian individual and corporate income taxation. Emphasis is on who is taxable, on what income, when and how tax is calculated. Tax planning opportunities will be identified by using long-term and clientele-based techniques.

Prerequisite(s): Accounting 601.

Accounting 723 **3 units; H(3-0)**

Advanced Taxation
Focuses on tax planning. It extends the material covered in the introductory tax course with an examination of specialized topics in personal and corporate income tax.

Prerequisite(s): Accounting 721.

Accounting 725 **3 units; H(3-0)**

Auditing
Discusses the techniques and theory behind the external auditor's provision of assurance services on financial information. Topics include: the demand for assurance, the role of auditors in providing assurance, auditor independence, audit reports, and audit liability.

Prerequisite(s): Accounting 641.

Accounting 741 **3 units; H(3-0)**

Financial Statement Analysis
Covers the theories, concepts and practices of financial statement analysis with an emphasis placed on applications.

Prerequisite(s): Accounting 603.

Accounting 743 **3 units; H(3-0)**

Advanced Financial Accounting
Focuses on advanced accounting methods related to inter-corporate investments and financial reporting. Topics include accounting for business combinations and inter-corporate investments, foreign currency transactions and translation, bankruptcy, partnerships, and not-for-profit organizations.

Prerequisite(s): Accounting 643.

Accounting 745 **3 units; H(3-0)**

Accounting Theory
Examines the conceptual framework underlying the preparation of financial accounting information, and the theories and propositions on the use of such information by investors, regulators, standard setters, and other corporate stakeholders

Prerequisite(s): Accounting 643.

Accounting 765 **3 units; H(3-0)**

Managerial Control Systems
Emphasis is placed on how managers use planning and control to accomplish a firm's strategies. Uses a case approach to management control systems explaining the usefulness of accounting data from a managerial perspective.

Prerequisite(s): Accounting 661.

Accounting 789 **3 units; H(3S-0)**

Seminar in Accounting
Development of and solutions to current issues and problems in accounting.

Prerequisite(s): Accounting 603 or consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Accounting 797 **3 units; H(3S-0)**

Advanced Seminar in Accounting
Advanced accounting research topics.

Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Accounting 799 **3 units; H(3S-0)**

Doctoral Seminars in Accounting
799.01. Seminar in Financial Accounting
799.02. Seminar in Managerial Accounting
799.04. Seminar in Taxation

Actuarial Science ACSC

Instruction offered by members of the Department of Mathematics and Statistics in the Faculty of Science.

Note: In addition to the prerequisites listed below, consent of the Department is a prerequisite for all graduate courses.

Actuarial Science 600 **1.5 units; Q(3S-0)**

Research Seminar
A professional skills course, focusing on the development of technical proficiencies that are essential for students to succeed in their future careers. The emphasis is on delivering professional presenta-

tions and using modern actuarial techniques and statistical research tools. Ethics and professionalism are also covered.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Actuarial Science 611 **3 units; H(3-0)**

Generalized Linear Models for Actuaries
Description of insurance data, response distributions, exponential family responses and estimation, GLMs, models for count data, categorical and continuous responses. Applications include: personal injury insurance, vehicle insurance, diabetes deaths, third party claims, and degree of vehicle crash. Software for fitting GLMs will be discussed.

Prerequisite(s): Statistics 323 or Mathematics 323, and Statistics 429.

Actuarial Science 617 **3 units; H(3-0)**

Estimating Unpaid Claims in General Insurance
Data collection, adjusting premiums, trending losses, development triangles, expected method, frequency-severity method, Bornhuetter Ferguson method, Benktander method, Cape Cod method, impact of changing conditions on projection method.

Prerequisite(s): Actuarial Science 327.

Antirequisite(s): Credit for Actuarial Science 617 and either 517 or 539.06 will not be allowed.

Actuarial Science 619 **3 units; H(3-0)**

Quantitative Financial Risk Management
Risk measures, correlations and copulas, various approaches to modelling market and credit risk, liquidity risk, enterprise risk management.

Prerequisite(s): Actuarial Science 327.

Actuarial Science 627 **3 units; H(3-0)**

Advanced Life Contingencies
Multiple life functions, dependent and independent models, related annuities and insurances. Multiple decrement models: time until and causes of death. Associated single decrement tables. Applications of multiple decrement theory. Asset shares. Business and regulatory considerations.

Prerequisite(s): Actuarial Science 327; and one of Statistics 323 or Mathematics 323; and one of Mathematics 311 or 313 or 353 or 367 or 375 or 381; and one of Computer Science 217 or 231 or 235.

Antirequisite(s): Credit for Actuarial Science 627 and 527 will not be allowed.

Actuarial Science 637 **3 units; H(3-0)**

Credibility Theory
Limited fluctuation credibility; full and partial credibility; greatest accuracy credibility; Bayesian methodology; credibility premium; Buhlmann model; Buhlmann-Straub model; empirical Bayes method; bonus-malus system.

Prerequisite(s): Actuarial Science 327; one of Mathematics 311 or 313 or 353 or 367 or 375 or 381; and Actuarial Science 437 or Statistics 437.

Antirequisite(s): Credit for more than one of Actuarial Science 637, 537 and 533 will not be allowed.

Actuarial Science 639 **3 units; H(3-0)**
(formerly Statistics 639)

Conference Course in Actuarial Modelling
Topics in advanced actuarial theory and practice, such as: insurance risk models; practical analysis of extreme values; advanced property and casualty rate making; actuarial aspects of financial theory.

MAY BE REPEATED FOR CREDIT

Anthropology ANTH

Instruction offered by members of the Department of Anthropology and Archaeology in the Faculty of Arts.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Anthropology 601 **3 units; H(3-0)**

Conference Course in Anthropology
A specialized area of Anthropology selected on the basis of particular interest and need.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Anthropology 603 **3 units; H(3S-0)**

Thesis Development
A reading and conference course in the student's substantive area conducted jointly by at least two faculty members.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Anthropology 605 **3 units; H(3-0)**

Professional Skills for Anthropologists
Training and practice in research/teaching skills: grantsmanship, conference and classroom presentations, academic publishing, job interviews.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Anthropology 605 and 601.90, or the equivalent, will not be allowed.

NOT INCLUDED IN GPA

Anthropology 611 **3 units; H(3-0)**

Methods in Anthropological Research
A variety of topics relevant to research and the logic of inquiry in Anthropology.

Prerequisite(s): Consent of the Department.

Anthropology 613 **3 units; H(3-0)**

Current Issues in Methodology in Primatology
A variety of topics relating to aspects of data collection and data analysis in primatology, with a focus on ecological and behavioural data.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Anthropology 631 **3 units; H(3-0)**

Anthropological Theory
Prerequisite(s): Consent of the Department.

Anthropology 635 **3 units; H(3-0)**

Primatological Theory
Seminar dealing with the theoretical material of primatological and biobehavioural perspectives in Anthropology.

Prerequisite(s): Consent of the Department.

Anthropology 641 **3 units; H(3-0)**

Seminar in Civil-Military Relations
Comparative analysis of relations between civil society and military institutions. A critical approach to analyzing how civil and military institutions mutually constitute each other, rather than taking the military and civilian sectors as a given. Special attention will be paid to twentieth century militarization as a social process that has dramatically changed the shape of both civilian and military spheres.

Prerequisite(s): Consent of the Department.

Anthropology 659 **3 units; H(3-3)**

Primatology
Specialized topics and laboratory training in this field will vary from year to year and may include: behavioural ecology, biomechanics, evolution, biosociality, and field methodology.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Anthropology 701 **3 units; H(3-0)**

Independent Studies
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Archaeology ARKY

Instruction offered by members of the Department of Anthropology and Archaeology in the Faculty of Arts.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Archaeology 601 **3 units; H(3S-0)**

Theoretical Foundations
The philosophy of science, the history of anthropological theory, and a survey of contemporary theoretical approaches in anthropology. Throughout, the relevance to and connections with the subdisciplines of archaeology and biological anthropology will be emphasized.

Prerequisite(s): Consent of the Department.

Archaeology 603 **3 units; H(3S-0)**

Seminar on Special Topics
Intensive study of special problems of particular interest to Archaeology Department graduate students. Subject matter for any particular year to be left to the discretion of the Department.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Archaeology 613 **3 units; H(3-1T-2)**

Analysis of Human Skeletal Remains
Methods of analyzing human remains from archaeological contexts with emphasis on identification and description. Lecture, lab and weekly seminar directed to Archaeology graduate students who have not had a previous course in human osteology.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Archaeology 613 and either 555 or 603.07 will not be allowed.

Archaeology 615 **3 units; H(3S-0)**

Topics in Archaeological Theory and Method
The history of archaeological theory and contemporary theoretical and methodological approaches used in archaeological research.

Prerequisite(s): Consent of the Department.

Archaeology 617 **3 units; H(3S-0)**

Theory and its Application in Biological Anthropology
Basic issues in the study of human adaptation with a focus on principles of evolutionary biology as

they apply to modern studies. Throughout, a biocultural approach will be emphasized.

Prerequisite(s): Consent of the Department.

Archaeology 619 **3 units; H(3-0)**

Advanced Topics in Human Osteology
Current developments in interpretation of human skeletal and dental remains. Topics include forensic anthropology, bone biology, and population reconstruction.

Prerequisite(s): Archaeology 555.

Archaeology 621 **3 units; H(3S-0)**

Problems in Ethnoarchaeology
Seminar on selected topics relating to ethnoarchaeology.

Prerequisite(s): Consent of the Department.

Archaeology 625 **3 units; H(3S-0)**

Hunter-Gatherer Adaptations
Intensive study of contemporary and prehistoric hunter-gatherer social and economic adaptations.

Archaeology 627 **3 units; H(3S-0)**

Origins of Agriculture
Intensive study of the origins of agriculture throughout the world.

Archaeology 631 **3 units; H(3S-0)**

The Development of Complex Societies
The rise, development, and collapse of complex societies throughout the world.

Prerequisite(s): Consent of the Department.

Archaeology 633 **3 units; H(3S-3)**

Specialized Analyses of Archaeological Materials
Theory and practice for specialized analyses of the physical and chemical composition of archaeological materials, including microscopic traces of use. Topics will cover procedures used to prepare materials for such specialized analyses and to identify the relevant properties, as well as issues of quantification and interpretation.

Prerequisite(s): Consent of the Department.

Archaeology 635 **3 units; H(3S-0)**

Social Identity
Social identity is a fundamental theoretical and practical concern for archaeologists, physical anthropologists, and paleoanthropologists. Explores how humans use material culture and material practices to interact in a world ordered by social identities. Students will explore how research in their area of interest has addressed social identities.

Prerequisite(s): Consent of the Department.

Archaeology 637 **3 units; H(3S-0)**

Mesoamerican Archaeology and History
Ancient history of Mesoamerica, emphasizing a conjunctive approach based on hieroglyphic, historical and ethnohistorical sources as well as on archaeological evidence.

Prerequisite(s): Consent of the Department.

Archaeology 639 **3 units; H(3S-0)**

Stable Isotope Methods in Archaeology
Methods and applications of stable isotope analysis to archaeological research. Topics to be covered include the use of light stable isotopes to determine past and present diet, the use of stable isotopes to document residence and migration, analysis of stable carbon isotopes in soils, stable isotope ecology for environmental reconstruction and paleoclimate studies.

Prerequisite(s): Consent of the Department.

Archaeology 701 **3 units; H(3S-0)**

Special Topics in World Archaeology
Archaeology of particular geographical areas such as Circumpolar, North America, Mesoamerica, South America, Africa, Oceania, and Europe and Near East.

MAY BE REPEATED FOR CREDIT

Archaeology 703 **3 units; H(3S-0)**

Advanced Seminar in Selected Topics
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Art ART

Instruction offered by members of the Department of Art in the Faculty of Arts.

Graduate Courses

Art 601 **3 units; H(0-3T)**

History of Art I
Individual study: in consultation with the instructor, the student will select a research topic in art history or art criticism.

Prerequisite(s): Admission to a graduate program in the Department of Art.

Art 603 **3 units; H(0-3T)**

History of Art II
Individual study: in consultation with the instructor, the student will select a research topic in art history or art criticism.

Prerequisite(s): Art 601.

Art 605 **3 units; H(0-3T)**

Critical Study and Research
Individual study and research in the area of studio specialization, critical theory, methodological issues and/or historical topics.

Prerequisite(s): Admission to a graduate program in the Department of Art.

MAY BE REPEATED FOR CREDIT

Art 609 **3 units; H(3-0)**

Art Theory and Criticism
Investigation of contemporary global art theory and criticism.

Prerequisite(s): Consent of the Department.

Art 611 **3 units; H(3-0)**

Research Methods in Art
Introduces students to art making as a process of knowledge production and research creation.

Prerequisite(s): Admission to a graduate program in the Department of Art.

Art 661 **6 units; F(3/2S-10)**

Advanced Studio Practice
Individual study in studio, with seminar-based discussions in research area.

661.01. Advanced Studio Practice

661.02. Thesis Studio Practice

Prerequisite(s): For Art 661.01: Admission to a graduate program in the Department of Art. For Art 661.02, the prerequisite is Art 661.01.

Art 691 **3 units; H(3-0)**

Pedagogy and Professional Practice
Issues in professional practice and post-secondary teaching in visual art. Optional course.

Prerequisite(s): Admission to a graduate program in the Department of Art.

MAY BE REPEATED FOR CREDIT

Art 761 **3 units; H(2T-10)**

Advanced Independent Studio research
Theoretical and applied concepts in studio.

Prerequisite(s): Admission to a graduate program in the Department of Art.

MAY BE REPEATED FOR CREDIT

Art History ARHI

Instruction offered by members of the Department of Art in the Faculty of Arts.

Graduate Courses

Art History 613 **3 units; H(3-0)**

Independent Study in Art History
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Art History 615 **3 units; H(3S-0)**

Conference Course in Art History
Focuses on close examinations and discussions of students' research and writing, with an emphasis on communicating informed research creation practices. The course will culminate in a conference presentation.

Prerequisite(s): Consent of the Department.

Art History 617 **3 units; H(3-0)**

Thesis Development
A reading and conference course in the student's research area.

Prerequisite(s): Consent of the Department.

Astrophysics ASPH

Instruction offered by members of the Department of Physics and Astronomy in the Faculty of Science.

Note: For listings of related courses, see Physics, Medical Physics, and Space Physics.

Graduate Courses

Astrophysics 607 **3 units; H(1-6)**

Advanced Observational Astrophysics
Principles and tools of modern ground-based and space astronomy emphasizing ultraviolet, optical, infrared, and radio radiation. Data acquisition and reduction techniques for astrometry, photometry, spectroscopy, imaging, and interferometry. Use of astronomical data analysis software.

Astrophysics 611 **3 units; H(3-0)**

Radio Astronomy
Wave propagation, antennas, interferometry, aperture synthesis, radio receivers, and spectrometers. Applications to continuum and line radiation in stars, interstellar medium and extragalactic objects.

Astrophysics 621 **3 units; H(3-0)**

High Energy Astrophysics
Interaction of high energy particles with matter, propagation and origin of cosmic rays; structure of white dwarfs and neutron stars; the physics of jets and the accretion process onto compact objects; supernovae and supernova remnants; active galactic nuclei.

Biochemistry BCEM

Instruction offered by members of the Department of Biological Sciences in the Faculty of Science.

Graduate Courses

Enrolment in any graduate course requires consent of the Department.

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

600-level courses are available with permission to undergraduate students in the final year of their programs.

See also the separate listing of graduate-level Chemistry courses.

Biochemistry 641 **3 units; H(3-0)**

Selected Topics in Biochemistry
Selected topics in Biochemistry such as those which appear annually in the serial publication Annual Review of Biochemistry.

MAY BE REPEATED FOR CREDIT

Biochemistry 731 **3 units; H(3-0)**

Current Topics in Biochemistry
A discussion of contemporary experimental and theoretical biochemical methods used for the study of drugs and diagnostics at a biomolecular level. Structural analysis, drug design and computational methods will be introduced, as well as modern 'omics' research approaches and current protein drug targets of the pharmaceutical industry.

Biology BIOL

Instruction offered by members of the Department of Biological Sciences in the Faculty of Science.

For other courses offered by the Department of Biological Sciences see Biochemistry; Cellular, Molecular and Microbial Biology; Ecology; Marine Sciences; Plant Biology; Zoology.

Graduate Courses

Enrolment in any graduate course requires consent of the Department. Only when appropriate to a student's program may graduate credit be received for courses numbered 500-599. 600-level courses are available with permission to undergraduate students in the final year of their program.

Biology 601 **3 units; H(1S-0)**

Research Seminar
Reports on studies of the literature or of current research. Graduate students normally register in their supervisor's research cluster.

601.01. Biochemistry I

601.02. Biochemistry II

601.03. Integrative Cell Biology I

601.04. Integrative Cell Biology II

601.05. Ecology and Evolutionary Biology I

601.06. Ecology and Evolutionary Biology II

601.11. Microbiology I

601.12. Microbiology II

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Biology 607 **3 units; H(3-0 or 0-6)**

Special Problems in Biology
Independent research or reading project that may include, seminars, term papers and training in theoretical and/or laboratory methods.

MAY BE REPEATED FOR CREDIT

Biology 609 **3 units; H(3-0)**

Advanced Statistical Applications in Biology
This course explains and demonstrates the analysis of biological data with general linear models, generalized linear models, maximum-likelihood fitting of non-linear models, and resampling techniques. Content is presented in a workshop format, so that students learn the application of computer analysis coincidentally with statistical concepts.

Prerequisite(s): Ecology 425 or consent of the Department.

Biology 617 **3 units; H(3-0)**

Darwin's Origin of Species
An examination of the first edition of Charles Darwin's "On the Origin of Species" and related writings. Students will lead discussions of scientific, philosophical, and other issues raised by the book.

Prerequisite(s): Consent of the Department.

Biology 619 **3 units; H(3-0)**

Advanced Evolutionary Biology
The theory of organic evolution. Historical development of evolutionary ideas. Darwin's contribution. The mechanism of natural selection; sexual, kin and group selection. The application of the theory in biogeography, ecology, ethology and other areas of biology.

Biology 703 **3 units; H(3-0) or H(0-6)**

Recent Advances in Biology
Lectures, seminars and/or laboratories on special advanced topics in biological sciences. Each student should seek consent of a departmental faculty member who will supervise the chosen study.

MAY BE REPEATED FOR CREDIT

Biomedical Engineering BMEN

Instruction offered by members of the Schulich School of Engineering, Faculty of Kinesiology, Cummings School of Medicine, Faculty of Veterinary Medicine, Faculty of Science, and other faculties involved in the multi-faculty Biomedical Engineering Graduate Program.

Graduate Courses

Biomedical Engineering 600 **3 units; H(4-0)**
(formerly Biomedical Engineering 611/612/613/614)

Biomedical Engineering Foundations
An introduction to core concepts of Biomedical Engineering including an introduction to biomedical engineering fundamentals. Course allows students to select between a biology focused or an engineering focused fundamental module to complement previous course work (with approval of course instructor).

Biomedical Engineering 602 **3 units; H(2-0)**
(formerly Biomedical Engineering 611/612/613/614)

Biomedical Engineering Core I
Topics may include an introduction to a) biomedical engineering research, research integrity and ethics, b) career paths and progression in biomedical engineering and c) oral research communication skills.

Antirequisite(s): Credit for Biomedical Engineering 602 and either 605 or 607 will not be allowed.

NOT INCLUDED IN GPA

Biomedical Engineering 604 **3 units; H(2-0)**
(formerly Biomedical Engineering 611/612/613/614)

Biomedical Engineering Core II
Topics may include an introduction to a) research methodology, including experimental design and b) written research communication skills in biomedical engineering, and c) preparation and review of research proposals. Satisfactory completion of this course within one year of first registration will ensure that the Biomedical Engineering Graduate Program Research Proposal requirements are met.

Antirequisite(s): Credit for Biomedical Engineering 604 and either 605 or 607 will not be allowed.

NOT INCLUDED IN GPA

Biomedical Engineering 605 **1.5 units; Q(1.5S-0)**

Research Seminars in Biomedical Engineering
Reports of studies of the literature or of current research.

NOT INCLUDED IN GPA

Biomedical Engineering 607 **1.5 units; Q(1.5S-0)**

Research Seminars in Biomedical Engineering
Reports of studies of the literature or of current research.

NOT INCLUDED IN GPA

Biomedical Engineering 609 **3 units; H(3-3/2)**

Anatomy and Physiology for Biomedical Engineers
Advanced instruction on human skeletal structure, types of connective tissues, structure of joints, muscle and organ structure and function, cardiac physiology, blood properties and flow, introduction to autonomous nervous system, and disorders of the musculoskeletal system. Other topics will be covered dependent on the interests of the instructor and students.

Biomedical Engineering 619 **3 units; H(3-0)**

Special Problems in Biomedical Engineering
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member.

MAY BE REPEATED FOR CREDIT

Biostatistics BIST

Instruction offered by members of the Department of Mathematics and Statistics in the Faculty of Science.

Biostatistics 600 1.5 units; Q(3S-0)

Research Seminar
A professional skills course, focusing on the development of technical proficiencies that are essential for students to succeed in their future careers as practicing statistician in academia, government, or industry. The emphasis is on delivering professional presentations and using modern statistical research tools. A high level of active student participation is required.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Business and Environment BSEN

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Business and Environment 691 3 units; H(3-0)

Fundamentals of Project Management
Application of management principles to the project environment; planning, control, scope, time and cost processes; project organization and human resource issues. Students review a current major capital project and submit and defend a project report.

Prerequisite(s): Consent of the Program Director.

Antirequisite(s): Credit for Business and Environment 691 and Civil Engineering 691 will not be allowed.

Business and Environment 719 3 units; H(3-0)

Project External Issues
Projects will focus on the effects of external factors on business. External factors may include: corporate influences; financial interfaces; sources of funds; lending environment, owner's and lender's risks; government involvement; regulatory requirements; public interfaces; public information; compensation; project commissioning.

Prerequisite(s): Business and Environment 691.

Business and Environment 749 3 units; H(3-0)

Rediscovering Leadership: The Haskayne Wilderness Retreat
One-week intensive wilderness retreat combines experiential outdoor activities and personal growth challenges with cross-cultural first nations teachings and ceremonies to deliver core leadership skills for social responsibility and sustainable development.

Business and Environment 751 3 units; H(3-0)

Strategies for Sustainable Development
The strategic context for making business decisions with respect to sustainable development issues. The role of sustainability in economic development, international trade relations and emerging technologies. Stakeholder perspectives and the effect of environmental and social issues on industrial performance.

Business and Environment 753 3 units; H(3-0)

Managing Social and Environmental Issues in the Global Market Place
Canadian companies operating in the international arena find themselves faced with an increasingly complex array of social and environmental risks that threaten their strategic objectives. This course examines this new class of strategic corporate risks through a review of changes in international sustainable development policy initiatives, changes in communications, the emergence of an environmental and social activist sector, and the interaction of these factors resulting in new international business risk challenges. The course uses lectures, cases, simulations and class discussion of theories and concepts.

Business and Environment 761 3 units; H(3-0)

Ethics and the Professional Manager
The role of values in business decision making; alternative moral codes and their principles; moral principles as decision tools, and reasoning through moral dilemmas; role of business in society; specific issues in business ethics; application through cases and exercises.

Business and Environment 777 3 units; H(3-0)

Global Environment of Business
Economic, political, social and legal factors affecting management decisions. Topics may include Canada in the world economy, business and government relations, business ethics and legal environment for business. Develops knowledge and ability to analyze and deal with complexities of the business environment.

Business and Environment 789 3 units; H(3S-0)

Seminar in Business and Environment
Study and discussion of current research literature and contemporary issues on topics related to Business and Environment.

MAY BE REPEATED FOR CREDIT

Business and Environment 793 3 units; H(3-0)

Legal Environment of Business
The study of the various areas of business law. Topics may include: contracts, patents and copyrights, product liability, incorporation and other relevant legal issues.

Prerequisite(s): Organizational Behaviour and Human Resources 601, Operations Management 601, Business Technology Management 601, Accounting 601.

Business and Environment 797 3 units; H(3S-0)

Advanced Seminar in Business and Environment
Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Business Technology Management BTMA

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Business Technology Management 601 3 units; H(3-0)
(formerly Management Information Systems 601)

Business Technology Management
The fundamentals of how to use information technology (IT) innovatively to create competitive firms, to manage global interdependencies, and to provide and support quality products and services efficiently and effectively. Topics covered include trends in IT and how they may affect organizations, how organizations and the value chain can be redesigned using IT to encourage and facilitate better performance, how the Internet and electronic commerce impact organizations and markets, how IT-based platforms drive the network economy.

Business Technology Management 725 3 units; H(3-0)
(formerly Management Information Systems 725)

e-Business
The fundamental theories and practices in e-Business. Topic includes economic motivations for e-Business, the underlying information technologies and applications that enable e-Business, and e-Business strategies.

Prerequisite(s): Business Technology Management 601.

Business Technology Management 731 3 units; H(3-0)

Data Management and Business Analytics
Covers organizing, storing, and managing available data using relational database technologies and generating insights through business analytics techniques.

Prerequisite(s): Business Technology Management 601.

Business Technology Management 735 3 units; H(3-0)
(formerly Management Information Systems 735)

Enterprise Analysis
Course focus is on enterprise analysis and management of IT-enabled solutions to business problems. Emphasis is placed on problem identification, requirements determination, process analysis, enterprise architecture design and IT auditing using the COBIT framework.

Prerequisite(s): Business Technology Management 601.

Business Technology Management 736 3 units; H(3-0)

Data Analytics I
Covers tools and methods used in data analytics to discover, collect, organize, and clean data to make it ready for analysis. Software packages used to clean and organize the data for analysis will be introduced, as well as software to enable users' understanding of the data that is collected.

Prerequisite(s): Business Technology Management 601.

Business Technology Management 737 3 units; H(3-0)
(formerly Management Information Systems 737)

Data Analytics II
Covers tools and methods used in data analysis. Focus is on analytic and mapping methods, such as data mining, text mining, machine learning, social network analytics and preference mapping, and their application to business data analytics.

Prerequisite(s): Business Technology Management 601.

Business Technology Management 743 **3 units; H(3-0)**
(formerly Management Information Systems 743)

IT Platform Strategy
Basic characteristics of industries based on network and information goods. Topics include platform-mediated networks, network effects, versioning, pricing, and compatibility, discussed through analytical models and business cases.

Prerequisite(s): Business Technology Management 601.

Business Technology Management 797 **3 units; H(3S-0)**

Advanced Seminar in Business Technology Management
Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Business Technology Management 799 **3 units; H(3S-0)**
(formerly Management Information Systems 799)

Doctoral Seminars in Business Technology Management
799.01. PhD Seminar I in Business Technology Management

799.02. PhD Seminar II in Business Technology Management

799.03. PhD Seminar III in Business Technology Management

799.04. PhD Seminar IV in Business Technology Management

Cellular, Molecular and Microbial Biology CMMB

Instruction offered by members of the Department of Biological Sciences in the Faculty of Science.

Graduate Course

Enrolment in any graduate course requires consent of the Department.

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

600-level courses are available with permission to undergraduate students in the final year of their programs.

Cellular, Molecular and Microbial Biology 637 **3 units; H(3-0)**

Advanced Topics in Molecular Microbiology
Techniques and discussion of recent literature in molecular microbiology. Topics covered will vary from year to year, but could include bioinformatics, genomics, mutagenesis, advanced microscopy techniques, proteomics, vectors and cloning techniques, gene expression, and over-expression of proteins, as they relate to the study of prokaryotic systems. Course content will be tailored to the interests of the graduate students enrolled in the class in a given year.

Chemical Engineering ENCH

Instruction offered by members of the Department of Chemical and Petroleum Engineering in the Schulich School of Engineering.

Graduate Courses

Chemical Engineering 607 **3 units; H(3-0)**

Natural Gas Processing Principles
Physical and chemical properties of natural gases; vapour-liquid equilibrium data and computations; flow of gas and gas-liquid mixtures; separation of gaseous mixtures; heat transfer in gas processing; production of natural gas and its associated liquids.

Note: This course does not count towards the degree requirements of MSc and PhD students.

Chemical Engineering 609 **3 units; H(3-0)**

Natural Gas Processing Technology
Design and operational criteria in transporting and processing of natural gas; refrigeration and compression; cryogenics; hydrocarbon dew point control; LPG recovery; sulphur recovery; mechanical flow diagrams; process simulation.

Prerequisite(s): Chemical Engineering 607 or an undergraduate degree in Chemical Engineering.

Chemical Engineering 613 **3 units; H(3-0)**

Advanced Topics in Mass Transfer
Advanced concepts in mass transfer in multiphase systems. Mass transfer with simultaneous chemical reaction and heat transfer.

Chemical Engineering 615 **3 units; H(3-1.5)**

Model Predictive Control
Review of process dynamics and control fundamentals (step response curves, PID control structures and PID controller tuning). Identification of finite impulse response models from plant data. Model Predictive Control (MPC) algorithms (e.g. Dynamic Matrix Control). Applications of Linear Programming to determine optimal MPC setpoints respecting unit constraints. Computer simulation using the MATLAB MPC toolbox. Introduction to univariate controller performance assessment techniques.

Chemical Engineering 617 **3 units; H(3-1.5)**

Modelling and Identification Advanced Control
First-principles dynamic models of complex chemical processes. Comparison of dynamic simulation models generated using MATLAB/Simulink with those imbedded in commercial process simulators. Consideration of operability in plant design. Introduction to time series analysis and closed-loop identification. Causality versus correlation. Multivariate regression methods for soft sensor design.

Chemical Engineering 619 **3 units; H(3-0)**

Special Problems
Advanced studies on specialized topics in chemical, petroleum, biochemical and environmental engineering.

MAY BE REPEATED FOR CREDIT

Chemical Engineering 620 **6 units; F(0-4)**

Graduate Project
Individual project in the student's area of specialization under the guidance of a faculty member. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course. Open only to students in the MEng (course-based) program.

Prerequisite(s): Consent of the Department Head or Associate Head Graduate Studies.

Antirequisite(s): Credit for Chemical Engineering 620 and 699 will not be allowed.

Chemical Engineering 621 **3 units; H(3-0)**

Reservoir Simulation
Enhanced recovery modelling (generalized black-oil models, compositional and miscible), well treatment, grid orientation. New developments in gridding, thermal models, naturally fractured reservoirs, modelling of induced fractures (hydraulic and waterflood), reservoir geomechanics, and practical aspects of conducting simulation studies.

Prerequisite(s): Petroleum Engineering 429 or 523.

Chemical Engineering 623 **3 units; H(3-0)**

Chemical Reactor Design
Advanced study of design and operation of chemical reactors for both homogeneous and heterogeneous systems, batch, continuous flow stirred tank, tubular and multibed adiabatic reactors. Cold shot cooling in reactors. Optimal temperature gradients and yields. Catalyst effectiveness factors and optimal control with decaying catalysts. Analysis of sulphur plant reactor design including cost optimization.

Prerequisite(s): Chemical Engineering 421.

Chemical Engineering 625 **3 units; H(3-0)**

Advanced Topics in Heat Transfer
Diffusive and convective transport of heat. Analytical and approximate solutions to steady state and transient conduction and convection problems. Superposition techniques. Forced convection of heat in laminar and turbulent regimes.

Chemical Engineering 627 **3 units; H(3-1.5)**

Chemical Process Simulation
Object oriented programming applied to the design of a steady state chemical process simulator via the sequential modular approach and by the equation-based approach. Material and energy balances for systems of process units.

Chemical Engineering 629 **3 units; H(3-0)**

Secondary and Tertiary Recovery
Displacement processes for improved recovery of hydrocarbons. Waterflooding, gas flooding, solvent flooding and chemical flooding. Performance prediction techniques. Comparative economics.

Prerequisite(s): Petroleum Engineering 525.

Chemical Engineering 630 **3 units; H(3-1T)**

Electrochemical Engineering
Electrochemical kinetics and thermodynamics. Mass transport in electrochemical cells. Design and modelling of electrochemical cells. Application of electrochemistry to fuel cells, batteries, and water treatment.

Chemical Engineering 631 **3 units; H(3-0)**

Advanced Topics in Fluid Mechanics
Constitutive equations for viscous flow and methods of solution. Laminar, transition and turbulent flows. Hydrodynamic stability. Vortices. Boundary layers.

Chemical Engineering 633 **3 units; H(3-0)**

Chemical Thermodynamics
Advanced application of thermodynamic principles. Calculation of thermodynamic properties; ideal and non-ideal solution theory; calculation of phase equilibria; properties of reacting mixtures.

Prerequisite(s): Chemical Engineering 427.

Chemical Engineering 639 **3 units; H(3-0)**

Applied Numerical Methods in Engineering
Numerical solution of systems of linear and non-linear algebraic equations, eigenvalue problems.

Numerical solution of systems of ordinary and partial differential equations. Initial value and boundary value problems. Finite difference and finites element methods. Numerical stability.

Note: Knowledge of a programming language and undergraduate-level numerical methods is necessary.

Chemical Engineering 643 3 units; H(3-0)
(Environmental Engineering 641)

Air Pollution Control Engineering
Introduction to air quality and air pollution. Energy and air pollution. Fossil fuel combustion and related air pollution. Industrial air pollution control. Control of particulate matter. Control of VOCs, SOx, and NOx. Adsorption, absorption and biofiltration of air pollutants. GHG emission control. Recent advances on related topics.

Antirequisite(s): Credit for Chemical Engineering 643 and Environmental Engineering 641 will not be allowed.

Chemical Engineering 645 3 units; H(3-0)
(Environmental Engineering 661)

Industrial and Produced Wastewater Treatment
Sources and characterization of industrial wastewater. Treatment objectives and regulations. Unit and process design. Physical/chemical treatment including sedimentation, coagulation, filtration, absorption, adsorption, ion exchange, membrane processes and pH adjustment.

Note: Credit for Chemical Engineering 645 and Environmental Engineering 661 will not be allowed.

Chemical Engineering 647 3 units; H(3-0)

Thermal Recovery Methods
Oil sands and heavy oil resources. Fluid and rock properties. Heat transfer processes in porous media. Comparative analysis of viscous oil recovery methods: steam flooding, cyclic steam stimulation, in-situ combustion and steam-assisted-gravity-drainage. Surface equipment and operation. Laboratory and field performance evaluation of thermal recovery methods. Process economics.

Prerequisite(s): Petroleum Engineering 429, 523 or 621.

Chemical Engineering 649 3 units; H(3-0)

Naturally Fractured Reservoirs
Classification and characterization of naturally fractured reservoirs. Drilling and completion methods. Production characteristics. Tight gas reservoirs. Reserve estimation. Emphasis is placed on the relationship between geology, log interpretation, well testing, and primary-secondary recovery of hydrocarbons from naturally fractured reservoirs.

Chemical Engineering 653 3 units; H(3-0)

Horizontal Wells for Petroleum Production
Drilling and completion methods for horizontal wells; mathematical analysis of steady state flow to horizontal wells and well combinations; pseudo steady state and constant well bore pressure models; theoretical comparisons of predicted performance and coning behaviour of horizontal and vertical well patterns; performance in fractured reservoirs; potential for horizontal wells in heavy oil and bitumen production; basic conceptual ideas of steam-assisted gravity drainage.

Prerequisite(s): Petroleum Engineering 429 or Petroleum Engineering 523.

Chemical Engineering 657 3 units; H(3-0)

Advanced Reservoir Engineering
Formulation and solution of reservoir-engineering problems including combination of variables, Laplace transform, approximate Integral methods, and solution methods of moving boundary problems. Examples from thermal processes (e.g. hot waterflooding, SAGD), different recovery mechanisms (e.g. imbibition, expansion drive, solution-gas drive), well testing problems and naturally fractured reservoirs.

Prerequisite(s): Petroleum Engineering 429 or Petroleum Engineering 523.

Note: Prior knowledge of reservoir engineering and analytical solution methods of differential equations is necessary.

Chemical Engineering 659 3 units; H(3-0)

Advanced Cell and Tissue Engineering
Current challenges in tissue engineering. Focus on specific tissues. Course topics include a brief biology review, cell fate processes, stem cells, tissue microenvironments and mass transfer, biomaterials, bioreactors, and clinical delivery of tissue engineered constructs.

Prerequisite(s): Consent of the Department.

Note: Credit for Chemical Engineering 659 and Biomedical Engineering 619.06 will not be allowed.

Chemical Engineering 661 3 units; H(3-0)

Geostatistics for Reservoir Characterization
Statistical/probability concepts, exploratory data analysis, spatial structural analysis, estimation theory (Kriging), integration of auxiliary information and conditional stochastic simulation. Special emphasis on reservoir characterization and the particular problems encountered in that area. The geostatistical methodology for reservoir characterization will be demonstrated on a fluvial reservoir example.

Prerequisite(s): Petroleum Engineering 429 or Petroleum Engineering 523.

Note: Open to graduate Chemical Engineering, Civil Engineering and Geophysics students, and Geology graduate students with sound quantitative skills. Prior exposure to statistical/probability theory is required.

Chemical Engineering 665 3 units; H(3-0)
(Environmental Engineering 665)

Wastewater Issues for the Oil and Gas Industry
Produced water characteristics, regulations governing produced water management, management options. Technologies used for produced water treatment, novel/emerging technologies. Process design approaches and comparative evaluation of various technologies. Case Studies.

Note: Credit for Chemical Engineering 665 and Environmental Engineering 665 will not be allowed.

Chemical Engineering 677 3 units; H(3-0)

Advanced Oil and Gas Engineering
Problems related to production of conventional oil, heavy oil and natural gas; analysis of the interactions of oil, water and gas, effects of fluid properties, rock structure and capillary, gravity and viscous forces acting on the reservoir system; application to the design of improved oil and gas recovery methods. New processes in oil and gas recovery.

Prerequisite(s): Petroleum Engineering 429 or 523.

Chemical Engineering 687 3 units; H(3-0)
(formerly Chemical Engineering 619.87)

Petroleum Economics
Economic principles and risk management practices in the petroleum industry. Project selection; investment ranking; budgeting; and portfolio development. Decision making under uncertainty and risk.

Antirequisite(s): Credit for Chemical Engineering 687 and Petroleum Engineering 626 will not be allowed.

Chemical Engineering 689 3 units; H(3-0)

Drilling Advances, Modelling and Simulation
Application of drilling optimization simulator tools to optimize rate of penetration and minimize cost. Drilling hydraulics simulation, directional drill string torque and drag calculations, drilling fluid selection and analysis and real time drilling rate analysis.

Antirequisite(s): Credit for Chemical Engineering 689 and either Chemical Engineering 619.91 or Petroleum Engineering 627 will not be allowed.

Chemical Engineering 698 6 units; F(3-0)
(Geology 698)

Reservoir Characterization for Field Development
A team-based, integrated reservoir description experience working with geophysical, geological, petrophysical, and engineering data to produce a field development plan.

Prerequisite(s): Chemical Engineering 621, Geology 697 and Organizational Behaviour and Human Resources 789, and admission to the Master of Engineering with Reservoir Characterization Specialization.

Antirequisite(s): Credit for Chemical Engineering 689 and either 619.95 or 619.96 will not be allowed.

Chemical Engineering 699 3 units; H(0-4)

Special Project
Project study conducted under the guidance of a faculty member and intended to expose the student to the tools, techniques and basic aspects of research. A written comprehensive report and one or more written progress reports are required.

Prerequisite(s): Consent of the Department Head or Associate Head Graduate Studies.

Antirequisite(s): Credit for Chemical Engineering 699 and 620 will not be allowed.

MAY BE REPEATED FOR CREDIT

Chemical Engineering 701 3 units; H(3-0)
(Environmental Engineering 621)

Experimental Design and Error Analysis
Statistical analysis and design of engineering experiments. Random variables and sampling distributions; estimation and hypothesis testing; concepts of central tendency, variability, confidence level; correlation, regression and variation analysis; robust estimation; experiments of evaluation; experiments of comparison; factorial experiments (analysis of variance); experimental designs (involving randomization, replication, blocking and analysis of covariance).

Antirequisite(s): Credit for more than one of Chemical Engineering 701, Environmental Engineering 621, Chemical Engineering 619.45 and 619.82 will not be allowed.

Note: Intended for MSc/PhD students. MEng students may be able to register with instructor's permission.

Chemical Engineering 703 3 units; H(3-0)

Advanced Mathematical Methods in Engineering
Review of theory of linear algebra. Review of ordinary differential equations: linear, non-linear; series solutions; special exact solutions; applications. Partial differential equations: geometric interpretation; characteristic curves; separation of variables;

the Sturm-Liouville problem and Fourier series; eigenfunction expansion; Fourier, Laplace and Hankel transforms; self similarity; Green's function; applications.

Antirequisite(s): Credit for Chemical Engineering 703 and 619.83 will not be allowed.

Note: Intended for MSc/PhD students. MEng students may be able to register with instructor's permission.

Chemistry CHEM

Instruction offered by members of the Department of Chemistry in the Faculty of Science.

Graduate Courses

Advanced graduate-level courses are listed below. Courses in certain areas are grouped under "Selected Topics" titles. The content and offering of these are decided annually by the Department to meet the requirements of graduate students in the program. A student may receive credit for several courses in a given selected topics area. Details of offerings and course outlines may be obtained from the Department on request.

Unless stated otherwise the prerequisite for entry to all courses at the 600 level and above is "consent of the Department." Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Chemistry 601 **3 units; H(2S-0)**

Research Seminar
Reports on studies of the literature or of current research. Required of all graduate students in Chemistry.

NOT INCLUDED IN GPA

Chemistry 603 **3 units; H(2S-0)**

Research Seminar
Continuation of Chemistry 601.

NOT INCLUDED IN GPA

Chemistry 613 **3 units; H(3-0)**

Electrochemical Fundamentals and Methodologies
Origin, significance, and thermodynamics of interfacial potential differences; structure of the double layer; basic principles of electron transfer at interfaces, Butler-Volmer equation; mass transport control of electro-chemical reactions; controlled potential methods as applied to electrode surface reactions and homogeneous reactions coupled to electron-transfer processes.

Chemistry 615 **3 units; H(3-0)**

Analytical Separations
Theory and practice of resolving mixtures into separate components for analysis. Basic theory; liquid-liquid extraction; high performance liquid chromatography; gas-liquid, open bed, ion exchange and exclusion chromatography; electrophoresis.

Chemistry 617 **3 units; H(3-0)**

Advanced Analytical Chemistry
Consideration of principles and equilibria pertaining to aqueous and nonaqueous neutralization, redox, complexation, precipitation and potentiometric methods employed in analyses. Statistical considerations of analytical data and analysis.

Chemistry 619 **3 units; H(3-0)**

Selected Topics in Analytical Chemistry
Topics of current interest such as: properties of synthetic polymer membranes, advanced instrumental methods, developments in chemical sensors, speciation studies, environmental analytical chemistry.

MAY BE REPEATED FOR CREDIT

Chemistry 621 **3 units; H(3-0)**

Organometallic Chemistry
A detailed discussion of structure, bonding and preparative methods in organometallic chemistry including the industrial and synthetic applications of organometallic compounds.

Chemistry 623 **3 units; H(3-0)**

Chemistry of the Main Group Elements
The chemistry of electron-deficient, electron-precise, and electron-rich rings, inorganic polymers, and organometallic compounds of the main group elements; applications of spectroscopic techniques; industrial uses. Seminars on recent research developments.

Chemistry 627 **3 units; H(3-0)**

Theoretical Inorganic Chemistry
Aspects of theoretical inorganic and organometallic chemistry including: quantitative and qualitative molecular orbital theory; the bonding and structure of molecules, clusters, and extended arrays; the fragments of organometallic species; orbital correlation diagrams in inorganic reactions; spectroscopic methods and their interpretation.

Chemistry 629 **3 units; H(3-0)**

Selected Topics in Inorganic Chemistry
Courses are offered to cover topics of current interest, such as bioinorganic chemistry, inorganic solution phenomena, and the inorganic chemistry of the solid state.

MAY BE REPEATED FOR CREDIT

Chemistry 641 **3 units; H(3-0)**

Concepts in Biochemical Toxicology
An interdisciplinary course focused on the diverse biomolecular mechanisms by which organic (e.g. PCB's) and inorganic pollutants (e.g. Cd, Hg, As) adversely affect cell function examined at multiple levels of organization, from molecules to whole organisms. Topics include how natural toxins exert toxicity, how toxins/light generate free radicals within cells, how the speciation of metals in the environment affects their bioavailability/toxicity, and the toxicity mechanisms that lead to homeostatic dysfunction.

Antirequisite(s): Credit for Chemistry 641 and either Chemistry 541 or Biochemistry 541 will not be allowed.

Chemistry 651 **3 units; H(3-0)**

Advanced Organic Stereochemistry
Stereochemical principles in organic chemistry, including: geometry, bonding, symmetry, molecular isomerism, conformational analysis, asymmetric and stereocontrolled reactions.

Chemistry 653 **3 units; H(3-0)**

Advanced Organic Spectroscopy
Advanced spectroscopic techniques for the determination of complex organic structures. Emphasis will be on NMR methods, practical aspects of acquiring spectra, advanced interpretation and reporting spectral data.

Chemistry 655 **3 units; H(3-0)**

Advanced Organic Synthesis
A review of modern synthetic reactions and methods in the field of organic chemistry with emphasis on the recent literature.

Chemistry 657 **3 units; H(3-0)**

Theoretical Organic Chemistry
Theoretical principles of organic chemistry including stereochemistry, molecular orbital calculations, pericyclic processes (Woodward-Hoffmann rules), and PMO theory.

Chemistry 659 **3 units; H(3-0)**

Selected Topics in Organic Chemistry
Courses are offered in major branches of organic chemistry, including: carbohydrate chemistry, steroids and terpenoids, semiochemistry, heterocyclic chemistry, biosynthesis of secondary metabolites, as well as other topics of current interest.

MAY BE REPEATED FOR CREDIT

Chemistry 669 **3 units; H(3-0)**

Selected Topics in Applied Chemistry
Courses are offered in such topics as electrochemistry, industrial catalysis, chemistry of energy sources, colloid and surface chemistry and polymer chemistry.

MAY BE REPEATED FOR CREDIT

Chemistry 681 **3 units; H(3-0)**

Crystallography
A general introduction to X-ray analysis of single crystals. Topics include: Geometry of the crystalline state; diffraction of X-rays; Fourier synthesis; methods of structure solution; accuracy and precision of derived parameters.

Chemistry 689 **3 units; H(3-0)**

Selected Topics in Physical Chemistry
Courses are offered in such topics as dielectric properties, kinetics, molecular vibrations, fluorescence spectroscopy, X-ray diffraction.

MAY BE REPEATED FOR CREDIT

Chemistry 701

Independent Study
Independent study not directly related to the student's thesis project normally under the direction of any chemistry faculty member. A course information sheet must be provided and a student report must be submitted on completion of the course.

Note: Multiple 701 courses can be offered in any one term. However, students may take this course for credit not more than twice.

MAY BE REPEATED FOR CREDIT

Civil Engineering ENCI

Instruction offered by members of the Department of Civil Engineering in the Schulich School of Engineering.

Graduate Courses

Registration in all courses requires the approval of the Department of Civil Engineering. For a more complete listing of Environmental Engineering graduate courses look under Environmental Engineering.

Civil Engineering 611 **3 units; H(3-1)**

Bituminous Materials
Origin of bituminous materials. Production, composition, and internal structure. Natural and petroleum-refined bituminous materials. Characteristics of bituminous materials and their measurement. Basic material and rheological tests. Application of bituminous materials in asphalt paving technologies. Hot mixes and asphalt emulsions. Paving mix design, properties and testing. Main failure modes of asphalt pavements. Industrial asphalts. Environmental impacts of asphalt technologies.

Civil Engineering 615 **3 units; H(3-0)**

Rheology of Engineering Materials
Elements of tensor calculus. Constitutive equations. Linear and non-linear viscoelasticity. Dielectric properties of materials. Rheometry. Temperature and molecular mass dependencies of material functions. Relations between material functions. Microstructure and rheology of materials.

Civil Engineering 617 **3 units; H(3-0)**

Fracture of Civil Engineering Materials
Cohesive strength; plasticity. Fracture mechanics in relation to structural steel, stress intensity, fracture toughness, energy release rate, LEFM, COD, J-Integral, R-Curve, fatigue. Compressive fracture of concrete, masonry and rocks; cracking patterns, fracture theories, damage models, test methods and effects.

Civil Engineering 619 **3 units; H(3-0)**

Special Problems
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member. Students would be required to consider problems of an advanced nature.

MAY BE REPEATED FOR CREDIT

Civil Engineering 621 **3 units; H(3-0)**

Computer Analysis of Structures
Review of the displacement method of structural analysis, energy theorems, and transformation of force and displacement matrices. Computer analysis of framed structures: banded stiffness matrices, assemblage of stiffness matrices, displacement and support conditions and calculation of reactions, solution of banded equations. Structural symmetry, anti-symmetry and cyclic symmetry. Analysis of large structures by substructuring. Analysis of shear wall structures. Introduction to the finite element method: displacement functions, stiffness matrix formulation, consistent load vectors, isoparametric elements. Non-linear analysis: effect of axial forces combined with large displacements, geometric stiffness matrix, Newton-Raphson techniques, examples of geometric non-linearity, non-linear buckling, cable networks including membrane elements, analysis of structures made of non-linear materials. Structuring and composition of available structural analysis computer programs, and their applications.

Civil Engineering 623 **3 units; H(3-0)**

Behaviour and Design of Reinforced Concrete Members
Behaviour and strength of reinforced concrete members; materials; safety; design of members subjected to flexure, compression, compression and flexure including biaxial bending, shear, torsion; bond and anchorage; slender columns; deep beams; serviceability; rotation capacity; relation between results of research and current design codes.

Civil Engineering 627 **3 units; H(3-0)**

Serviceability of Concrete Structures: Advanced Topics
Material properties affecting serviceability: creep and shrinkage of concrete and relaxation of prestressed steel. Displacement method of analysis of strains and stresses due to temperature, creep and shrinkage; composite sections; cracked sections. Time-dependent internal forces; effects of loading, prestressing and construction in stages. Displacements of cracked members; crack spacing; stabilized cracks; force-induced and displacement-induced cracking. Deflections of beams, frames, slabs and floor systems. Non-linear effects of cracking on internal forces. Effects of temperature. Fatigue of cracked prestressed members. Corrosion; effects of cracking. Serviceability considerations of miscellaneous structures, e.g., bridges, water-retaining structures and pavements.

Civil Engineering 629 **3 units; H(3-0)**

Computational Modelling of Concrete Structures
Discussion of linear finite element analysis; non-linear analysis and iterative techniques; constitutive relations and failure theories; modelling of reinforcement and prestressing; cracking models and post-cracking behaviour; tension stiffening and strain softening; models for shear transfer; time-dependent effects of creep, shrinkage and temperature; behaviour under cyclic loading and dynamic effects; numerical examples and computer applications on analysis of beams, frames, slabs, shear panels and walls, thin shells, axisymmetric solids and three dimensional structures.

Civil Engineering 633 **3 units; H(3-0)**

Fibre Reinforced Polymers for Construction and Repair of Structures
Properties and behaviour of various types of Fibre-Reinforced Polymers (FRP)materials. Limit States Design, procedures and design philosophy of structures reinforced or strengthened with FRP. Flexural and shear design. FRP systems for flexural and shear strengthening of structures. Axial strengthening of columns. Concrete prestressed with FRP. Durability and fire resistance, blast mitigation and repair using FRP. Case studies and field applications.

Civil Engineering 635 **3 units; H(3-0)**

Behaviour and Design of Prestressed Concrete Bridges and Other Structures
Forces due to prestressing in statically indeterminate structures such as continuous beams, frames, slabs, using load balancing method, force method and prestressing influence coefficients. Limit analysis of continuous prestressed concrete structures. Design of prestressed flat slabs. Initial and time-dependent deflections. Effect of creep and shrinkage in statically indeterminate structures; effect of differential settlement; creep behaviour of structures made continuous by cast-in situ concrete. Discussion of various types of prestressed concrete bridges; selection of cross-section, pier arrangement, abutments, approach slab, bearings. Loads. Design of skew and curved bridges. Cable layout in skew and curved bridges. Methods of bridge construction. Aesthetic considerations in bridge design.

Civil Engineering 637 **3 units; H(3-0)**

Behaviour and Design of Prestressed Concrete Members
Flexural analysis and design of prestressed and partially prestressed concrete members based on stresses, deflections and strength. Design of members subjected to shear, torsion, compression or tension. Fire resistance. Composite members. Bond and anchorage zones. Prestressing losses and time-dependent deformations. Discussion of current design standards.

Civil Engineering 639 **3 units; H(3-0)**

Structural Dynamics
Numerical analysis of simple systems; rigorous analysis of one-degree systems; lumped mass multi-degree systems and structures with distributed mass and load; approximate analysis and design methods; earthquakes, blast-resistant design, beams subjected to moving loads; calculation of results by analog and digital computer.

Civil Engineering 641 **3 units; H(3-0)**

Seismic Analysis and Design
Introduction to seismology, ground movements, typical accelograms. Response spectra for linear and non-linear responses, role of damping and inelastic behaviour. Equivalent lateral load for design, code requirements. Structural design concepts to mitigate seismic effects. Design of steel structures for earthquake motions. Design of concrete frames and walls for earthquake motions.

Prerequisite(s): Civil Engineering 639.

Civil Engineering 643 **3 units; H(3-0)**

Structural Masonry Design
Component materials and their properties, masonry properties, quality control, plain and reinforced masonry, beams, walls, slender walls, columns, load-moment interaction curves, concentrated load bearing, shear load distribution, shear walls, code provisions, building envelope, detailing, differential movement, geometric walls, prestressed masonry, arches.

Civil Engineering 645 **3 units; H(3-0)**

Risk Analysis
The objective of this course in engineering risk analysis and risk assessment is to familiarize students with the principles and techniques of quantitative risk analysis. Key focus points are the treatment of uncertainties, the attitude of conservatism, risk perception, the careful use of quantitative risk measures, and a discussion of the dangers tasks facing risk-based decision makers. Includes: Hazards, risk, risk analysis, risk assessment; risk measures; probability, uncertainty modelling, stochastic variables; using and misusing data, reliability, tails; risk assessment frameworks, models in health and environmental risk analysis, models in engineering risk analysis; risk perception, risk comparison; and practical case studies.

Civil Engineering 647 **3 units; H(3-0)**

Structural Reliability Analysis
Concepts of risk and reliability, uncertainties, and engineering decision making. Techniques for reliability-based assessment of structural components and systems. Time-dependent structural reliability analysis including load, load effect, and resistance modelling. Code calibration using structural reliability. Reliability assessment of existing structures. Applications focus on design and optimization of uncertain systems such as structures, soils, and infrastructure systems.

Civil Engineering 653 **3 units; H(3-0)**

Theory and Applications of the Finite Element Method
Conceptual framework of the finite element method with emphasis on applications to structural analysis: shape functions, continuity at nodes, numerical integration, matrix assembly. Scope of the method, use of basic equations of elasticity, displacement (stiffness) method of analysis. Sources of error and poor performance; mesh sensitivity;

element types, their selection and behaviour. Applications in structural analysis, heat conduction and other non-structural problems; use of available finite element programs.

Civil Engineering 655 **3 units; H(3-0)**

Numerical Methods for Modelling Geomaterials
Methods of theoretical analysis for solving partial differential equations associated with Geotechnical and Structural Engineering. Variational Principles, Principle of Virtual Work and Galerkin Method. Theory of finite element and focus on its computer implementation for analysis of engineering problems. Typical applications include two- and three-dimensional stress analysis, seepage flow, and coupled fluid flow-solid deformation problems. Advanced topics: numerical strategies for solving material and geometric non-linearities (plasticity and large deformations), poro-elasticity and plasticity, strain localization, and presentation of other numerical techniques such as finite difference, boundary element, discrete element methods.

Civil Engineering 657 **3 units; H(3-0)**

Airport Planning and Engineering
Planning of airport systems; planning and design of the airfield; airside capacity and delay; air traffic control; planning and design of the passenger terminal; analysis of airport operations.

Civil Engineering 659 **3 units; H(3-0)**

Sustainable Infrastructure
Sustainability and durability issues of structural materials; properties and uses of non-renewable and recycled materials; energy efficient design and green material selection; life cycle cost analysis. Constructability. Aesthetics. Infrastructure management, inventory, assessment/monitoring, performance and remaining service life. Preservation of existing infrastructure; repair and rehabilitation, strengthening and retrofitting to extend service life of structures. Structural composites: properties and applications to improve performance and sustainability of infrastructure.

Civil Engineering 665 **3 units; H(3-0)**

Fundamentals of Soil Behaviour
Principle of effective stress in saturated soil, unsaturated soil and clay. Engineering properties of soils. Shear strength and deformation characteristics of soils in static, cyclic, drained and/or undrained loading. Laboratory testing of soils. One-dimensional consolidation, poro-elastic deformation, swelling mechanism, time-dependent deformation and soil contamination in soils.

Civil Engineering 667 **3 units; H(3-0)**

Applied Rock Engineering
Engineering properties of intact rock and rock mass. Rock classification. Slope and underground excavation; groundwater flow in fractured rock; poro-elastic deformation analyses; hydraulic fracturing.

Civil Engineering 669 **3 units; H(3S-3)**

Permafrost Engineering
Development, characteristics and significance of permafrost, including the thermal and hydrological processes and resulting periglacial geomorphology and geotechnical implications. Contemporary topics in science and engineering of seasonally and perennially frozen ground.

Antirequisite(s): Credit for Civil Engineering 669 and Geography 689 will not be allowed.

Civil Engineering 671 **3 units; H(3-0)**

Advanced Foundation Engineering
Application of geotechnical engineering in the design and analysis of foundations. Includes shallow foundations, deep foundations, earth retaining structures, embankments. Use of bearing capacity theory to calculate ultimate loads. Use of typical elasticity solutions to evaluate settlement. Introduction to Limit State Design. Introduction to the use of geosynthetics to improve soil behaviour in foundation design. Design problems and computer applications in geotechnical foundation engineering.

Civil Engineering 673 **3 units; H(3-0)**

Constitutive Laws for Geomaterials
Definition of a continuous medium. Description of deformable continuous media; concepts of stress, strain and their invariants. Constitutive equations geomaterials as a generic for soil, rock and concrete materials in civil engineering. Review of elasticity theory. Introduction to yielding, plastic flow and failure phenomena in geomaterials. Limit analysis with applications to both geotechnical and structural engineering. Stress-strain behaviour for both cohesive and granular materials. Constitutive models based on critical state theory will be presented. Other topics such as strain localization and fracture phenomena may be included as appropriate.

Civil Engineering 689 **3 units; H(3-0)**

Advanced Project Management Practices and Principles
Advanced practices, tools and concepts in managing complex volatile or large projects. SMART project management based on best practices in diverse industries forms the basis of this course.

Prerequisite(s): Civil Engineering 691, and 697.

Civil Engineering 691 **3 units; H(3-0)**

Fundamentals of Project Management
Application of management principles to the project environment; planning, control, scope, time and cost processes; project organization and human resource issues. Students review aspects of a current major capital project and submit and defend a project report.

Prerequisite(s): Consent of the Program Director.

Antirequisite(s): Credit for Civil Engineering 691 and Business and Environment 691 will not be allowed.

Civil Engineering 693 **3 units; H(3-0)**

Project Engineering Management
Role of the engineering manager in the project management team. The engineering firm, its organization and function; project development, engineering project control; design control; scope and estimate control; engineering interfaces with procurement and construction; engineering responsibility in project commissioning start-up and operations.

Civil Engineering 695 **3 units; H(3-0)**

Project Construction Management
Role of the construction manager in the project management team; project options for the management of construction; managing the contractor's business; labour relations; claims; contractor(s) responsibility in project commissioning start-up and operations.

Civil Engineering 697 **3 units; H(3-0)**

Project Planning and Control
Strategic and tactical planning; planning for scope, quality, time and cost; selection and implementation of project management information system; economic and risk analysis; planning for construction labour relations.

Civil Engineering 699 **3 units; H(3-0)**

Law for Project Managers
Legal issues related to the effective management of projects. Introduction to the legal system and processes; environmental law; intellectual property non-disclosure; professional liability; contract law; strategic alliances; employment law; the builder's lien act. Cases are reviewed and students are expected to complete a number of assignments requiring research into case law.

Note: This course may not be taken for credit towards the JD or LLM degrees.

Civil Engineering 707 **3 units; H(3-0)**

Theory of Transport Demand Modelling
Modelling for transport planning; data in transport modelling; trip generation modelling; trip distribution modelling; modal split modelling; direct demand models; traffic assignment; equilibrium in transport modelling; discrete-choice models; specification and estimation of logit models; aggregation issues; simplified transport demand models; model updating and transferability.

Prerequisite(s): Consent of the Department.

Civil Engineering 709 **3 units; H(2-4)**

Practice of Transport Demand Modelling
Sample enumeration modelling; practical aspects of logit model estimation and calibration; disaggregate choice behaviour data; practical 4-step transport demand modelling using conventional software packages; application of computer-based network assignment models.

Prerequisite(s): Civil Engineering 707.

Civil Engineering 711 **3 units; H(3-0)**

Advanced Analysis and Modelling of Public Transit Systems
Role of public transport in a city; concepts of public and private benefits; economies of scale; main modes of urban public transport systems: rail, bus, van and other vehicles; advanced mathematical modelling of mode of operation, route alignment, access, station and stop location, transfer protocols, time table, vehicle and fleet size, reliability; concepts of utility and value of time; detailed functional design and optimization of a bus route, rail line; bus, rail and metro networks.

Prerequisite(s): An undergraduate degree in engineering or instructor approval.

Civil Engineering 715 **3 units; H(3-0)**

Transport Economics
Economic characteristics of transport; movement and location; transport demand; direct costs of transport; the value of travel time; external costs of transport; shadow prices; pricing of transport services; containment of external costs of transport; private and public sector investment analysis in transport; transport and economic development; transport policy.

Prerequisite(s): Consent of the Department.

Civil Engineering 717 **3 units; H(3-0)**

Dynamic Traffic Flow and Network Modelling
Fundamental traffic flow characteristics; moving bottlenecks and standing queues; macroscopic traffic flow models, shockwave theory and queu-

ing theory. Traffic instabilities such as capacity drop, wide moving jams and hysteresis loops. Higher order traffic models. Microscopic models. Static assignment including the concepts of user equilibrium and system optimum, shortest path and Braece paradox. Formulation of traffic assignment as a mathematic programming and solution algorithm. Basic concepts of dynamic traffic assignment including dynamic network loading and route choice; advanced traffic management with particular emphasis on advanced traffic control and discussion of microscopic simulation models.

Prerequisite(s): Consent of the Department.

Civil Engineering 741 3 units; H(3-0)
(Environmental Engineering 663)

Biological Processes for Wastewater Treatment
Specialized biological wastewater treatment processes for removal of impurities not effectively removed by conventional secondary wastewater treatment systems, such as nutrients (e.g. nitrogen and phosphorus), residual organics, residual solids, bacteria and viruses. Wetlands. Activated sludge modelling. Biological nutrient removal. Sludge management. Disinfection.

Antirequisite(s): Credit for Civil Engineering 741 and Environmental Engineering 663 will not be allowed.

Civil Engineering 745 3 units; H(3-0)
(Environmental Engineering 655)

Hazardous Waste and Contaminated Sites Management
Integrated waste management. Functional and fundamental properties of hazardous waste. Toxicological properties of contaminants. Contaminant release mechanisms. Fate and transport of contaminants in the environment. Contaminated site assessment principles. Quantitative human health risk assessment (QHHRA) as applied to contaminated sites. Hazard identification, exposure pathway analysis, risk characterization. Risk management and site remediation. Methods of hazardous waste treatment and contaminated site remediation. Secure land disposal of hazardous waste and contaminated soils and sludges.

Antirequisite(s): Credit for Civil Engineering 745 and Environmental Engineering 655 will not be allowed.

Civil Engineering 747 3 units; H(3-0)
(Environmental Engineering 653)

Contaminated Soil Remediation
Overview of soil remediation engineering. Contaminant partitioning in air, water and gas phases. Phases of site assessments, Physical and chemical treatment processes, soil vapour extraction, air sparging, soil washing, soil flushing, thermal desorption and incineration, solidification and stabilization, vitrification, biological treatment processes, bioremediation kinetics, ex situ and in situ techniques. Liquid phase bioremediation as it pertains to soil remediation.

Antirequisite(s): Credit for Civil Engineering 747 and Environmental Engineering 653 will not be allowed.

Civil Engineering 749 3 units; H(3-0)

Environmental Aspects of Waste Disposal Systems
Soil-chemical interactions and implications in waste disposal system design; landfill design principles; leachate production, leachate migration in the unsaturated/saturated zones; analytical and numerical solution of flow and transport equations; applications and case studies of groundwater contamination; design and construction of barrier systems; bioreactor landfills; landfill closure issues; greenhouse gas control systems.

Antirequisite(s): Credit for Civil Engineering 749 and Environmental Engineering 651 will not be allowed.

Civil Engineering 751 3 units; H(3-0)

Snow Avalanche Hazard Mitigation
Avalanche motion and protection including avalanche terrain, frictional flow, impact pressures, avalanche risk for fixed structures, elements of structural defence, and run-out estimation based on statistical models, dynamic models, air photo interpretation, field studies of vegetation and historical records.

Civil Engineering 753 3 units; H(3-0)

Snow Avalanche Formation and Release
Snowpack properties and processes including meteorological and ground effects on the snowpack, energy balance at the snow surface, snowpack stratigraphy, metamorphism of snow grains, bonding, as well as spatial and temporal variability of the snowpack. Avalanche initiation including deformation and failure of weak layers, models of slab failure and fracture propagation. Concepts of snow stability, avalanche forecasting and avalanche risk for recreationists.

Communication and Culture CMCL

Graduate Courses

These courses are offered by the Graduate Program in the Department of Communication, Media and Film Studies are now listed in the Communication and Media (COMS) section of the calendar.

Communication and Media Studies COMS

Graduate Courses

Instruction offered by the Graduate Program in the Department of Communication, Media and Film Studies in the Faculty of Arts.

Notes:

- Communication and Media Studies (COMS) courses were formerly named Communications Studies (COMS). All are COMS courses and considered equivalent for prerequisite purposes.
- Not all courses will be offered each year. Registration is open to graduate students admitted into the program. All other students require consent of the Department's Graduate Program Director.

Communication and Media Studies 601
3 units; H(3S-0)
(formerly Communication and Culture 601)

Interdisciplinary Approaches to Communication and Media Studies
An overview of theories, problematics and approaches in communication and media.

Antirequisite(s): Credit for Communication and Media Studies 601 and either Communications Studies 601 or Culture and Society 601 will not be allowed.

Communication and Media Studies 603
3 units; H(3S-0)
(formerly Communication and Culture 603)

Critical Media Studies
Theories and perspectives in the study of media production, industries, genres, and reception.

Antirequisite(s): Credit for Communication and Media Studies 603 and Communications Studies 603 will not be allowed.

Communication and Media Studies 613
3 units; H(3S-0)
(formerly Communication and Culture 613)

Communication and Cultural Theory
An examination of the major perspectives in communication and cultural theory through a historical analysis of classic works and an overview of contemporary approaches and applications.

Antirequisite(s): Credit for Communication and Media Studies 613 and either Communications Studies 613 or Culture and Society 613 will not be allowed.

Communication and Media Studies 615
3 units; H(3S-0)
(formerly Communication and Culture 615)

Research Methods
A survey of research methods appropriate to the study of communication and media.

Antirequisite(s): Credit for Communication and Media Studies 615 and Communications Studies 615 will not be allowed.

Communication and Media Studies 617
3 units; H(3S-0)
(formerly Communication and Culture 617)

Representation and Identity
An investigation of various issues related to representation and identity, including but not limited to race, ethnicity, gender and sexuality.

Antirequisite(s): Credit for Communication and Media Studies 617 and Culture and Society 603 will not be allowed

Communication and Media Studies 619
3 units; H(3S-0)
(formerly Communication and Culture 619)

Communications and Cultural Industries
An analysis of the governmental and social contexts which inform the current development of telecommunications, communications, cultural industries and new media in Canada.

Antirequisite(s): Credit for Communication and Media Studies 619 and Communications Studies 619 will not be allowed.

Communication and Media Studies 623
3 units; H(3S-0)
(formerly Communication and Culture 623)

Social Contexts of Science and Technology
Theoretical perspectives for understanding central debates in the study of science and technology in their social, political, cultural, and communication contexts.

Communication and Media Studies 631
3 units; H(3S-0)

Social and Media Activism
A critical overview of how digital media are being taken up by social justice movements and the implications of these new media practices in relation to politics and activism.

Antirequisite(s): Credit for Communication and Media Studies 631 and Culture and Society 607 will not be allowed.

Communication and Media Studies 641
3 units; H(3S-0)
(formerly Communication and Culture 641)

International Communication
An examination of cultural/communication issues and practices in international contexts. Examines the role of media systems in processes of culture, development, and identity formation.

Antirequisite(s): Credit for Communication and Media Studies 641 and Communications Studies 641 will not be allowed.

Communication and Media Studies 643
3 units; H(3S-3)

Methods in Film Studies
An examination of key approaches to studying film, including its aesthetic, historical, and theoretical dimensions.

Communication and Media Studies 645
3 units; H(3S-0)

Media and Democracy
An examination of the role played by media in democratic systems past and present. Draws from classic and contemporary democratic theory to explore the changing positions of traditional and new media, focusing on the interrelationships of media, political institutions and citizenship.

Communication and Media Studies 647
3 units; H(3S-0)

Communication and Health
Critically exploring the concept of health through the lens of communication, examines cultural and media representations of health, along with questions of health and identity, health promotion and advocacy, health risk and regulation, and social movements.

Communication and Media Studies 711
3 units; H(3S-0)
(formerly Communication and Culture 711)

Directed Studies
A research project under the direction of a faculty member.

Antirequisite(s): Credit for Communication and Media Studies 711 and Communications Studies 711 will not be allowed.

MAY BE REPEATED FOR CREDIT

Communication and Media Studies 713
3 units; H(3S-0)
(formerly Communication and Culture 713)

PhD Theory Seminar
A seminar that enables PhD students to focus their research interests and to explore theories relevant to their areas of specialization.

Prerequisite(s): Admission to the Communication and Media Studies PhD program.

Antirequisite(s): Credit for Communication and Media Studies 713 and Communications Studies 713 will not be allowed.

Communication and Media Studies 717
3 units; H(3S-0)
(formerly Communication and Culture 717)

Selected Topics in Communication, Media and Film
A variety of communication, media and film topics based on faculty expertise.

MAY BE REPEATED FOR CREDIT

Community Health Sciences MDCH

Instruction offered by members of the Cumming School of Medicine.

Community Health Sciences 600 3 units; H(3-0)

Introduction to Community Health Sciences
An introduction to the Department as well as a general orientation to the education and research programs in Community Health. Determinants of health within a population health framework and the implications for the determinants of health construct in analyzing and addressing specific population health problems.

Prerequisite(s): Admission to the Community Health Sciences or Public Health and Preventative Medicine program or consent of the program. Not available to Open Studies students.

Antirequisite(s): Credit for Community Health Sciences 600 and Medical Science 644 will not be allowed.

NOT INCLUDED IN GPA

Community Health Sciences 602 3 units; H(1-0)

Practicum in Public Health and Preventative Medicine
Clinical or field-based practicum for the Master of Community Medicine Program of the Community Health Sciences graduate program.

Prerequisite(s): Admission to the Master of Community Medicine specialization or the Public Health and Preventative Medicine program.

Antirequisite(s): Credit for Community Health Sciences 602 and Medical Science 649.01 will not be allowed.

NOT INCLUDED IN GPA

Community Health Sciences 603 3 units; H(1-0)

Practicum in Healthcare Epidemiology
Clinical or field-based practicum for the Healthcare Epidemiology specialization of the Community Health Sciences graduate program.

Prerequisite(s): Admission to the Healthcare Epidemiology specialization in the Community Health Sciences graduate program.

Antirequisite(s): Credit for Community Health Sciences 603 and Medical Science 649.02 will not be allowed.

NOT INCLUDED IN GPA

Community Health Sciences 604 3 units; H(1-0)

Practicum in Community Health Sciences
Clinical or field-based practicum for students in any specialization of the Community Health Sciences graduate program.

Prerequisite(s): Admission to the Community Health Sciences graduate program.

Antirequisite(s): Credit for Community Health Sciences 604 and Medical Science 649.03 will not be allowed.

NOT INCLUDED IN GPA

Community Health Sciences 605
3 units; H(3-1T)
(Veterinary Medicine 605)

Introduction to Biostatistical Methods
Analysis and design of research related to biological sciences. Emphasis is placed upon formulating good research questions, evaluating the appropriateness of different statistical methods for analyzing results, and performing and interpreting such statistical analyses. Statistical analyses will be carried out using modern statistical software.

Prerequisite(s): Consent of the program.

Community Health Sciences 610
3 units; H(3-2T)
(Veterinary Medicine 610)

Biostatistics I: Essentials of Biostatistics
Introduces the fundamental concepts of summarizing data and statistical inference, including graphical displays, hypothesis testing, p-values, and confidence intervals. Specific topics include comparisons of means and proportions, non-parametric tests, correlation and regression, confounding, sample size determination, and power calculations. Additional topics include a brief introduction to analysis of variance and covariance, logistic regression, and analysis of time-to-event data. Students gain hands-on experience analyzing data using STATA statistical software. Although this course uses STATA exclusively, much of the technical knowledge and some of the computing techniques are applicable to any statistical package.

Prerequisite(s): Admission to the Community Health Sciences graduate program or Public Health and Preventative Medicine program, or consent of the program. Not available to Open Studies students.

Antirequisite(s): Credit for Community Health Sciences 610 and Medical Science 643.01 will not be allowed.

Community Health Sciences 611
3 units; H(3-2T)
(Veterinary Medicine 611)

Biostatistics II: Models for Health Outcomes
Extends the fundamental concepts to modelling health outcomes using modern regression analysis techniques. Logistic and linear regressions, and their extensions, are covered in detail. The rationale, formulation, and statistical assumptions underlying each regression technique are discussed. Methods for selecting and assessing models are included. Additional topics include a brief introduction to models used in the analysis of repeated measures, longitudinal studies, and time-to-event data. STATA statistical software is used to analyze data. Required course for Biostatistics and Epidemiology specializations.

Prerequisite(s): Community Health Sciences 610 or Medical Science 643.01 and admission to the Community Health Sciences graduate program. Not available to Open Studies students.

Antirequisite(s): Credit for Community Health Sciences 611 and Medical Science 643.02 will not be allowed.

Community Health Sciences 612
3 units; H(3-2T)

Biostatistics III: Models for Repeated Measures Studies and Time-to-Events Studies
Discusses techniques for analyzing data collected at more than one point in time (repeated measures) and time-to-event (survival) data. Topics include generalized linear models (GLM), generalized additive models (GAM), Poisson regression, generalized estimating equations (GEE), and proportional hazards regression with time-varying covariates. STATA statistical software is used to analyze data.

Prerequisite(s): Community Health Sciences 611 or Medical Science 643.02 and admission to the Community Health Sciences graduate program, or consent of the program. Not available to Open Studies students.

Antirequisite(s): Credit for Community Health Sciences 612 and Medical Science 643.03 will not be allowed.

Community Health Sciences 626 3 units; H(3-0)

Meta-Analysis/Systematic Review in Medical Education

To become familiar with the theory, research, and application of meta-analysis/systematic review as it applies to the compilation of studies in education and healthcare with a focus on the discipline of medicine education. In particular, an emphasis will be placed on the principles of using statistical methods and techniques related to synthesizing studies in the measurement of a pre-determined and appropriate topic of interest to the participant.

Prerequisite(s): Admission to the Medical Education Specialization of the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 626 and Medical Science 738 will not be allowed.

Community Health Sciences 627 3 units; H(3-0)

Medical Education Assessment and Measurement

Approaches to assessment and measurement within the context of competency-based medical education.

Prerequisite(s): Admission to the Medical Education Specialization of the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 627 and Medical Science 739 will not be allowed.

Community Health Sciences 628 3 units; H(3-0)

Teaching, Learning, and Curriculum Design

Overview of context in which medicine is taught and learned, the theory related to learning and change, the key elements of curriculum design and evaluation, and examine traditional and innovative methods used to enhance student and practitioner knowledge, skills and attitudes.

Prerequisite(s): Admission to the Medical Education Specialization of the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 628 and any of Community Health Sciences 623, 624 and 625 will not be allowed.

Community Health Sciences 629 3 units; H(3-0)

Foundations of Practice and Science in Medical Education

Foundational academic concepts in the science of medical education including an overview of the philosophy of science, history of medical education and medical education scholarship along with fundamental concepts in medical education scholarship such as ethics and professionalism, critical appraisal and academic leadership.

Prerequisite(s): Admission to the Medical Education Specialization of the Community Health Sciences graduate program or consent of the program.

Community Health Sciences 630 3 units; H(3-1)
(formerly Community Health Sciences 621)

Designing Medical Education Research

Why and how of research in medical education including core components of research, ethical issues, project management, the research proposal, reviewing the literature, data collection and analysis, reports and dissemination.

Prerequisite(s): Admission to the Medical Education Specialization of the Community Health Sciences graduate program or consent of the program.

Community Health Sciences 631 3 units; H(3-0)

Implementation of Medical Education Research

Technical aspects of conducting a study including writing questions, selecting methods that are aligned with the research questions and approaches to analyzing quantitative and qualitative data.

Prerequisite(s): Admission to the Medical Education Specialization of the Community Health Sciences graduate program or consent of the program.

Community Health Sciences 640
3 units; H(3-2T)
(Veterinary Medicine 640)

Fundamentals of Epidemiology

Principles and methods of descriptive and analytic epidemiology. Emphasizes the underlying concepts and approaches of epidemiological research and critical appraisal of epidemiologic studies including: observational study designs and their vulnerabilities to bias, measures of frequency and association, basic methods for addressing sampling variability, confounding, and effect modification. Concepts related to causal judgment in epidemiology are also introduced.

Prerequisite(s): Admission to the Community Health Sciences graduate program or Public Health and Preventative Medicine program, or consent of the program. Not available to Open Studies students.

Corequisite(s): Community Health Sciences 610.

Antirequisite(s): Credit for Community Health Sciences 640 and Medical Science 647.01 will not be allowed.

Community Health Sciences 641 3 units; H(3-0)

Introduction to Clinical Trials

An introduction to methodological issues in the design and conduct of randomized controlled trials. Topics include ethics, blinding, randomization, sample size determination, sequential designs, data monitoring, and the logistical and organizational aspects of single centre and multi-centre trials.

Prerequisite(s): Community Health Sciences 610 and 640 or Medical Science 643.01 and 647.01 and admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit Community Health Sciences 641 for and Medical Science 659.04 will not be allowed.

Community Health Sciences 642 3 units; H(3-0)

Psychiatric Epidemiology

An overview of the context, principles and methods of psychiatric epidemiology. Basic concepts of bias and random error will be applied specifically to problems encountered in conducting psychiatric epidemiological studies. An additional objective is for students to gain a basic understanding of psychiatric terminology and nosology, including a basic understanding of the clinical features of major diagnostic categories.

Prerequisite(s): Community Health Sciences 610 and 640 and admission to the Community Health Sciences graduate program or consent of the program. Not available to Open Studies students.

Community Health Sciences 643 3 units; H(3-0)

Research in Healthcare Epidemiology and Infection Control

Emphasizes the research aspects of health care epidemiology and the application of basic epidemiologic and biostatistical techniques in the health care environment. The course uses an interdisciplinary approach and fosters the integration of knowledge and skills from the bench to the bedside and back.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 643 and Medical Science 647.07 will not be allowed.

Community Health Sciences 644 3 units; H(3-0)

Surveillance I: Data Handling for Infection Control

Focuses on the skills needed for data handling related to Infection Control in various settings. The primary aims are: (1) to develop the skills to properly manage data using various tools and technology; (2) to use basic statistical tools to analyze data used in Infection control; (3) to properly interpret and draw appropriate conclusions from data used in infection control.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 644 and Medical Science 647.10 will not be allowed.

Note: This is an online course.

Community Health Sciences 645 3 units; H(3-0)

Surveillance II: Principles of Surveillance

Focuses on the practice of surveillance for Infection Prevention and Control in various settings. The primary aims are: (1) to be able to base surveillance on an appropriate rationale; (2) to understand and use various methods of surveillance; (3) to make recommendations and follow up on the results of surveillance; (4) to be able to evaluate a surveillance program and incorporate into quality improvement.

Prerequisite(s): Community Health Sciences 644 or Medical Science 647.10 and admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 645 and Medical Science 647.11 will not be allowed.

Note: This is an online course.

Community Health Sciences 646 3 units; H(3-0)

Introduction to Public Health Surveillance

Surveillance is a public health function. Topics included in this online course include definition and overview of public health surveillance, indicators, frameworks and principles for the planning and evaluation of surveillance systems; analysis and interpretation of surveillance data; communication of public health information; and legal and ethical issues relevant to surveillance systems.

Prerequisite(s): Community Health Sciences 610 and 640 or Medical Science 643.01 and 647.01 and admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 646 and Medical Science 647.12 will not be allowed.

Community Health Sciences 647 3 units; H(3-0)

Clinical Epidemiology
Designed for students who have some familiarity and experience in epidemiology, biostatistics and who have a background in clinical health care or related field. It focuses on the application of epidemiologic methods to clinical health issues.

Prerequisite(s): Community Health Sciences 610 and 640 or Medical Science 643.01 and 647.01 and admission to the Community Health Sciences graduate program with a clinical background or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 647 and Medical Science 647.15 will not be allowed.

Community Health Sciences 648
6 units; F(3-1.5)

On-line Basic Infection Control
Focuses on providing novice Infection Control Professionals (ICPs) with the basic knowledge, tools and strategies needed to do Infection control in a board range of health care environments from health care institutions to the community. The purpose of this entry to practice course is (1) to identify and describe the scope of infection prevention and control problems and issues for novice ICPs and (2) to examine and integrate their current expertise with the basic knowledge, tools and strategies needed to examine problems and develop practical solutions in Infection Control.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 648 and Medical Science 660 will not be allowed.

Note: This is an online course.

Community Health Sciences 649 3 units; H(3-0) (Medical Science 613.01)

Epidemiology of Infectious Diseases
Focuses on the principles of epidemiology that are of particular relevance to infectious diseases. The course emphasizes the research aspects of infectious diseases epidemiology and how the basic techniques of epidemiology and biostatistics are applied in the communicable diseases.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Community Health Sciences 660 3 units; H(3-0)

Foundations of Health Services Research
An introduction to the fundamental concepts of health services research including topics related to health systems and methods in health services research, as well as evaluation of health systems performance, with emphasis on knowledge translation and health policy creation and analysis.

Prerequisite(s): Admission to the Community Health Sciences Graduate Program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 660 and Medical Science 645.18 will not be allowed.

Community Health Sciences 661 3 units; H(3-0) (Economics 679)

Health Economics I
Application of basic concepts from economics to examination of health and health care policy issues, such as why we have the kind of health care system we have, various aspects of health care reform, promotion of health, and evaluation of interventions.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 661 and Medical Science 679 will not be allowed.

Community Health Sciences 662 3 units; H(3-0)

Economic Evaluation
Designed for students interested in being able to critically interpret economic evaluation studies of health or health care interventions and beyond. The aim of the course is to introduce students to the concepts and methods of economic evaluation, provide an introduction to how it may serve as a useful tool in health and health care decision-making, and to enable students to critically appraise the economic evaluation literature.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 662 and Medical Science 659.08 will not be allowed.

Community Health Sciences 663 3 units; H(3-2)

Decision Analysis in Health Economic
Students will be introduced to the concepts of decision analysis and how it may serve as a useful tool in health care economics evaluation. Through attention to a clinical question or health care policy issue, students will develop the skills necessary to perform an economic evaluation to address it.

Prerequisite(s): Community Health Sciences 662 or Medical Science 659.08 and admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 663 and Medical Science 659.06 will not be allowed.

Community Health Sciences 664 3 units; H(3-0)

Administrative Data Analysis Methodology
Administrative data have been used widely for decision making and research. Analysis of the data requires knowledge of the data features and unique analytical skills since the data are not collected for research purposes. This course is designed to provide these skills. Through analyzing available administrative data, students will write manuscripts suitable for publications at peer-reviewed journals.

Prerequisite(s): Minimum grade of "B+" in Community Health Sciences 610 and 640 or Medical Science 643.01 and 647.01 and consent of the program.

Antirequisite(s): Credit for Community Health Sciences 664 and Medical Science 659.07 will not be allowed.

Note: Consent of the program must be obtained by September 30.

Community Health Sciences 665 3 units; H(3-0)

Leadership in Health Care Organizations
A foundation for developing management and leadership skills in health care organizations. The curriculum includes: fundamentals of leadership; formal and informal components of organizations; strategic, operational, financial and project planning; managing change and conflict; human resources; and evaluating organizational performance. A variety of learning opportunities are incorporated including: reading materials, student seminars, self-assessment tools, case studies, team assignments, guest speakers and class discussion.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 665 and Medical Science 645.10 will not be allowed.

Community Health Sciences 666 3 units; H(3-0)

Health Policy
An advanced level course focused on developing and deepening participants' understanding of critical policy issues affecting health and health services. The course will primarily review health policy in the context of Canadian populations and systems. However, a more global comparative frame of reference will be used to test, challenge and contrast both the historical and current underpinnings of health policy in Canadian jurisdictions.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 666 and Medical Science 645.15 will not be allowed.

Community Health Sciences 667 3 units; H(3-0)

Introduction to the Legal and Ethical Framework of Health Care in Canada
An introduction to two integrated aspects of health care in Canada: the legal dimensions and the ethical dimensions. No formal background or training in law or ethics is presupposed. Successful students will gain grounding in the ethico-legal complexity of health care and health research in Canada.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 667 and Medical Science 645.17 will not be allowed.

Community Health Sciences 680
3 units; H(3S-0)

Foundations of Population/Public Health
Students will learn, discuss, and interrogate foundational content in population health and public health. Foundational content includes history, structure, functions, concepts, theories, and debates. The course is structured with the first half focusing on public health and the second half focusing on population health.

Prerequisite(s): Admission to the Community Health Sciences graduate program or Public Health and Preventive Medicine program, or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 680 and Medical Science 651.04 will not be allowed.

Community Health Sciences 681
3 units; H(3-2T)

Health Research Methods
Introduction to health research, including research design, measurement, data collection, proposal and grant writing.

Prerequisite(s): Community Health Sciences 610 or Medical Science 643.01 and admission to in the Community Health Sciences graduate program or consent of the program. Not available to Open Studies students.

Antirequisite(s): Credit for Community Health Sciences 681 and Medical Science 659.02 will not be allowed.

Community Health Sciences 683 3 units; H(3-0)

Qualitative Health Research
A focus on interpreting published examples of qualitative health research as well as qualitative data relevant to health. The importance of both methods and theories for sound interpretation will be emphasized. Examples relevant to people's experiences of health services as well as influences on population health outcomes other than health services and technologies will be considered.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 683 and Medical Science 659.05 will not be allowed.

Community Health Sciences 687 3 units; H(3-0)

Environmental Health
Examination of the interaction between natural and man-made environments in human health/illness.

Prerequisite(s): Admission to the Community Health Sciences graduate program or the Public Health and Preventative Medicine program, or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 687 and Medical Science 651.06 will not be allowed.

Community Health Sciences 689 3 units; H(3-0)

Global Health and Development
An examination of health, the determinants of health, and approaches to health policy and programming in the context of less developed country populations. Provides an overview of the history and evolution of primary health care and the role of health in development and examines current trends and issues related to global development. Cross-cutting themes include: international perspectives and trends in health sector reform, globalization, policy programming and financing, public participation in decision making, governance, health human resources, gender, human rights, partnerships and information-education-communication among others.

Prerequisite(s): Admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit in Community Health Sciences 689 and Medical Science 651.08 will not be allowed.

Community Health Sciences 700 3 units; H(1-6)

Community Health Directed Study
Independent study in special topics at an advanced level in Community Health Sciences.

Prerequisite(s): Consent of the program.

MAY BE REPEATED FOR CREDIT

Community Health Sciences 710 3 units; H(3-0)

Advanced Topics in Biostatistics
Advanced topics and methods used in Biostatistics.

Prerequisite(s): Consent of the program.

Antirequisite(s): Credit for Community Health Sciences 710 and Medical Science 712.01 will not be allowed.

Community Health Sciences 720 3 units; H(2-3)

Pro Doctoral Seminar
Pertinent topics discussed to prepare students for thesis preparation.

Community Health Sciences 730 6 units; F(3S-0)

Doctoral Medical Education Research Seminar
An exploration of medical education research as an emerging field with multiple overlapping discourses, methods, philosophies, and ideologies.

Prerequisite(s): Admission to the Medical Education Specialization in the PhD program in Community Health Sciences.

Community Health Sciences 740 3 units; H(3-2T)
(Veterinary Medicine 740)

Advanced Epidemiology
An expansion on the understanding of causality and threats to validity in epidemiologic research. The focus will be on the assessment and control of bias, including selection, information and confounding. The concept of effect modification (interaction) will be appraised. Stratified analysis will be considered as a tool for the assessment and control of confounding and effect modification and will be applied to a variety of study designs including case-control, and cohort studies.

Prerequisite(s): Community Health Sciences 640 or Medical Science 647.01 and admission to the Community Health Sciences graduate program or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 740 and Medical Science 709 will not be allowed.

Community Health Sciences 741 3 units; H(3-0)

Systematic Reviews and Meta-Analysis
An exposure to all steps involved in the conduct of a systematic review and meta-analysis.

Prerequisite(s): Community Health Sciences 610 or Medical Science 643.01 and Community Health Sciences 640 or Medical Science 647.01 and admission to the Community Health Sciences graduate program, or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 741 and Medical Science 711 is not allowed.

Community Health Sciences 742 3 units; H(3-0)

Advanced Topics in Epidemiology
Advanced topics and methods used in Epidemiology.

Prerequisite(s): Community Health Sciences 640 or Medical Science 647.01 and consent of the program.

Antirequisite(s): Credit for Community Health Sciences 742 and Medical Science 712.02 will not be allowed.

Community Health Sciences 760 3 units; H(3-0)

Advanced Topics in Health Services Research
Advanced topics and methods used in health services research.

Prerequisite(s): Community Health Sciences 660 or Medical Science 645.18 and consent of the program.

Antirequisite(s): Credit for Community Health Sciences 760 and Medical Science 712.03 will not be allowed.

Community Health Sciences 761 3 units; H(3-0)

Advanced Methods in Health Research
Advanced health research designs and measurement techniques.

Prerequisite(s): Community Health Sciences 681 or Medical Science 659.02 and admission to the Community Health Sciences graduate program, or consent of the program.

Antirequisite(s): Credit for Community Health Sciences 761 and Medical Science 705 will not be allowed.

Community Health Sciences 780 3 units; H(3-0)

Advanced Topics in Population/Public Health
Advanced topics and methods used in population/public health.

Prerequisite(s): Community Health Sciences 680 or Medical Science 651.04 and consent of the program.

Antirequisite(s): Credit for Community Health Sciences 780 and Medical Science 712.04 will not be allowed.

Community Rehabilitation CORE

Instruction offered by members of the Community Rehabilitation and Disability Studies interdisciplinary team.

Graduate Courses

Community Rehabilitation 624 6 units; F(3-1S-3)

Specialization Theory and Practice: A Collaborative Inquiry Capstone
Students refine a topic of inquiry, prepare background working papers, invite reactions from stakeholders/experts and report on their experience to stakeholder audience, fellow students and faculty. This is not a research course but an opportunity for students to own their knowledge and find ways to share their experience and education with others in a collaborative manner.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Community Rehabilitation 630 3 units; H(3-1S)

Foundations and Futures of Disability and Community Studies
History, current issues, and futures of intervention, activism, and academic study related to disability. This will include the systems and changing roles of those traditionally served, professionals, the teams they generate and society.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 630 and 603.15 will not be allowed.

Community Rehabilitation 631 3 units; H(3-1S)

Politics of Inclusion and Exclusion of Disability and Community Studies
Current topics relevant to inclusion and exclusion will be reviewed. An examination of research in disability provides an opportunity for the student to learn, understand, and compare legislation, policy, and ethical frameworks that inform action. Frame-

works of choice, respect, consultation, collaboration, and co-operation will be examined.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 631 and 603.12 will not be allowed.

Community Rehabilitation 632 3 units; H(3-0)

Leadership and Innovation
The changing personal, organizational, and societal, leadership role and its importance for innovation in the field of disability and community studies.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 632 and 603.13 will not be allowed.

Community Rehabilitation 633 3 units; H(3-1S)

Social Construction: Health Capacity and Disability
A constructivist exploration of language, political structures, and sense of self to deepen the understanding of health capacity and disability.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 633 and 603.18 will not be allowed.

Community Rehabilitation 634 3 units; H(3-1S)

Appraisal of Social and Health Quantitative Research Methods
Provides students with experience in critically appraising a range of quantitative research methods and familiarize them with a variety of bio-statistical approaches. A variety of frameworks will be used to critically appraise literature from students' chosen field of study and examine and discuss the implications for evidence-based practice.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 634 and 603.16 will not be allowed.

Note: Pre-session requirements include reading of pre-session materials and participation in orientation session prior to online course delivery.

Community Rehabilitation 641 3 units; H(3-0)

Special Topics in International Disability Research and Policy
Selected topics in disability research and policy provide an opportunity for the student to learn, understand, and compare the policies in two or more countries.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Community Rehabilitation 650 3 units; H(3-0)

Adapting Curriculum and Instruction from K-12
A variety of practical strategies for developing meaningful curriculum and instructional methods for students with severe disabilities. The strategies are premised on using the content of typical community collaborative team approaches to planning and implementing programs for students. Involving parents as part of the Learning Team will be emphasized.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 650 and 691.04 will not be allowed.

Community Rehabilitation 651 3 units; H(3-0)

Challenging Behaviours in the Classroom: Inclusive Education
Examines and builds upon the participant's belief systems about challenging behaviour. Participants will be offered opportunities to learn about successful strategies for supporting difficult students within a classroom setting.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 651 and 691.32 will not be allowed.

Community Rehabilitation 652 3 units; H(3-0)

Collaboration, Ethics, Management: Inclusive Education
Each year a topic is negotiated with the education sector in partnership with provincial advocacy organizations.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 652 and 691.33 will not be allowed.

Community Rehabilitation 653 3 units; H(3-1S)

Advanced Seminar: Assessment and Intervention for Families with Children with Special Needs
Exploration of cognitive, social/emotional, motor, language/communication development and assessment of children with disabilities in the context of their families and communities.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 653 and 603.02 will not be allowed.

Community Rehabilitation 654 3 units; H(3-0)

Health Research, Emerging Technologies and Marginalized Groups
Provides an in-depth view of the impact of new emerging technologies and the governance of science and technology and health research on social policy, disability studies, disability research and the lives of disabled people and other marginalized groups.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 654 and 691.42 will not be allowed.

Note: This is an online course.

Community Rehabilitation 655 3 units; H(3-0)

Bioethics and People with Disabilities
Provides an in-depth view of the impact of bioethics on social policy, disability studies, disability research and the lives of disabled people.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 655 and 691.44 will not be allowed.

Note: This is an online course.

Community Rehabilitation 656 3 units; H(3-0)

Career Development and Disabilities
Exploration of career development issues such as occupational change, and integration back into the workforce because of disability experienced in adult life.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Antirequisite(s): Credit for Community Rehabilitation 656 and 603.03 will not be allowed.

Community Rehabilitation 676 6 units; F(3-1S-3)

Consultation in Human Services and Systems
Qualitative and quantitative evaluation research informs the design and implementation of a collaborative evaluation of a rehabilitation program, policy or system.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other students.

Community Rehabilitation 730 3 units; H(3S-0)

Doctoral Pro-Seminar in Disability, Community and Rehabilitation
This advanced professional seminar focuses on a critical examination of theoretical, methodological, and professional issues relevant to research in the domains of community rehabilitation and disability studies. The course is intended for PhD students preparing their dissertation research proposals as a final preparation for their Candidacy Exam.

Prerequisite(s): Must be registered in the Community Health Sciences graduate program. Consent of the instructor is required for all other graduate students.

NOT INCLUDED IN GPA

Computational Media Design CMDA

Instruction offered by the members of the Faculties of Arts, Environmental Design and Science.

Computational Media Design 601 3 units; (3-0)

Special Topics in Computational Media Design
A study of topics in computational media design.

MAY BE REPEATED FOR CREDIT

Computational Media Design 603 3 units; H(0-9)

Research Project in Computational Media Design
An independent research project in computational media design under the guidance of a faculty member.

MAY BE REPEATED FOR CREDIT

Computer Science CPSC

Instruction offered by members of the Department of Computer Science in the Faculty of Science.

Notes:

- Computer Science students should also see courses listed under Software Engineering.
- In several cases, credit is not allowed for Computer Science courses and various courses offered by the Faculty of Engineering. Students who have successfully completed Engineering courses should contact the Department of Computer Science for additional information.

Graduate Courses

Note: Registration in all courses requires the approval of the Department of Computer Science. Computer Science students should also see courses listed under Software Engineering.

Computer Science 601 **3 units; H(3-0)**

Special Topics in Computer Science
A study of problems of particular interest to graduate students in Computer Science.

MAY BE REPEATED FOR CREDIT

Computer Science 605 **3 units; H(3-0)**
(Medical Science 605)

Information Storage and Processing in Biological Systems
Examination of complex biological systems; concepts and fundamentals of biological solutions to information storage and processing; modelling and computer simulation of biological systems; information storage in biological molecules; genetic networks; hierarchical organization of biological information processing in signal transduction, development, evolution, and ecology; biological control systems.

Computer Science 607 **3 units; H(3-0)**

Biological Computation
Examination and modelling of biological networks; focus on the latest developments in biological computing and their theoretical backgrounds, such as: DNA computing; genomic algorithms; artificial chemistries; complex adaptive systems, chaos and fractals; immune system computing; gene regulatory networks; swarm intelligence systems.

Computer Science 609 **3 units; H(3-0)**

Foundations of Multi-Agent Systems
Modelling of agents and properties of multi-agent systems. Communication issues, including interaction and co-ordination concepts, forming and maintaining organizations, and competitive agent environments. Example systems; the implementation of a multi-agent system will be performed as the assignment.

Antirequisite(s): Credit for Computer Science 609 and either Computer Science 567 or Software Engineering 697 will not be allowed for programs offered by the Department of Computer Science.

Computer Science 610 **3 units; H(3-0)**

Compiler Code Generation and Optimization
Compiler code generation and optimization techniques, including register allocation, instruction selection, dataflow analysis, and code optimization techniques using intermediate representations. Implementation of special language features and tools for automated code generation.

Computer Science 611 **3 units; H(3-0)**

Complexity Theory
Deterministic and non-deterministic time and space complexity; complexity classes and hierarchies; NP-complete problems and intractable problems; axiomatic complexity theory.

Antirequisite(s): Credit for Computer Science 611 and Computer Science 511 will not be allowed.

Computer Science 615 **3 units; H(3-0)**

Computational Techniques for Graphics and Visualization
Various case studies from the fields of graphics and visualization. Topics in numerical linear algebra, numerical optimization, and discrete differential geometry.

Antirequisite(s): Credit for Computer Science 615 and Computer Science 601.13 will not be allowed.

Computer Science 617 **3 units; H(3-0)**

Category Theory for Computer Science
Introduction to category theory with applications in computer science. Functors, natural transformations, adjoints and monads, initial and final algebras. Introduction to 2-categories and fibrations.

Computer Science 619 **3 units; H(3-0)**

Quantum Computation
Introduction to quantum computing. Quantum algorithms, quantum search, quantum fourier transforms, quantum error correcting codes, quantum cryptography, nonlocality and quantum communication complexity, and quantum computational complexity.

Antirequisite(s): Credit for Computer Science 619 and Computer Science 519 will not be allowed.

Computer Science 622 **3 units; H(3-0)**

Randomized Algorithms
Design and analysis of randomized algorithms; discrete probability theory; randomized data structures; lower bound techniques; randomized complexity classes; advanced algorithmic applications from various areas.

Antirequisite(s): Credit for Computer Science 622 and Computer Science 522 will not be allowed.

Computer Science 625 **3 units; H(3-0)**

Principles of Computer Security
Security policies and protection mechanisms for a computing system, including such topics as design principles of protection systems, authentication and authorization, reference monitors, security architecture of popular platforms, formal modelling of protection systems, discretionary access control, safety analysis, information flow control, integrity, role-based access control. Legal and ethical considerations will be introduced as necessary.

Antirequisite(s): Credit for Computer Science 625 and Computer Science 525 will not be allowed.

Computer Science 626 **3 units; H(3-0)**

Network Systems Security
Attacks on networked systems, tools and techniques for detection and protection against attacks including firewalls and intrusion detection and protection systems, authentication and identification in distributed systems, cryptographic protocols for IP networks, security protocols for emerging networks and technologies, privacy enhancing communication. Legal and ethical issues will be introduced as necessary.

Antirequisite(s): Credit for Computer Science 626 and Computer Science 526 will not be allowed.

Computer Science 627 **3 units; H(3-0)**

Computer Viruses and Malware
Study of computer viruses, worms, Trojan horses, and other forms of malicious software. Countermeasures to malicious software. Legal and ethical issues, and some general computer and network security issues.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Computer Science 627 and Computer Science 527 will not be allowed.

Computer Science 628 **3 units; H(3-0)**

Spam and Spyware
Spam and other unsolicited bulk electronic communication, and spyware. Legal and ethical issues. Countermeasures, and related security problems.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Computer Science 628 and Computer Science 528 will not be allowed.

Computer Science 629 **3 units; H(3-0)**
(Pure Mathematics 629)

Elliptic Curves and Cryptography
An introduction to elliptic curves over the rationals and finite fields. The focus is on both theoretical and computational aspects; subjects covered will include the study of endomorphism rings, Weil pairing, torsion points, group structure, and effective implementation of point addition. Applications to cryptography will be discussed, including elliptic curve-based Diffie-Helman key exchange, El Gamal encryption, and digital signatures, as well as the associated computational problems on which their security is based.

Computer Science 630 **3 units; H(3-2T)**

Information Theory and Security
Information theoretic concepts such as entropy and mutual information, and their applications to defining and evaluating information security systems including encryption, authentication, secret sharing and secure message transmission.

Antirequisite(s): Credit for Computer Science 630 and Computer Science 530 will not be allowed.

Computer Science 635 **3 units; H(3-0)**

Image Analysis and Computer Vision
Standard methods used in the analysis of digital images. Image acquisition and display: visual perception; digital representation. Sampling and enhancement. Feature extraction and classification methods. Object recognition.

Antirequisite(s): Credit for Computer Science 635 and Computer Science 535 will not be allowed.

Computer Science 641 **3 units; H(3-0)**

Performance Issues in High Speed Networks
An overview of current research in high speed networks. Topics covered will include the current Internet, the future Internet, wireless networks, optical networks, Asynchronous Transfer Mode (ATM), TCP/IP, network traffic measurement, Web server performance, and mobile computing. Emphasis will be placed on network performance issues for next-generation Internet protocols and applications.

Computer Science 643 **3 units; H(3-0)**

Modern Wireless Networks
An introduction to the fundamentals and applications of wireless networks.

Computer Science 653 **3 units; H(3-0)**

Computational Geometry
Geometric searching, hull proximity and intersection data structures and algorithms and their complexity.

Computer Science 657 **3 units; H(3-0)**

Modelling And Visualization of Plants
Modelling, simulation and visualization of plants for computer graphics and biological purposes. Modelling of plants as an example of interdisciplinary research including computer science, biology, mathematics and physics. L-systems as a formal basis for model construction. Modelling languages. Information flow in plants. Symmetry, self-similarity and allometry of plants. Descriptive models of plant architecture. Models integrating plant structure and function. Simulation of plant development. Case studies: competition for space, phyllotaxis, tropisms, and biomechanical considerations. Reaction-diffusion models of morphogensis. Genotype-to-phenotype mapping. Modelling of plant ecosystems. Rendering and visualization of the models. A survey of applications and research directions.

Computer Science 661 **3 units; H(3-0)**

Algorithms for Distributed Computation
Fundamental algorithmic problems in distributed computation; impact of communication, timing, failures and other characteristics on computability and complexity of solutions.

Antirequisite(s): Credit for Computer Science 661 and Computer Science 561 will not be allowed.

Computer Science 662 **3 units; H(3-0)**

Agent Communications
An examination of communication paradigms in multi-agent systems. A number of paradigms will be covered including simple protocols, BDI (Believe, Desire, Intension), and social commitments.

Antirequisite(s): Credit for Computer Science 662 and Computer Science 568 will not be allowed.

Computer Science 667 **3 units; H(3-0)**

Computer Algebra
Fundamental problems, classical and modern algorithms, and algorithm design and analysis techniques of use in computer algebra. Integer and polynomial arithmetic. Additional problems in computer algebra, possibly including problems in computational linear algebra, factorization, and concerning systems of polynomial equations will be considered as time permits.

Antirequisite(s): Credit for Computer Science 667 and Computer Science 518 will not be allowed.

Computer Science 669 **3 units; H(3-0)**
(Pure Mathematics 669)

Cryptography
An overview of the basic techniques in modern cryptography, with emphasis on fit-for-application primitives and protocols. Topics will include symmetric and public-key cryptosystems; digital signatures; elliptic curve cryptography; key management; attack models and well-defined notions of security.

Computer Science 671 **3 units; H(3-0)**

Database Management Systems
Foundations of database applications and database systems, plus some advanced topics in data management systems will be introduced.

Antirequisite(s): Credit for Computer Science 671 and Computer Science 571 will not be allowed.

Computer Science 672 **3 units; H(3-0)**
(formerly Computer Science 601.77)

Fundamentals of Social Network Analysis and Data Mining
Introduction to data mining with emphasis on frequent pattern mining, clustering and classification, data collection, network construction, basic graph theory concepts and network analysis metrics, and case studies.

Antirequisite(s): Credit for Computer Science 672 and either Computer Science 572 or 599.77 will not be allowed.

Computer Science 673 **3 units; H(3-0)**

Distributed Database Systems
Introduction to distributed database systems. Topics covered include: architecture, data design, query processing, transaction management, multidatabases, object-oriented databases and advanced system issues.

Computer Science 675 **3 units; H(3-0)**

Datawarehouse Systems
Design, development and deployment of datawarehouses. Schemas, models, data organization, OLAP, tuning, data mining and architectural models may be discussed.

Computer Science 681 **3 units; H(3-0)**

Research Methods in Human-Computer Interaction
Application of the theory and methodology of human-machine studies to real systems; theory and practice.

Computer Science 683 **3 units; H(3-0)**

Information Visualization: Theory and Practice
The theory and development of interactive visual representations of abstract data for the purpose of amplifying cognition. Topics covered can include representational issues, perceptual issues, visual literacy, spatial abstraction, and interaction issues.

Computer Science 687 **3 units; H(3-2T)**

Computer Animation
Principles of traditional animation, key framing, parametric and track animation, free form deformation, inverse kinematics, dynamics, spring mass systems, particle systems, numerical integration, Lagrangian constraints, space time constraints, collisions, human animation, behavioural animation, metamorphosis, implicit animation techniques, animating liquids, gases and cloth, motion capture.

Antirequisite(s): Credit for Computer Science 687 and Computer Science 587 will not be allowed.

Computer Science 689 **3 units; H(3-0)**

Modelling for Computer Graphics
Parametric Modelling. B-splines and NURBS. Subdivision schemes. Surface subdivision. Multiresolution. Wavelets. Implicit modelling. Blends. Polygonization. Blobtree. Precise contact modelling. Solid modelling. CSG. Procedural modelling. Special topics, e.g. Differential geometry. Graph-based modelling. Topology.

Antirequisite(s): Credit for Computer Science 689 and Computer Science 589 will not be allowed.

Computer Science 691 **3 units; H(3-0)**

Rendering
Physical foundations of illuminations techniques. Color. Radiometry and photometry. Reflection models. The rendering equation. Ray tracing. Monte Carlo techniques. Sampling and antialiasing. Texturing. Radiosity. Photon tracing. Volume rendering. Image-based rendering. Real-time shading.

Antirequisite(s): Credit for Computer Science 691 and Computer Science 591 will not be allowed.

Computer Science 695 **3 units; H(3-0)**

Data Management in Geographical Information Systems
Examination of advanced geometric algorithms for representation, analysis and visualization of Geographical Information Systems. Data structures such as progressive mesh, ROAM, multidimensional Delauney triangulization, quadtree and space partitioning. Algorithmic techniques such as incremental, divide and conquer, sweep-plane, and dimension reduction. Algorithms for surface simplification, culling, quality measurement and reduction.

Computer Science 696 **3 units; H(3-0)**

Information Security Seminar
Topics in information security, such as security management, emerging threats, research frontiers using case studies and best practices.

Antirequisite(s): Credit for Computer Science 696 and 699 will not be allowed.

Computer Science 697 **3 units; H(3-0)**

Biometric Security
Principles of biometric system design, technology and performance evaluation. Verification, identification and synthesis in biometrics. Traditional and emerging techniques for fingerprint matching, face recognition, iris modelling, signature authentication, and biometric pattern recognition. Multimodal biometrics and biometric security.

Computer Science 698 **6 units; F(3-0)**

Information Security Project
An information security project conducted under the guidance of a faculty member. A report must be written and presented on completion of the course.

Computer Science 699 **3 units; H(3-0)**

Research Methodology in Computer Science
An introduction to and survey of research areas and methods in Computer Science. Professional skills in computer science research such as reviewing, critical evaluation, and the preparation of research proposals.

Antirequisite(s): Credit for Computer Science 699 and 696 will not be allowed.

NOT INCLUDED IN GPA

Computer Science 701 **3 units; H(3-0)**

Research Topics in Computer Science
In-depth course on a focused current research topic in Computer Science. Involves a significant research component and requires substantial background knowledge.

MAY BE REPEATED FOR CREDIT

Computer Science 767 **3 units; H(3-0)**

Advanced Topics in Multiagent Systems
An in-depth study of a selected subfield of multiagent systems including state-of-the-art research. This is a project-driven course.

Prerequisite(s): Computer Science 567 or 609.

Computer Science 771 **3 units; H(3-0)**

Current Trends in Database Technology
Advanced topics chosen from Bioinformatics, Data mining, Mobile Databases, Spatial Databases and

Web Databases. There is a large project component.

Computer Science 781 **3 units; H(3-0)**

Advanced Topics in Human-Computer Interaction
The topics covered will change year by year depending on current advances in human computer interaction.

Prerequisite(s): Computer Science 481.

Computer Science 785 **3 units; H(3-0)**

Implicit Modelling
A detailed look at modelling using implicit and iso-surface techniques taking an in-depth review of the literature. Algebraic methods will be followed by skeletal models, field function design, modelling techniques, rendering and texture mapping. Polygonisation algorithms, ray tracing implicits, techniques for animation, meta-morphosis, precise contact modelling, deformation and warping. Algorithms and data structures and implementation details will be presented. Students will be expected to make a new contribution in their project and term paper.

Computer Science 789 **3 units; H(3-0)**

Advanced Geometric Modelling
Current research topics including spline modelling, Subdivision Surfaces, multiresolution, wavelets, analysis of the subdivision surfaces and reverse subdivision.

Dance DNCE

Instruction offered by members of Dance in the School of Creative and Performing Arts in the Faculty of Arts. An audition and consent of Dance is necessary before students register in certain courses.

Graduate Course

Dance 681 **3 units; H(2S-2)**

Special Topics in Dance
Prerequisite(s): Consent of the Division Chair, Dance.

MAY BE REPEATED FOR CREDIT

Data Science DATA

Instruction offered by the members of the Faculty of Science, Haskayne School of Business and Cumming School of Medicine.

Data Science 601 **3 units; H(3-0)**

Working with Data and Visualization
An introduction to fundamental data science concepts including basic data organization, data collection, and data cleaning. Includes a review of basic programming concepts in Python, as well as an introduction to the fundamentals of data visualization and critical thinking with data. Also provides an introduction to data ethics, security, and privacy.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Fundamental Data Science and Analytics, or the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 602 **3 units; H(3-0)**

Statistical Data Analysis
An introduction to the foundations of statistical inference including the application of probability models to data, as well as an introduction to simulation-based and classical statistical inference, and the creation of statistical models with R.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Fundamental Data Science and Analytics, or the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 603 **3 units; H(3-0)**

Statistical Modelling with Data
An introduction to the creation of complex statistical models, including exposure to multivariate model selection, prediction, the statistical design of experiments and analysis of data in R.

Prerequisite(s): Data Science 602 and admission to the Post-baccalaureate Certificate in Fundamental Data Science and Analytics or the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 604 **3 units; H(3-0)**

Big Data Management
An introduction to data storage and manipulation at both desktop and cloud scales. Introduces core database concepts and provides a practical introduction to both SQL and NoSQL systems. Also introduces parallel and distributed computing concepts including distributed storage and large scale parallel data processing using MapReduce. Design and implementation of new data visualizations to aid analysis, with emphasis on the practical and ethical implications of design and analysis decisions.

Prerequisite(s): Data Science 601 and admission to the Post-baccalaureate Certificate in Fundamental Data Science and Analytics or the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 605 **3 units; H(3-0)**

Actionable Visualization and Analytics
Introduces deeper tools, skills, and techniques for collecting, manipulating, visualizing, analyzing, and presenting a number of different common types of data. With a data life-cycle perspective, looks into data elicitation and preparation as well as the actual usage of data in a decision-making context. Introduces techniques for visualizing and supporting the interactive analysis and decision making on large complex datasets. Focus on critical thinking and good analysis practices to avoid cognitive biases when designing, thinking, analyzing, and making decisions based on data.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 606 **3 units; H(3-0)**

Statistical Methods in Data Science
Design of surveys and data collection, bias and efficiency of surveys. Sampling weights and variance estimation. Multi-way contingency tables and introduction to generalized linear models with emphasis on applications.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 607 **3 units; H(3-0)**

Statistical and Machine Learning
Advancement of the linear statistical model including introduction to data transformation methods, classification, model assessment and selection. Exposure to both supervised learning and unsupervised learning.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 608 **3 units; H(3-0)**

Developing Big Data Applications
Provides advanced coverage of tools and techniques for big data management and for processing, mining, and building applications that leverage large datasets. Addresses database and distributed storage design for both SQL and NoSQL systems, and focuses on the application of distributed computing tools to perform data integration, apply machine learning, and build applications that leverage big data. Students will also examine the security and ethical implications of large-scale data collection and analysis.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 611 **3 units; H(3-0)**

Predictive Analytics
Overview of the basic concepts and techniques in predictive analytics as well as their applications for solving real-life business problems in marketing, finance, and other areas. Techniques covered in this course include: decision trees, classification rules, association rules, clustering, support vector machines, instance-based learning. Examples and cases are discussed to gain hands-on experience.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 612 **3 units; H(3-0)**

Decision Analytics
Introduces fundamental concepts and modelling approaches to solve problems that are faced by decision makers in today's fast-paced and data-rich business environment. Different decision alternatives are analyzed and evaluated with the use of computer models. Topics include the most commonly used applied optimization, simulation and decision analysis techniques. Extensive use will be made of appropriate computer software for problem solving, principally with spreadsheets.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 613 **3 units; H(3-0)**

Introductory Data Analytics
Introduction to new tools for data analytics that can be used to discover, collect, organize, and clean the data to make it ready for analysis. Emphasis is placed on software tools used to interact with data sources and provision of user skills to create business applications that encompass a variety of business data sources; such as customers, suppliers, markets, competitors, and regulators. Software packages used to clean and organize the data for analysis will be introduced, as well as software to enable users' understanding of the data that is collected.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 614 **3 units; H(3-0)**

Advanced Data Analytics
Examination of tools and methods used in data analysis, including basic and advanced analytic tools, as well as machine learning techniques. One or more data analysis packages/programs are used to analyze different types of business data. Statistical and other analytic methods, such as data mining, machine learning and various techniques, and their application to business data analytics are explored.

Prerequisite(s): Data Science 613 and admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 621 **3 units; H(3-0)**

Advanced Statistical Modelling
An introduction to the fundamental statistical methods used in health data science including interpretation and communicating the results of these methods. Explores modelling using an epidemiological paradigm such as the assessment for modification and confounding. Introduces fundamental health research methods including study design and the evidence hierarchy.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 622 **3 units; H(3-0)**

Machine Learning for Precision Health
An introduction to the application of machine learning methods to problems in health data. The concepts of precision medicine and precision public health are introduced and the role of data science in these endeavors is explored, using real examples from health data.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 623 **3 units; H(3-0)**

Big Data in Health
Explores the synthesis and summary of large volumes of information into interpretable and compelling results. Software packages useful for visualization of data are examined, including software for geographic information systems, augmented reality, and infographics. Data Science software commonly used in health industry is examined. Fundamental design principles are introduced to guide the approach to data presentation, communication, and interpretation.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Data Science 624 **3 units; H(3-0)**

Advanced Exploration and Visualization in Health
Explores the synthesis and summary of large volumes of information into interpretable and compelling results. Software packages useful for visualization of data are examined, including software for geographic information systems, augmented reality, and infographics. Data Science software commonly used in health industry is examined. Fundamental design principles are introduced to guide the approach to data presentation, communication, and interpretation.

Prerequisite(s): Admission to the Post-baccalaureate Diploma in Data Science and Analytics.

Drama DRAM

Instruction offered by members of Drama in the School of Creative and Performing Arts in the Faculty of Arts.

Graduate Courses

Drama 605 **3 units; H(4S-0)**

Methods in Theatre Research
Methods in research in the four areas of specialization in the MFA Theatre program.

Note: Required of all students enrolled in the MFA Theatre program.

Drama 607 **3 units; H(2S-2)**

Director, Designer, and Mise-en-scene
Advanced collaborative methods and techniques for directors, designers and dramaturges, leading to the creation of a mise-en-scene for selected plays of varying styles and genres.

Drama 610 **6 units; F(2S-3)**

Selected Problems in Directing

Drama 623 **3 units; H(2S-2)**

Seminar in Scene Design
MAY BE REPEATED FOR CREDIT

Drama 625 **3 units; H(2S-2)**

Seminar in Costume Design
MAY BE REPEATED FOR CREDIT

Drama 627 **3 units; H(2S-2)**

Seminar in Lighting Design
MAY BE REPEATED FOR CREDIT

Drama 629 **3 units; H(2S-2)**

Seminar in Technical Direction
MAY BE REPEATED FOR CREDIT

Drama 647 **3 units; H(3S-0)**

Studies in Modern Drama I
Studies in the literature, history, theory and criticism of drama, theatre and performance from the late nineteenth century to the mid-twentieth century.

Drama 649 **3 units; H(3S-0)**

Studies in Modern Drama II
Studies in the literature, history, theory and criticism of drama, theatre and performance from the mid twentieth century to the present.

Drama 651 **3 units; H(2S-0)**

Directed Studies
MAY BE REPEATED FOR CREDIT

Drama 660 **6 units; F(2S-3)**

Seminar and Practicum in Performance Creation

Drama 671 **3 units; H(3S-0)**

Selected Problems in Playwriting I

Drama 673 **3 units; H(3S-0)**

Selected Problems in Playwriting II

Ecology ECOL

Instruction offered by members of the Department of Biological Sciences in the Faculty of Science.

Graduate Courses

Enrolment in any graduate course requires consent of the Department.

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599. 600-level courses are available with permission to undergraduate students in the final year of their programs.

Ecology 603 **3 units; H(3-0)**

Advanced Behavioural Ecology
Current problems and recent research in areas of particular significance. Topics will vary from year to year.

Note:

Offered during even-odd dated academic years.

MAY BE REPEATED FOR CREDIT

Economics ECON

Instruction offered by members of the Department of Economics in the Faculty of Arts.

Graduate Courses

Economics 605 **3 units; H(3-0)**

Computational Optimization and Economic Applications
Explores the theory and numerical implementation of mathematical programming, covering basic classes of optimization problems — linear programming, non-linear programming and complementarity problems — as ways to operationalize models of individual choice and decentralized equilibrium behaviour from economics. Applications will vary.

Economics 609 **3 units; H(3-0)**

Political Economy
Provides a selective overview of modern political economy. Gives an introduction to the basic theoretical models, empirical methodologies, and substantive findings in political economy. Covers theoretical and empirical research and the links between the two. Also treats a number of selected topics on the research frontier.

Economics 611 **3 units; H(3-0)**

Special Topics in Economics
Topics will vary from year to year. Consult the timetable or the Department for the topics available in a given year.

MAY BE REPEATED FOR CREDIT

Economics 615 **3 units; H(3-0)**

Econometrics
Provides a foundation of econometric theory relevant for empirical work in economics. Covers classical estimation and inference procedures, including linear regression, linear instrumental variables, differences-in-differences, and linear panel data techniques. Also covers the problem of causality and identification in empirical economics.

Prerequisite(s): Admission to the Master of Arts Economics program or permission of the Department.

Economics 619 **3 units; H(3-0)**

Empirical International Trade
Examines issues from the economic literature on international trade. Focuses on quantitative and empirical analysis. Specific topics include the factor content of trade, firm level and multinational behaviour, empirical testing of political economy determinants of protection, and assessing the environmental impact of trade agreements.

Economics 621 **3 units; H(3-0)**

International Trade
Focuses on the microeconomic aspects of international economics with emphasis on general equilibrium models commonly employed in international economics. Specific topics covered include theories of international specialization and exchange, trade policy and economic welfare, international factor movement, trade and growth, under both perfect competition and imperfect competition, and selected problems of trade policy in the international trading system.

Economics 627 **3 units; H(3-0)**

Energy Economics
Applies the tools of microeconomics, institutional economics, and econometrics to energy markets and policies. Focuses on empirical studies of the

energy business including markets for natural gas, crude oil, gasoline, electricity and coal.

Economics 633 **3 units; H(3-0)**

Labour Economics
Emphasizes empirical implementation of theoretical models through the use of data and econometrics. Topics include labor supply theory, search theory, wage determination theories, and numerical methods for the estimation of dynamic models.

Economics 635 **3 units; H(3-0)**

Regulatory Economics
An in-depth study of regulatory economics, defined as price and entry regulation. Price and entry regulation occurs when the state restricts who can provide services and approves the terms of service. A considerable part of the course will address regulatory restructuring in network industries, with case studies on electricity reform, local telecommunications, and pipelines.

Economics 641 **3 units; H(3-0)**

Financial Economics
A review of the main themes of financial economics and an introduction of a number of frontier ideas that have marked the recent evolution of the discipline. The main focus is on asset pricing and the application of financial econometrics to modelling and prediction of financial data.

Economics 649 **3 units; H(3-0)**

Empirical Public Economics
Focuses on empirical research on the economics of the public sector, including material on taxation, public expenditures and social insurance. Gives a broad overview of this growing field and prepares for research in public economics.

Economics 651 **3 units; H(3-0)**

Redistribution and Social Insurance
A focus on the economics of public expenditure programs designed to redistribute income or to provide social insurance against risks faced by households.

Economics 653 **3 units; H(3-0)**

Public Revenue Analysis
A focus on the revenue side of public finance, primarily in the form of taxation. The equity and efficiency aspects of different taxes are considered, as is optimal tax design. Possible topics include the taxation of labour and capital, the impact taxation on savings and risk taking, and environmental and resource taxation.

Economics 655 **3 units; H(3-0)**

Cost/Benefit Analysis
Theoretical and applied aspects of the use of cost-benefit techniques and applied welfare analysis in the evaluation of investment projects and public policies.

Economics 657 **3 units; H(3-0)**

Microeconomic Theory
Introduction to advanced microeconomic theory. Topics include consumer theory, theory of the firm, general equilibrium, uncertainty, game theory, and informational economics.

Prerequisite(s): Admission to the Master of Arts Economics program.

Note: Students in other departments can take this course with permission of the Department of Economics.

Economics 659 **3 units; H(3-0)**

Macroeconomic Theory
Introduction to the analysis of macroeconomics at an advanced level. Provides an overview of theories addressing the major questions of macroeconomic phenomena. Some coverage of applied topics, such as economic growth and government policy.

Prerequisite(s): Admission to the Master of Arts Economics program.

Note: Students in other departments can take this course with permission of the Department of Economics.

Economics 661 **3 units; H(3-0)**

Behavioural Economics
Survey of research incorporating psychological evidence into economics. Topics include fairness, altruism, prospect theory, self-control, biases in probabilistic judgment, mental accounting, and the relationship between markets, incentives, and attention and various cognitive processes.

Economics 667 **3 units; H(3-0)**

Industrial Organization
A focus on market power: its acquisition, maintenance, and exercise. Both theory and application, with an emphasis on how industrial organization does, and should, inform competition policy and antitrust law, will be examined.

Economics 669 **3 units; H(3-0)**

Empirical Industrial Organization
Firm behaviour in oligopolistic markets, as well as consumer and firm behaviour in environments with asymmetric information. Strong emphasis on combining economic models with econometric techniques to answer economic questions. Models of demand and supply, discrete static and dynamic games, production function estimation, single agent dynamic models and matching models.

Antirequisite(s): Credit for Economics 669 and 611.71 will not be allowed.

Economics 675 **3 units; H(3-0)**

Natural Resource Economics
Examines economic models of the structure and nature of natural resource industries and their interaction with the rest of the economy. Includes non-renewable and renewable resources and applies methods from capital theory, growth theory, public economics, and industrial organization to the study of natural resources.

Economics 677 **3 units; H(3-0)**

Environmental Economics
Environmental economics describes the ways in which people interact with their natural environment and the policies that best achieve society's goals in this context. Topics vary from year to year and may include benefit-cost analysis, non-market valuation, choice of policy instruments, environmental taxation, trade growth and the environment, global warming and international environmental treaties.

Economics 679 **3 units; H(3-0)**
(Community Health Sciences 661)

Health Economics
An overview of topics in health economics. An introduction to economic principles and techniques used in analyzing and planning health policy, in particular the delivery of health services, and for understanding the health behaviour of individuals.

Economics 691 **1.5 units; Q(3-0)**

Research Methods I
Survey of research methods in economics. For course-based MA students.

Economics 693 **1.5 units; Q(3-0)**

Research Methods II
Survey of research methods in economics. For course-based MA students.

Economics 695 **3 units; H(3-0)**

Research Methods III
Master's research project. Identify an interesting and feasible research question, carry out an extensive literature review of the problem area, develop an economic/econometric model to address the problem, identify and collect appropriate data for empirical research.

Prerequisite(s): Admission into the Master of Arts Economics (course-based) program.

Antirequisite(s): Credit for Economics 695 and 611.55 will not be allowed.

Economics 697 **3 units; H(3-0)**

Research Methods IV
Master's research project. Continuing from Research Methods III, the economic/econometric model is fully developed with specific attention to identification issues and testable hypotheses. Appropriate econometric analyses, validation and testing are carried out, leading to a research paper reporting the problem, the model and the results.

Prerequisite(s): Admission into the Master of Arts Economics (course-based) program.

Antirequisite(s): Credit for Economics 697 and 611.57 will not be allowed.

Economics 705 **3 units; H(3-0)**

Advanced Econometrics I
Devoted to rigorous treatment of asymptotic theory as it applies to econometric practice. Provides a detailed treatment of the theory and practice of classical estimation procedures, including linear regression and instrumental variables, Maximum Likelihood, the General Method of Moments, as well as an extension to simulation based methods. The theory of hypothesis testing is also covered.

Prerequisite(s): Economics 615 and admission to the PhD program in Economics.

Economics 707 **3 units; H(3-0)**

Advanced Microeconomic Theory I
Introduction to advanced microeconomic theory. Topics include consumer theory, theory of the firm, and general equilibrium.

Economics 709 **3 units; H(3-0)**

Advanced Macroeconomic Theory I
Introduction to the basic structure of the dynamic general equilibrium framework that forms the backbone of most modern macroeconomics research. Selected topics include growth, business cycles, and monetary and labor economics.

Economics 711 **3 units; H(3-0)**

Independent Study
MAY BE REPEATED FOR CREDIT

Economics 715 **3 units; H(3-0)**

Advanced Econometrics II
Focuses on the problem of causality and identification of treatment effects in empirical work in Economics. Topics include but are not limited to randomized trials, causality, instrumental variables,

difference in differences, regression discontinuity designs. Students are introduced to empirical applications of these different approaches.

Prerequisite(s): Economics 705.

Economics 717 3 units; H(3-0)

Advanced Topics in Econometrics
Studies cutting edge econometric tools used to evaluate the impacts of policies, extrapolate their effects to new environments, and predict the effects of policies that have never been tried. Methods from both the structural and treatment effect paradigms of policy evaluation will be considered

Prerequisite(s): Economics 705.

Economics 723 3 units; H(3S-0)

Trade, Growth and the Environment I
Covers relevant theoretical work on the environmental consequences of trade liberalization and economic growth, and the relationship between resource use and globalization, focusing on newly published research. Participants are expected to present and discuss research. The specific choice of topics will be made based on research interests of the class.

Antirequisite(s): Credit for Economics 723 and 611.10 will not be allowed.

Economics 725 3 units; H(3S-0)

Trade, Growth and the Environment II
Covers relevant empirical work on the environmental consequences of trade liberalization and economic growth, and the relationship between resource use and globalization, focusing on newly published research. Participants are expected to present and discuss research. The specific choice of topics will be made based on research interests of the class.

Economics 757 3 units; H(3-0)

Advanced Microeconomic Theory II
Building on Economics 707, a comprehensive treatment of game theory, the economics of uncertainty and information, and the theory of incentives will be introduced. Other topics may be included as time and interest allow.

Prerequisite(s): Economics 707.

Economics 759 3 units; H(3-0)

Advanced Macroeconomic Theory II
Building on Economics 709, a survey of the ideas, controversies, and techniques that constitute modern macroeconomics. The principal issues it covers lie at the heart monetary and fiscal policy and of such important social problems as business cycles and unemployment. The empirical study of key issues raised in theoretical and political debates is also emphasized.

Prerequisite(s): Economics 709.

Economics 791 1.5 units; Q(3-0)

PhD Research Workshop
Survey of research methods in economics.

Prerequisite(s): Admission to the PhD program in Economics.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Psychology EDPS

Instruction is offered by members of Graduate Programs in Education.

Additional graduate education courses are offered under the course heading Educational Research (EDER).

Graduate Courses

Students must be admitted into a graduate program in Educational Psychology or receive consent of Graduate Programs in Education to enrol in these courses.

Educational Psychology 602 3 units; H(3S-0)

Counselling Theories and Professional Practice
Engages students in a critical evaluation of a range of contemporary counselling theories and helps them begin to develop a description of their own emerging theory.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 602 and any of Educational Psychology 681, Applied Psychology 602 or Campus Alberta Applied Psychology 601 will not be allowed.

Educational Psychology 604 3 units; H(3-0)

Professional Ethics in Applied Psychology
Ethical, legal and professional knowledge to inform practice in educational, counselling and mental health contexts.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 604 and any of Educational Psychology 603, Educational Psychology 614 or Campus Alberta Applied Psychology 603 will not be allowed.

Educational Psychology 606 3 units; H(3S-0)

Methods of Inquiry in Professional Practice
Helps students critically analyze other research efforts and in the process learn how to think through their own research questions in a critically evaluative manner.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 606 and Applied Psychology 606 will not be allowed.

Educational Psychology 608 3 units; H(3S-0)

Introduction to Statistical Analyses
An introductory course on descriptive and inferential statistics designed to give students with minimal statistical background sufficient competence to conduct basic statistical procedures. Topics will include: displaying data; measures of central tendency, variability, and correlation; regression analysis and prediction; probability; parameter estimation; and analysis of variance. Emphasis will be on understanding basic concepts, using software to conduct analyses, and interpretation of results.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 608 and either Applied Psychology 608 or Campus Alberta Applied Psychology 608 will not be allowed.

Educational Psychology 609 3 units; H(3-2)

Research Design in Statistics II
Research design and statistics, including methods for research in psychology and related laboratory instruction.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 609 and either Educational Psychology 605 or Applied Psychology 605 will not be allowed.

Educational Psychology 610 3 units; H(3-0)

Research Methodology in Counselling
Survey course on research methodologies in counselling, which addresses issues of research design, methods and interpretation of research findings.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 610 and any of Applied Psychology 605 or Educational Psychology 605 or Campus Alberta Applied Psychology 617 will not be allowed.

Educational Psychology 611 3 units; H(3-2)

Qualitative Research Methodologies
Advanced study of qualitative research methods for use in applied psychology and education.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 611 and Applied Psychology 611 will not be allowed.

Educational Psychology 612 3 units; H(3-0)

Research Methods in School Psychology
Advanced study of research methods for use in applied psychology and education.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

MAY BE REPEATED FOR CREDIT

Educational Psychology 614 3 units; H(3-0)

Ethics in Professional Psychology
Ethical, legal, and professional knowledge to inform practice in educational, counselling, and mental health contexts.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 614 and any of Educational Psychology 603, Educational Psychology 604 or Applied Psychology 603 will not be allowed.

Educational Psychology 615 3 units; H(3-0)

Theoretical and Clinical Foundations of Assessment
In-depth review of theoretical and clinical foundations of psycho-educational assessment. Focus is on processes of assessment, properties of tests, use and interpretation of tests and clinical diagnosis.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 615 and Applied Psychology 615 will not be allowed.

Educational Psychology 616 3 units; H(3S-0)

Assessment Theory and Practices
Combines a theoretical and practical focus to develop a framework from which to approach the assessment of client change in a variety of contexts.

Prerequisite(s): Educational Psychology 602 and 622 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 616 and either Applied Psychology 616 or Campus Alberta Applied Psychology 613 will not be allowed.

Educational Psychology 617 3 units; H(3-3)

Psychological Assessment of Adults
Provides students with the knowledge and skills necessary to select, administer, score and interpret formal psychological tests and other assessment instruments commonly used within counselling contexts.

Prerequisite(s): Educational Psychology 615 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 617 and Applied Psychology 617 will not be allowed.

Educational Psychology 618 3 units; H(3-2)

Multivariate Design and Analysis
Research design and statistics in psychology, with special reference to large sample techniques.

Prerequisite(s): Educational Psychology 609 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 618 and either Educational Psychology 607 or Applied Psychology 607 will not be allowed.

Educational Psychology 619 3 units; H(3-0)

Counselling Girls and Women
Sex role development; stereotyping and social roles; counselling theories; counselling approaches.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 619 and Applied Psychology 619 will not be allowed.

Educational Psychology 621 3 units; H(2-2)

Creating a Working Alliance
Theory and practice in developing skills contributing to working alliance and problem clarification. Ethical, legal and professional issues are the context for the application of generic counselling skills in laboratory experiences.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Corequisite(s): Prerequisite or Corequisite: Educational Psychology 623.

Antirequisite(s): Credit for Educational Psychology 621 and Applied Psychology 621 will not be allowed.

Note: Not open to Open Studies students.

Educational Psychology 622 3 units; H(3S-0)

Developing and Sustaining a Working Alliance with Clients
Focuses on the understanding and acquisition of skills that are essential for the development of working alliances in counselling contexts. Introduces a theoretical framework for the application of counselling skills in addition to providing the opportunity for skill practice.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Corequisite(s): Prerequisite or Corequisite: Educational Psychology 602.

Antirequisite(s): Credit for Educational Psychology 622 and either Applied Psychology 622 or Campus Alberta Applied Psychology 605 will not be allowed.

Educational Psychology 623 3 units; H(3-0)

Theory in Counselling
History and systems involved in counselling psychology and client change.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 623 and Applied Psychology 623 will not be allowed.

Educational Psychology 624 3 units; H(3-0)

Cultural and Social Justice Issues in Professional Practice
A critical examination of cultural and equity issues related to the lives of clients and the psychological professionals serving them.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 624 and any of Applied Psychology 625, Educational Psychology 625 or Campus Alberta Applied Psychology 607 will not be allowed.

Educational Psychology 625 3 units; H(3-0)

Cultural Influences on Professional Practice
An examination of cultural influences on theory and practice in applied psychology.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 625 and Applied Psychology 625 will not be allowed.

Educational Psychology 626 3 units; H(3-0)

Group Interventions and Processes
Examines theoretical, research, and experiential knowledge helpful in facilitating diverse educational and psychological groups.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 626 and any of Applied Psychology 627 or Educational Psychology 627 or Campus Alberta Applied Psychology 637 will not be allowed.

Educational Psychology 627 3 units; H(3-1)

Group Processes in Applied Psychology
Theory of group practice in applied psychology, with experiential laboratory.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 627 and either Educational Psychology 626 or Applied Psychology 627 will not be allowed.

Educational Psychology 629 3 units; H(3S-2)

Theory and Applications: Selected Topics
Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 629 and Applied Psychology 629 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 630 3 units; H(3-0)

Foundations of Career Counselling
Review and application of theoretical and research literatures relevant to counselling clients with career concerns.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 630 and any of Applied Psychology 631, Educational Psychology 631 or Campus Alberta Applied Psychology 621 will not be allowed.

Educational Psychology 631 3 units; H(3-0)

Theories of Career Development
Study of career development theory and related research; implications for the applied field.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 631 and either Educational Psychology 630 or Applied Psychology 631 will not be allowed.

Educational Psychology 632 3 units; H(3S-0)

Career Development and Services for Organizational Settings
Designed to combine theoretical and practical concerns regarding applications of career development concepts to human resources contexts in organizations. Concepts will be relevant to counselling and human resources development professionals.

Prerequisite(s): Educational Psychology 602, 603, 622 and 625 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 632 and either Applied Psychology 632 or Campus Alberta Applied Psychology 627 will not be allowed.

Educational Psychology 633 3 units; H(2-2)

Career Counselling
Laboratory and field experiences in career counselling.

Prerequisite(s): Educational Psychology 631 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 633 and either Applied Psychology 633 or Campus Alberta Applied Psychology 623 will not be allowed.

Educational Psychology 634 3 units; H(3-0)

Multicultural Career Development and Counselling
Increasing cultural diversity requires career development practitioners to examine the ways that their services are designed and delivered. Designed to enable students to deliver culturally responsive career counselling services to diverse populations.

Prerequisite(s): Educational Psychology 636 and 646 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 634 and either Applied Psychology 634 or

Campus Alberta Applied Psychology 629 will not be allowed.

Educational Psychology 635 3 units; H(3-0)

Advanced History, Theory, and Practice in Psychology
Course examines the history of psychological concepts in Western culture, major theoretical systems and research approaches, and the foundational assumptions of contemporary perspectives in psychology.

Prerequisite(s): Admission to a graduate program in Educational Psychology or Educational Research.

Antirequisite(s): Credit for Educational Psychology 635 and Applied Psychology 635 will not be allowed.

Educational Psychology 636 3 units; H(3S-0)

Systemic Approaches to Community Change
Provides students with a theoretical and practical basis to work as effective community change agents in a broad range of sectors. An examination of comprehensive guidance in schools provides a foundation for exploring key concepts pertinent to developing and implementing comprehensive services in a variety of contexts, and in the process, gaining a better understanding of communities, and building their strengths and capacities.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 636 and either Applied Psychology 636 or Campus Alberta Applied Psychology 625 will not be allowed.

Educational Psychology 637 3 units; H(3-0)

Relationship Counselling
Review of theory and systems in marriage and family counselling. Structured observation activities.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Corequisite(s): Prerequisite or Corequisite: Educational Psychology 640 or consent of Graduate Programs in Education.

Antirequisite(s): Credit for Educational Psychology 637 and Applied Psychology 637 will not be allowed.

Educational Psychology 638 3 units; H(3S-0)

Counselling Interventions for Client Change
Combines a theoretical and practical focus to develop a framework from which to plan and implement client change interventions in a variety of contexts.

Prerequisite(s): Educational Psychology 602 and 622 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 638 and either Applied Psychology 638 or Campus Alberta Applied Psychology 615 will not be allowed.

Educational Psychology 639 3 units; H(2-2)

Counselling Interventions
Theory and practice in planning and implementing client change interventions; the application of counselling interventions in laboratory experiences.

Prerequisite(s): Educational Psychology 621 and 623 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 639 and Applied Psychology 639 will not be allowed.

Educational Psychology 640 6 units; F(2-7)

Practicum in Counselling Psychology
Supervised counselling experience and related seminars.

Prerequisite(s): Educational Psychology 621, 623, 625 and admission to a graduate program in Educational Psychology.

Corequisite(s): Prerequisites or Corequisites: Educational Psychology 614, 615, 639 and 695.

Antirequisite(s): Credit for Educational Psychology 640 and Applied Psychology 640 will not be allowed.

Note: Not open to Open Studies students.

NOT INCLUDED IN GPA

Educational Psychology 641 3 units; H(3-0)

Development, Learning and Cognition - Child and Adolescent
The interactions of development, learning and cognition in childhood and adolescence.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 641 and Applied Psychology 641 will not be allowed.

Educational Psychology 642 3 units; H(3S-0)

Counselling Practicum I
Provides an opportunity for professional development and supervised practice in a general counselling setting. Students will be involved in direct work with clients under the supervision of a qualified professional.

Prerequisite(s): Educational Psychology 602, 604, 616, 622, 624, and 638 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 642 and either Applied Psychology 642 or Campus Alberta Applied Psychology 611 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 643 3 units; H(3-0)

Development, Learning and Cognition - Adult
The interactions of development, learning and cognition in childhood and adulthood.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 643 and Applied Psychology 643 will not be allowed.

Educational Psychology 644 3 units; H(3S-0)

Counselling Practicum II
Provides an opportunity for professional development and supervised practice in a specialized counselling context. Students will be involved in direct work with clients under the supervision of a qualified professional. The practicum allows students to actively explore issues encountered in working with a specialized client population or area of practice.

Prerequisite(s): Educational Psychology 616, 638 and 642 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 644 and either Applied Psychology 644 or Campus Alberta Applied Psychology 619 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 646 3 units; H(3S-0)

Processes of Learning
Addresses the essential features of major theories of learning and presents current research in each area of learning. Students will discover how the principles of learning relate to their own learning and behaviour, and how the principles can be used to understand the behaviour of others and enhance counselling practice.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 646 and either Applied Psychology 646 or Campus Alberta Applied Psychology 631 will not be allowed.

Educational Psychology 648 3 units; H(3S-0)

Lifespan Human Development
Introduces a comprehensive view of human development across the lifespan, drawing on the major theoretical positions. Developmental themes are discussed in terms of their application to typical and atypical human development in children, adolescents and adults.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 648 and either Applied Psychology 648 or Campus Alberta Applied Psychology 633 will not be allowed.

Educational Psychology 650 3 units; H(3-0)

Family and Social Bases of Behaviour
Examines theoretical perspectives and contemporary research on socialization processes in childhood and adolescence, with particular emphasis on family and peer interpersonal relations. Students will explore the connections between family and the education system including parent involvement in schools.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 650 and Applied Psychology 650 will not be allowed.

Educational Psychology 651 3 units; H(3-0)

Disorders of Learning and Behaviour
Focuses on childhood and adolescent disorders through an examination of theories, diagnostic and associated features and disorders, prevalence, developmental course, cultural and gender context, and familial patterns.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 651 and Applied Psychology 651 will not be allowed.

Educational Psychology 652 3 units; H(3-0)

Academic and Language Assessment
Course provides a broad understanding of the standards that guide assessment practices through an examination of assessment of academic areas and language skills.

Prerequisite(s): Educational Psychology 689 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 652 and either Educational Psychology 667 or Applied Psychology 652 will not be allowed.

Educational Psychology 653 3 units; H(3-0)

Professional Practice of School Psychology
Focuses on the preparation, roles, functions, and employment of school psychologists as well as the regulation, evaluation, and accountability of school psychologists.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Educational Psychology 654 3 units; H(3-0)

Neurobiological and Developmental Bases of Learning and Behaviour
Examines the field of cognitive neuroscience from an assessment framework. It explores the evolving understanding of neurobehavioural disorders and testing techniques and practices now available to assess neuropsychological characteristics in both clinical and research settings.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 654 and Applied Psychology 654 will not be allowed.

Educational Psychology 655 3 units; H(3-0)

Advanced Child Development
Explores the theory and research supporting recent advances in select areas of child development. Topics include: parent/peer relations; personality, self and self-concept; language and thought; emotion and motivation; and pro-social, antisocial, and moral development.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Educational Psychology 656 3 units; H(1-14)

Practicum in Academic and Language Assessment and Intervention
This 200-hour practicum provides opportunities to develop competencies in academic and language assessment and interventions within an approved setting.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 656 and Applied Psychology 656 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 657 3 units; H(3-0)

Cognitive and Neuropsychological Assessment
Focuses on the theory and practice of intellectual/cognitive, memory, and neuropsychological assessment primarily through the use of individually administered standardized tests.

Prerequisite(s): Admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 657 and Applied Psychology 657 will not be allowed.

Educational Psychology 658 3 units; H(3-0)

Interventions to Promote Cognitive, Academic, and Neuropsychological Well-Being
Focuses on evidence-based interventions aimed at promoting cognitive, academic, and neuropsychological development in children and youth.

Prerequisite(s): Admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 658 and Applied Psychology 658 will not be allowed.

Educational Psychology 659 3 units; H(3-3)

Academic Assessment and Intervention
Academic and language assessment and intervention primarily through the use of individually administered standardized tests and evidence-based interventions aimed at promoting academic and language development in children and youth.

Prerequisite(s): Educational Psychology 665 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Educational Psychology 660 3 units; H(3-0)

Social, Emotional, and Behavioural Assessment
Grounded in bioecological systems perspective and developmental and resiliency frameworks, course focuses on the comprehensive assessment of children and youth referred for social, emotional, and behavioural concerns.

Prerequisite(s): Admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 660 and Applied Psychology 660 will not be allowed.

Educational Psychology 661 3 units; H(3-0)

Psychological Foundations of Student Exceptionality
Major trends, developments, theoretical foundations, and current practices and challenges relative to the education of students with diverse learning needs.

Prerequisite(s): Admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 661 and Applied Psychology 661 will not be allowed.

Educational Psychology 662 3 units; H(2-15)

School Psychology Practicum I
Provides supervised experience to develop competencies aligned with the practice of school psychology, including consultation, assessment, and intervention. Adherence to all provincial and national ethical and professional guidelines is expected.

Prerequisite(s): Educational Psychology 614, 665, 659, and 669 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

NOT INCLUDED IN GPA

Educational Psychology 663 3 units; H(2-15)

School Psychology Practicum II
Provides supervised experience to further develop and refine school psychologist competencies. Administration of evidenced–based intervention strategies will be also required. Adherence to all provincial and national ethical and professional guidelines is expected.

Prerequisite(s): Educational Psychology 662 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

NOT INCLUDED IN GPA

Educational Psychology 664 3 units; H(3S-0)

Psychological Approaches to Health
Focuses on how human psychology and human health intersect and is organized according to core principles and skills that guide the practice of health psychology. Will orient students to contemporary theories and models of health, illness, and health promotion, and their relevance in a variety of settings.

Prerequisite(s): Educational Psychology 602, 624 and 610 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 664 and either Applied Psychology 664 or Campus Alberta Applied Psychology 635 will not be allowed.

Educational Psychology 665 3 units; H(3-3)

Cognitive Assessment and Intervention
The theory and practice of intellectual/cognitive, and memory assessment primarily through the use of individually administered standardized tests and evidence-based interventions aimed at promoting cognitive, academic, and neuropsychological development in children and youth.

Prerequisite(s): Admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Corequisite(s): Educational Psychology 653.

Educational Psychology 667 3 units; H(3-3)

Assessment of Students with Exceptional Learning Needs
Theory and practice in school-based academic and social-emotional assessment techniques and strategies for use with students with diverse learning needs. Laboratory and field experiences.

Prerequisite(s): Admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 667 and either Educational Psychology 652 or Applied Psychology 667 will not be allowed.

Educational Psychology 668 3 units; H(3S-0)

Theory and Practice of Clinical Supervision
Intended for students to learn the process of clinical supervision and as a result become better consumers of supervision, more effective supervisors, and more able to evaluate their current and future development and involvement in supervisory roles.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 668 and either Applied Psychology 668 or Campus Alberta Applied Psychology 681 will not be allowed.

Educational Psychology 669 3 units; H(3-3)

Social-Emotional Assessment and Intervention
Focuses on the theory and practice of social, emotional, and behavioural assessment and on evidence-based interventions to enhance the mental health and behavioural well-being of children and youth.

Prerequisite(s): Educational Psychology 665 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Educational Psychology 670 3 units; H(3S-0)

Final Project Portfolio
Students complete a culminating independent project in their area of specialization to satisfy the degree requirements.

Prerequisite(s): Educational Psychology 602, 604, 610, 616, 622, 624, 626, 630, 638, 642, 646, 648, and 664.

Antirequisite(s): Credit for Educational Psychology 670 and either Applied Psychology 670 or Campus Alberta Applied Psychology 693 will not be allowed.

Educational Psychology 671 3 units; H(1-3)

Practicum in School-based Interventions for Children and Youth with Exceptional Learning Needs: I

Practicum in educational interventions for children and adolescents with special learning needs. Focus on general assessment, analysis, intervention, and strategies in applied settings.

Prerequisite(s): Educational Psychology 661 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 671 and Applied Psychology 671 will not be allowed.

Educational Psychology 672 3 units; H(3S-0)

Counselling Exceptional Children

Intended to help students enhance their awareness and understanding of major trends, developments, theoretical foundations, and current practices and challenges in counselling and providing consultation for special needs children and adolescents.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 672 and either Applied Psychology 672 or Campus Alberta Applied Psychology 641 will not be allowed.

Educational Psychology 673 3 units; H(3-3)

Practicum in School-based Interventions for Children and Youth with Exceptional Learning Needs: II

Advanced practicum in educational interventions for children and adolescents with special learning needs. Focus on specialized assessment, analysis, interventions, and strategies in applied settings.

Prerequisite(s): Educational Psychology 671 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 673 and Applied Psychology 673 will not be allowed.

Educational Psychology 674 3 units; H(3-0)

Interventions to Promote Socio-emotional and Behavioural Well-Being

Focus on strategies to enhance the socio-emotional and behavioural well-being of children and youth who exhibit significant emotional and behavioural needs in school and community settings.

Prerequisite(s): Educational Psychology 660 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 674 and Applied Psychology 674 will not be allowed.

Educational Psychology 675 3 units; H(1-14)

Practicum in Cognitive and Neuropsychological Assessment and Intervention

This 200-hour practicum provides opportunities to develop competencies in cognitive and neuropsychological assessment and interventions within an approved setting.

Prerequisite(s): Educational Psychology 651, 654, and 657 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 675 and Applied Psychology 675 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 676 3 units; H(1-14)

Practicum in Social, Emotional, and Behavioural Assessment

A supervised practicum in social, emotional, and behavioural assessment. Students will undertake comprehensive social, emotional, and behavioural assessment with children and youth presenting with various developmental disorders. Students will undertake this practicum experience within the Werklund School of Education's Integrated Educational Services office (ISE).

Prerequisite(s): Educational Psychology 674 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 676 and Applied Psychology 676 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 677 3 units; H(3-0)

Play Therapy Theory and Process

The theoretical foundations and basic orientation necessary to understand and use play as therapy are outlined, along with the developmental underpinnings of play in children and the basic principles upon which child-centred play therapy is built.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 677 and Applied Psychology 677 will not be allowed.

Educational Psychology 678 3 units; H(3S-0)

Art Therapy History

Art therapy is examined from a broad perspective, from its beginnings as a treatment for mentally or emotionally disturbed people, to its development as a distinct profession in North America and Europe. The works of key authors are covered, along with their theoretical approaches and current trends in the field. Students will learn how the foundations of art therapy are incorporated by many disciplines, with applications in many settings.

Prerequisite(s): Educational Psychology 642, 616, and 638 and admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 678 and either Applied Psychology 678 or Campus Alberta Applied Psychology 661 will not be allowed.

Educational Psychology 679 3 units; H(3-0)

Fundamentals of Solution-Oriented Therapy

Provides a working knowledge of the theory and practice of solution-oriented therapy and related models.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 679 and Applied Psychology 679 will not be allowed.

Educational Psychology 680 3 units; H(3S-0)

Counselling Graduate Practicum: Selected Topics

Graduate Practicum: Selected Topics.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 680 and either Applied Psychology 680 or Campus Alberta Applied Psychology 695 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 681 3 units; H(3-0)

Theories and Skills of Counselling

An introduction to the major theories of counselling as well as counselling micro-skills and interviewing skills.

Prerequisite(s): Admission to a graduate program in Educational Psychology or consent of Graduate Programs in Education.

Antirequisite(s): Credit for Educational Psychology 681 and Educational Psychology 602 will not be allowed.

Educational Psychology 682 3 units; H(3-3)

Special Topics: Counselling

Graduate Seminar: Special Topics.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 682 and either Applied Psychology 682 or Campus Alberta Applied Psychology 691 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 683 3 units; H(3-0)

Consultation in School Psychology

Examines the purpose and skills of consultation, evaluation issues, and strategies in consultation as well as the role of school psychologists relative to multidisciplinary school teams, school-based problems solving, and student development and learning.

Prerequisite(s): Admission to a graduate program in Educational Psychology or consent of Graduate Programs in Education.

Educational Psychology 684 3 units; H(3-0)

Advanced Seminar in the Domains of School Psychology Leadership and Function in the Schools

Provides an advanced study of the domains and functions of school and applied child psychologists. Constituting the final course within the MEd program, students are required to demonstrate a comprehensive understanding of and competency in the ten domains identified by the National Association of School Psychologists as central to the school psychology profession. For each of the ten domains, students will complete a case study requiring the integration of theory, research, and skills.

Prerequisite(s): Admission to the MEd program with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 684 and Applied Psychology 684 will not be allowed.

Note: Open only to students enrolled in the MEd School and Applied Child Psychology program who have completed all other course work prior to enrolment.

Educational Psychology 685 3 units; H(3-0)

Child and Adolescent Counselling

Introduces the theory and practice of counselling in school-based settings and fosters student development of rudimentary counselling and psychotherapy skills for school-based service delivery.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Educational Psychology 686 3 units; H(3S-0)

Counselling Graduate Seminar: Selected Topics
Graduate Seminar: Selected Topics.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 686 and Applied Psychology 686 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 687 3 units; H(3-0)

Developmental Psychopathology
An examination of the history of psychopathology and abnormal psychology, and the DSM-V. An empirical and theoretical scope will be used to approach childhood disorders including issues with classification, etiology, and developmental course.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 687 and Educational Psychology 651 will not be allowed.

Educational Psychology 688 3 units; H(3-0)

Cognitive and Affective Bases of Behaviour
A survey of cognitive development in the first two decades of life. Topics may include biological bases of cognition, perception, memory, motivation, emotion, learning, language and motor.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Educational Psychology 689 3 units; H(3-0)

Cognitive Assessment
A focus on the history, theory and practice of cognitive assessment. This course also focuses on report writing and multicultural assessment within the context of cognitive evaluation.

Prerequisite(s): Educational Psychology 653 and 654 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 689 and either Educational Psychology 665 or 657 will not be allowed.

Educational Psychology 690 3 units; H(3-0)

School-based Intervention and Consultation
An exploration of school systems, evidence-based interventions, and theories of consultation.

Prerequisite(s): Educational Psychology 696 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 690 and either Educational Psychology 658 or 683 will not be allowed.

Educational Psychology 691 1.5 units; Q(1.5S-0)

Graduate Seminar: Selected Topics
Applied course in program planning, design, and evaluation for counselling contexts.

Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 691 and Applied Psychology 691 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 692 6 units; F(3S-0)

Graduate Seminar: Selected Topics
Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 692 and Applied Psychology 692 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 693 3 units; H(3S-0)

Graduate Seminar: Selected Topics
Prerequisite(s): Admission to a graduate program in Educational Psychology or Educational Research.

Antirequisite(s): Credit for Educational Psychology 693 and Applied Psychology 693 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 694 6 units; F(1S-3)

Graduate Practicum: Selected Topics
Prerequisite(s): Admission to a graduate program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 694 and Applied Psychology 694 will not be allowed.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Psychology 695 3 units; H(1S-3)

Graduate Practicum: Selected Topics
Supervised counselling field experience.

Prerequisite(s): Admission to a graduate program in Educational Psychology with specialization in Counselling Psychology.

Antirequisite(s): Credit for Educational Psychology 695 and Applied Psychology 695 will not be allowed.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Psychology 696 3 units; H(3-0)

Social, Emotional, and Behavioural Assessment and Intervention
A focus on the assessment and intervention of children and youth who exhibit significant social, emotional, and behavioural needs in school and community settings.

Prerequisite(s): Educational Psychology 602 or 681 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 696 and any of Educational Psychology 660, 669 or 674 will not be allowed.

Educational Psychology 697 3 units; H(1-14)

Practicum in Academic and Cognitive Assessment
With a focus on academic and cognitive functioning, this practicum provides supervised experience to develop competencies aligned with the practice of school psychology including consultation, assessment, and intervention.

Prerequisite(s): Educational Psychology 652, 654, 687, and 689 and admission to a graduate program in Educational Psychology with specialization in School and Applied Child Psychology.

Antirequisite(s): Credit for Educational Psychology 697 and Educational Psychology 662 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 698 6 units; F

Pre-Master's Internship in School and Applied Child Psychology
Within this 1200-hour full-time internship, master's level interns will have opportunities to demonstrate under supervision their ability to apply their knowledge to develop specific skills needed for effective school psychological service delivery and integrate competencies that address various domains of professional preparation and practice in school psychology.

Prerequisite(s): Admission to the MEd program with specialization in School and Applied Psychology and consent of the Training Director.

Antirequisite(s): Credit for Educational Psychology 698 and Applied Psychology 698 will not be allowed.

Note: All MEd coursework must be completed before starting the internship.

NOT INCLUDED IN GPA

Educational Psychology 701 3 units; H(3-0)

Advanced Research Design, Psychometrics and Statistics in Applied Psychology
Provides intensive exposure to sophisticated quantitative techniques relevant to research design, psychometrics, and statistics such as structural equation modelling (SEM), item-response theory (IRT), and hierarchical linear modelling (HLM).

Prerequisite(s): Educational Psychology 618 and admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 701 and Applied Psychology 701 will not be allowed.

Educational Psychology 702 3 units; H(3-0)

Advanced Theories in Measurement
This advanced seminar course focuses on a variety of topics and issues related to measurement in the social, educational, and behavioural sciences. As we progress through the course, we will cover topics critical to measurement; including principles of scale development (e.g., item writing, scaling), and validity theory (e.g., construct representation and validation). This course is strongly recommended for anyone planning to pursue applied, clinical, or research studies/careers involving the use of tests and/or measures.

Prerequisite(s): Educational Psychology 618 and admission to a doctoral program in Educational Psychology.

MAY BE REPEATED FOR CREDIT

Educational Psychology 703 3 units; H(3-0)

Advanced Seminar in Applied Psychology
Doctoral seminar on issues in applied psychology. Dissertation development.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 703 and Applied Psychology 703 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 705 3 units; H(3-0)

Advanced Seminar in Special Education I
Advanced study of theoretical, empirical, and practical issues affecting individuals with exceptional learning needs.

Prerequisite(s): Educational Psychology 661 and admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 705 and Applied Psychology 705 will not be allowed.

Educational Psychology 709 3 units; H(3-0)

Advanced Seminar in Applied Learning and Developmental Psychology I
Advanced study of theory and practice in human development and learning.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 709 and Applied Psychology 709 will not be allowed.

Educational Psychology 731 3 units; H(3-0)

Advanced Clinical Supervision in Applied Psychology
Provides students with formal training in clinical supervision with the intent of raising an awareness of supervision models, as well as a conceptual framework and vocabulary for thinking through their supervision practice.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 731 and Applied Psychology 731 will not be allowed.

Educational Psychology 732 3 units; H(3-0)

Advanced Seminar in School and Applied Child Psychology
Seminar series that links theory and research with practice in the school psychology domains of professional competence.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 732 and Applied Psychology 732 will not be allowed.

Educational Psychology 741 3 units; H(3-2)

Advanced Professional Skills and Issues
Focuses on providing knowledge and developing skills in the areas of consultation, supervision, and program development and evaluation across the lifespan.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 741 and Applied Psychology 741 will not be allowed.

Educational Psychology 742 6 units; F(2-7)

Advanced Practicum in Counselling
Advanced practicum in counselling psychology, and related seminars.

Prerequisite(s): Admission to a doctoral program in Educational Psychology with specialization in Counselling Psychology.

Antirequisite(s): Credit for Educational Psychology 742 and Applied Psychology 742 will not be allowed.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Psychology 760 3 units; H(3-0)

Evidenced-Based Consultation for Intervention
Develops advanced problem-solving consultation skills as an indirect service delivery model. Through role play and consultative work in clinic and/or school settings, students gain hands-on experience in problem identification, problem analysis, plan development/implementation, and plan evaluation/recycling.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Educational Psychology 761 3 units; H(2-15)

Advanced Doctoral Practicum in Clinical Assessment and Supervision
Provides opportunities to apply and develop clinical knowledge and skill as well as best-practice approaches to supervision.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Psychology 762 3 units; H(3-0)

Advanced Neuropsychological Assessment and Intervention
Builds advanced understanding of neuropsychological approaches to assessment and intervention and the use of the cognitive hypothesis testing model to formulate and test hypotheses.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Educational Psychology 763 3 units; H(3-2)

School- and Clinical-based Interventions
Introduces behavioural, social, emotional, and counselling interventions with a particular focus on their application to school and clinical settings for use with children and adolescents.

Prerequisite(s): Educational Psychology 685 and admission to a doctoral program in Educational Psychology.

Educational Psychology 764 3 units; H(3-2)

Advanced Research Statistics
Provides instruction in advanced statistical methods. Topics include, but are not limited to, multilevel/growth curve modelling, structural equation modelling, and topics related to the measurement of growth and change and the use of advanced statistical software.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Educational Psychology 766 3 units; H(2-15)

School-Based Practicum
This advanced practicum will provide students with specialized assessment, intervention, analysis, and strategies in school settings under the supervision of registered school psychologists.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

NOT INCLUDED IN GPA

Educational Psychology 788 6 units; F

Pre-Doctoral Internship in Counselling Psychology
The internship is a full-time commitment over the course of one calendar year or half-time over the course of two consecutive calendar years. The full-time and half-time experiences each provide, at a minimum, 1,600 hours of supervised experience in an approved clinical setting. Practical application of theories and interventions pertaining to individual and group, couple, or family counselling as well as assessment, consultation, and supervision. Experience in addressing a variety of professional issues.

Prerequisite(s): Admission to the doctoral program in Educational Psychology with specialization in Counselling Psychology and consent of the Training Director.

Antirequisite(s): Credit for Educational Psychology 788 and Applied Psychology 788 will not be allowed.

NOT INCLUDED IN GPA

Educational Psychology 792 6 units; F(3-0)

Advanced Seminar: Selected Topics
Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 792 and Applied Psychology 792 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 793 3 units; H(3S-0)

Graduate Seminar: Selected Topics
Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 793 and Applied Psychology 793 will not be allowed.

MAY BE REPEATED FOR CREDIT

Educational Psychology 794 6 units; F(1S-3)

Advanced Practicum: Selected Topics
Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 794 and Applied Psychology 794 will not be allowed.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Psychology 795 3 units; H(1S-3)

Advanced Practicum: Selected Topics
Supervised counselling and school and applied child psychology field experience intended to enhance the professional practice skills of students.

Prerequisite(s): Admission to a doctoral program in Educational Psychology.

Antirequisite(s): Credit for Educational Psychology 795 and Applied Psychology 795 will not be allowed.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Psychology 798 6 units; F

Pre-Doctoral Internship in School and Applied Child Psychology
The internship is a full-time commitment over the course of one calendar year or half-time over the course of two consecutive calendar years. The full-time and half-time experiences each provide, at a minimum, 1,600 hours of supervised experience involving the theory and practice of evaluations, consultation, interventions, research, and related

activities within an approved school, clinic, or other human service agency.

Prerequisite(s): Admission to the doctoral program in Educational Psychology with specialization in School and Applied Child Psychology and consent of the Training Director.

Antirequisite(s): Credit for Educational Psychology 798 and Applied Psychology 798 will not be allowed.

NOT INCLUDED IN GPA

Educational Research EDER

Instruction is offered by members of Graduate Programs in Education.

Additional graduate education courses are offered under the course heading Educational Psychology (EDPS).

Graduate Courses

Educational Research 603 3 units; H(3-0)

Research Methods
Introduction to various approaches to research in education.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 605 1.5 units; Q(1.5-0)

Special Topics in Professional Development
Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 613 3 units; H(3-0)

Change and Innovation in Education
Examines both traditional and contemporary research literature relevant to change and innovation in educational settings.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 617 3 units; H(3-0)

Organizational Theory and Analysis in Education
Human organization as the setting for the delivery of educational services.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 619 3 units; H(3-0)

Special Topics in Educational Leadership
Attends to the contemporary and timely debates that shape educational leadership at local, national and international levels. Topics are reflective of the pressing and current issues in educational leadership.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 621 3 units; H(3-0)

Assessment of Classroom Learning
Examines both traditional and emerging assessment techniques, including Performance Assessment and Learning Portfolios, for examining students' learning outcomes.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 623 3 units; H(3-2)

Topics in Educational Technology
Topics and issues in educational technology.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 625 3 units; H(3-0)

Teacher Evaluation
Examines both traditional and emerging techniques, e.g. portfolios, for assessing teacher performance.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 629 3 units; H(3-0)

Special Topics in Assessment/Evaluation
Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 631 3 units; H(3-0)

Special Topics in Adult Learning
Examines topics in adult learning.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 635 3 units; H(3-0)

Topics in Adult Learning
Explores a variety of current topics and discourses pertaining to adult education and adult learning.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 641 3 units; H(3-0)

Research on the Reading Process
Examination and criticism of competing theoretical discourses about the teaching and learning of reading in the elementary school.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 649 3 units; H(3-0)

Special Topics in English Language Education
Explores a variety of theoretical perspectives and discourses in English Language Education.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 651 3 units; H(3-0)

Philosophy of Education
Philosophical topics in the context of education.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 653 3 units; H(3-0)

Sociology of Education
Sociological topics in the context of education.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 655 3 units; H(3-0)

Comparative Education
Topics in comparative education.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 657 3 units; H(3-0)

Culture and Gender Studies
Culture and gender topics in the context of education.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 659 3 units; H(3-0)

History of Education
Historical topics in the context of education.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 664 3 units; H(3-0)

Language and Literacy: Theory and Research
The exploration of ideas, issues, and questions related to and beyond the notions of language and literacy, and how they intersect. An introduction to the principles of language learning from cognitive, sociocultural, and critical perspectives.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 667 3 units; H(3-0)

Second Language Reading and Writing
Research and practice in second language reading and writing; instructional techniques for specific audiences; theories of reading and writing.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 668 3 units; H(3-0)

Theory and Research in Languages and Diversity
Topics include the acquisition, use, learning and teaching of language(s) and literacy in a variety of settings.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 669 3 units; H(3-0)

Aspects of Second Language and Culture
Introduction to research and issues on various aspects of second language and culture.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 671 3 units; H(3-0)

Conceptualizing Educational Technology
Seminar to familiarize students with the terrain of educational technology.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 673 3 units; H(3-0)

Instructional Design
Integration of theory and practice associated with the selection and sequencing of content across the instructional spectrum and the matching of instruc-

tional strategies to characteristics of learners and content.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 675 3 units; H(3-0)

Principles of Instructional Development
Topics include the examination of a variety of instructional development models, the systems approach to developing instruction, front-end analysis and needs assessment, risk analysis, constraint analysis, resource analysis, task analysis, and evaluation.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 677 3 units; H(3-0)

Distributed Learning
Examination of distributed teaching and learning processes in educational systems with attention to computer mediated teaching and communication and integrated instructional design methodologies. Other topics include media selection, online team-building, social context issues, and leadership of distributed learning organizations.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 678 3 units; H(3-0)

Special Topics in Learning Sciences
Examination of current topics and issues in learning sciences and related areas.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 679 3 units; H(3-0)

Special Topics in Educational Technology
Examination of current topics and issues in educational technology and related areas.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 681 3 units; H(3-0)

Studying Curriculum
Curriculum research, theory, and practice with particular reference to curriculum aims, content, organization and change.

Prerequisite(s): Admission to a graduate program in Educational Research.

Antirequisite(s): Credit for Educational Research 681 and any of 665, 669.27 or 699.42 will not be allowed.

Educational Research 682 3 units; H(3-0)

Conceptualizing Interpretive Inquiry
An introduction to the various approaches to conducting interpretive studies in curriculum.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 683 3 units; H(3-0)

Curriculum Development, Implementation and Assessment
Making sense of what happens when curriculum policy becomes reality and affects students, teachers, parents and politicians.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 684 3 units; H(3-0)

Contemporary Themes in Critical Pedagogy and Social Justice
Explores the relationship between structural inequalities, education and curriculum theory.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 685 3 units; H(3-0)

Interpretive Curriculum Discourses
The field of interpretive work in curriculum theory.

Prerequisite(s): Admission to a graduate program in Educational Research.

Educational Research 687 3 units; H(3-0)

Interpretive Study of Curriculum I
Introduction to the study of curriculum, theory and practice with an emphasis on lived experience at the Master's level.

Prerequisite(s): Admission to a graduate program in Educational Research.

Antirequisite(s): Credit for Educational Research 687 and either 681 or 683 are not allowed.

Educational Research 688 3 units; H(3-0)

Interpretive Study of Curriculum II
In-depth study of the historical movements and philosophical contexts of contemporary curriculum theorizing and practice at the Master's level.

Prerequisite(s): Admission to a graduate program in Educational Research.

Antirequisite(s): Credit for Educational Research 688 and 685 is not allowed.

Educational Research 689 3 units; H(3-0)

Aspects of School Curriculum
Introductory systematic study of research and issues focused on various areas of the school curriculum.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 692 3 units; H(3-0)

Collaboratory of Practice
An examination of real world problems and practices through reviewing the theoretical and research literature linking these to an analytical framework.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 693 3 units; H(3-0)

Interpretive Study of Curriculum
Introduction to the various forms of educational inquiry.

Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 696 3 units; H(3-2)

Special Topics in Education
Topics designed to prepare foreign-prepared teachers to meet Alberta Education teacher certification requirements.

Prerequisite(s): Admission to the Bridge to Teaching program or consent of the program.

MAY BE REPEATED FOR CREDIT

Educational Research 697 1.5 units; Q(1.5-0)

Special Topics
Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 698 6 units; F(3-0)

Special Topics
Prerequisite(s): Admission to a graduate program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 700 6 units; F(3-0)

Seminar for First-Year Doctoral Students
Seminar on selected topics.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 701 3 units; H(3-0)

Advanced Research Methods
Advanced study in the conduct of research.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 703 3 units; H(3-0)

Directed Study
Individual doctoral study in a selected area.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 705 3 units; H(3-0)

Doctoral Seminar in Educational Leadership
Provides doctoral students with a contemporary Canadian focus on significant issues in educational leadership.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 707 3 units; H(3-0)

Collaboratory of Practice I
Review the theoretical and research literature and use an analytical framework to explore problems of practice.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Research 708 3 units; H(3-0)

Collaboratory of Practice II
Integrate theoretical, research, and practical knowledge through a focus on data collection and analysis.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Educational Research 709 3 units; H(3-0)

Dissertation Seminar I
Undertaking a doctoral research study after the successful passing of the candidacy exam.

Prerequisite(s): Admission to a doctoral program in Educational Research.

NOT INCLUDED IN GPA

Educational Research 710 3 units; H(3-0)

Dissertation Seminar II
Ongoing engagement in doctoral research activities as appropriate to the research timelines, research design and methodology, and requirements for writing and defending the dissertation.

Prerequisite(s): Admission to a doctoral program in Educational Research.

NOT INCLUDED IN GPA

Educational Research 719 3 units; H(3-0)

Advanced Special Topics in Educational Leadership
Provides doctoral students with advanced exploration of diverse, contemporary topics in k-12 and post-secondary learning organizations.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 733 3 units; H(3-0)

Advanced Adult Learning
Advanced exploration of diverse topics in adult learning.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 735 3 units; H(3-0)

Advanced Topics in Adult Learning
Drawing from a foundational understanding and appreciation of adult education and adult learning, this course provides a deeper exploration of current topics and discourses that inform this field of scholarship and practice.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 741 3 units; H(3-0)

Advanced Seminar in Theory and Research in Literacy Education
A critical examination of theories, models, and research that underpin literacy education.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 764 3 units; H(3-0)

Advanced Language and Literacy: Theory and Research
A deeper exploration of ideas, issues, and questions that relate to and go beyond notions of language and literacy, and how they intersect. An examination of the principles of language learning from cognitive, sociocultural, and critical perspectives.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 768 3 units; H(3-0)

Theory and Research in Languages and Diversity
Topics include current issues in languages and diversity, assessment and evaluation, language policy and planning, and language-identity-democracy.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 770 3 units; H(3S-0)

Historical and Philosophical Foundations in Learning Sciences
An examination of theories, designs, and practices in learning sciences. Examination of the cognitive and social processes that constitute learning, teaching, and development in and across diverse settings—both formal and informal.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 771 3 units; H(3S-0)

Doctoral Seminar in Educational Technology
An examination of the historical and philosophical foundations of field informs the critical analysis of current and emerging research in educational technology. In this seminar, doctoral students study research and methodology across domains of the field, standards for practice, emerging trends and leading, teaching and learning with technology in diverse contexts.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 772 3 units; H(3S-0)

Advanced Seminar in Design
An introduction to various perspectives on designing formal and informal learning environments in technological and non-technological settings. Exploration of research approaches and methodologies in the scope of design thinking and the structure, nature, contexts, and assessment practices of learning environments. Engagement with applications of theory to practice through structured internships.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 773 3 units; H(3S-0)

Advanced Seminar in Design and Development of Learning
An exploration of advances and trends in learning and instructional design and development theory and evaluation; investigate collaboration and community; participatory cultures, innovation and change research, learning science theory, and knowledge building.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 774 3 units; H(3S-0)

Leadership, Learning, and Systemic Change
An exploration of systemic and organizational change and innovation theories in relation to leading teaching and learning in agile and changing educational systems and networks. The role of leadership in advancing research and developing systemic change will be examined.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 775 3 units; H(3S-0)

Advanced Seminar in Technology Enabled Learning Environments
An evaluation of prevalent and promising distributed, blended and collaborative learning environments through design, development and inclusive learning perspectives; analysis of affordances and constraints of mobile, dynamic and participatory realities and integrative networks.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 777 3 units; H(3S-0)

Advanced Seminar in Leading Systemic Change
Key concepts include issues of systemic change, network/systems theory, diffusion of innovations and change theories, complex adaptive leadership, and opportunities for transformed leadership, teaching and learning in agile and changing education systems and networks.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 778 3 units; H(3-0)

Advanced Learning Sciences
Advanced concepts in learning sciences.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 779 3 units; H(3-0)

Advanced Educational Technology
Advanced concepts in educational technology.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 780 3 units; H(3-0)

Interpretive Study of Curriculum III
In-depth study of the various approaches to conducting interpretive studies in curriculum, teaching and learning at the doctoral level.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 781 3 units; H(3-0)

Conceptualizing Curriculum Research
Analysis of different approaches to curriculum research, especially assumptions, meaning frameworks, and views of the theory/practice relationship.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 783 3 units; H(3-0)

Advanced Topics in Curriculum and Learning
Advanced study of topics in curriculum and learning at the doctoral level.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 784 3 units; H(3-0)

Doctoral Seminar on Perspectives of Learning
Study of particular aspects of Learning Theory at the doctoral level.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 785 3 units; H(3-0)

Advanced Study of Interpretive Curriculum Discourses
An advanced study of interpretive curriculum discourses focusing on cutting-edge examples of such work.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 786 3 units; H(3-0)

Doctoral Seminar in Interpretive Curriculum Discourses
Study of particular aspects of Interpretive Curriculum Discourses at the doctoral level.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Educational Research 787 3 units; H(3-0)

Contemporary Themes in Critical Pedagogy and Social Justice
Explores the relationship between structural inequalities, education and curriculum theory.

Prerequisite(s): Admission to a doctoral program in Educational Research.

Educational Research 798 6 units; F(3-0)

Advanced Special Topics
Provides doctoral students with advanced exploration and study of emerging topics in education.

Prerequisite(s): Admission to a doctoral program in Educational Research.

MAY BE REPEATED FOR CREDIT

Electrical Engineering ENEL

Instruction offered by members of the Department of Electrical and Computer Engineering in the Schulich School of Engineering.

Graduate Courses

Electrical Engineering 601 3 units; H(3-0)

Advanced Power System Analysis
Energy transfer in power systems; real and reactive power flows; VAR compensation. Power system control, interconnected operation. Power system stability, techniques of numerical integration. Load representation, power quality. Computational paradigms for typical power system problems. Computer simulation of representative power system problems.

Prerequisite(s): Electrical Engineering 487 or consent of the Department.

Electrical Engineering 602 3 units; H(3-1) (formerly Software Engineering for Engineers 619.71)

Virtual Environments and Applications
Introduction to virtual reality (VR) technologies; Characterization of virtual environments; hardware and software; user interfaces; 3D interaction; research trends. Applications: medicine, manufacturing, oil and gas reservoirs, the arts, and education.

Electrical Engineering 603 3 units; H(3-0)

Rotating Machines
General theory of rotating machines providing a unified approach to the analysis of machine performance. General equations of induced voltage and torque. Transient performance of machines.

Electrical Engineering 604 3 units; H(3-1)

System Design of Wireless Transceivers
Linear and nonlinear system analysis. Radio architectures – super-heterodyne, low intermediate frequency, direct conversion, sub-sampling; receiver system analysis and design; transmitter system analysis and design. Applications of transceiver system design to satellite and wireless communications.

Prerequisite(s): Electrical Engineering 327 and 471.

Antirequisite(s): Credit for Electrical Engineering 604 and 619.38 will not be allowed.

Electrical Engineering 606 3 units; H(3-0)

Optical Instrumentation
Review of ray and wave optics. Free-space and fiber optic components. Linear, non-linear, and super-resolution microscopy. Light measurement and characterization. Digital imaging. Solid state light sources. Spectroscopy.

Antirequisite(s): Credit for Electrical Engineering 606 and 619.68 will not be allowed.

Electrical Engineering 609 1.5 units; Q(3-1)

Special Topics
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member.

MAY BE REPEATED FOR CREDIT

Electrical Engineering 611 3 units; H(3-0)

Digital Systems
Introduction to digital system design for mask programmable and field programmable gate arrays. CMOS digital logic design. Flip-flop timing and metastability. Design for testability. CAD tools for digital systems design.

Electrical Engineering 613 3 units; H(3-0)

Nonlinear Microwave Engineering
Theory, design and optimization of RF power amplification systems for wireless and satellite communication applications. The course provides a detailed treatment of linear and non-linear characterization and modelling of amplifiers/transmitters from device to system level perspective. Theory of operation as well as design techniques of linear amplifiers (class A, AB, B, C), switching mode amplifiers (class E, D and F) and balanced amplifiers are presented. Linearization and power efficiency enhancements techniques of power amplifiers/transmitters are also covered.

Prerequisite(s): Electrical Engineering 574 or consent of the Department.

Antirequisite(s): Credit for Electrical Engineering 613 and 619.22 will not be allowed.

Electrical Engineering 615 3 units; H(3-0) (formerly Electrical Engineering 619.16)

Non-linear Control
Non-linear systems; phase portraits, equilibrium points, and existence of solutions. Lyapunov stability definitions and theorems. Non-linear control design; feedback linearization, sliding modes, adaptive control, backstepping, and approximate-adaptive control. Frequency domain stability analysis using describing functions.

Electrical Engineering 617 3 units; H(3-0)

RF Integrated Circuit Design
Introduction to complementary metal oxide semiconductor (CMOS) wireless communication circuits; computer-aided design; impedance matching concepts; passive circuit elements in monolithic circuits; radio frequency integrated circuit building blocks.

Prerequisite(s): Electrical Engineering 567 or 647.

Antirequisite(s): Credit for Electrical Engineering 617 and 619.31 will not be allowed.

Electrical Engineering 619 3 units; H(3-1) or H(3-0)

Special Problems
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member.

MAY BE REPEATED FOR CREDIT

Electrical Engineering 623 3 units; H(3-1)

Biomedical Systems and Applications
Introduction to biomedical systems. The four elements of a biomedical monitoring system. Biomedical system modelling. Biomedical sensors: basic concepts. Biomedical amplifiers and signal conditioning circuits. Noise, noise sources and non-idealities. Repeatability of measurements. Power supplies for biomedical monitoring systems. Frequency conditioning. Isolation amplifiers and patient safety. Analog-to-Digital conversion and anti-aliasing requirements. Multichannel biomedical data acquisition. Real-time requirements. Real-time digital conditioning of biomedical signals. The concept of closed-loop real-time control.

Prerequisite(s): Consent of the Department.

Electrical Engineering 625 3 units; H(3-0)

Estimation Theory
Fundamentals of estimation theory as applied to general statistical signal processing applications such as communication systems, image processing, target and position tracking, and machine learning. Estimator fundamentals including probability density functions, Cramer Rao bounds, Fisher information, linear and nonlinear regression, sufficient statistics, maximum likelihood estimation, minimum mean square error, least squares, Bayesian estimators and concepts. Statistical tracking filters such as Kalman filter and particle filter.

Electrical Engineering 627 3 units; H(3-0)

Antennas
Foundations of theory and practice of modern antennas. Topics covered will include: theoretical background, antenna parameters, simple radiators, antenna array theory, wire antennas, broadband antennas, microstrip antennas, aperture radiators, base station antennas, antennas for mobile communications, antenna measurements.

Note: Students registering in this course should have a background in electromagnetics and basic microwave engineering.

Electrical Engineering 629 3 units; H(3-0)

Advanced Logic Design of Electronic and Nanoelectronic Devices
Two-level and multi-level logic synthesis; flexibility in logic design; multiple-valued logic for advanced technology; multi-level minimization; Binary Decision Diagrams, Word-level Decision Diagrams, sequential and combinational equivalence checking; technology mapping; technology-based transformations; logic synthesis for low power, optimizations of synchronous and asynchronous circuits, logical and physical design from a flow perspective; challenges of design of nanoelectronic devices.

Electrical Engineering 631 3 units; H(3-0)

System Identification and Parameter Estimation
Parametric models of linear time-invariant systems. System and noise models. Estimation of model parameters. Structure and order selection. Model validation. Convergence and sensitivity analysis. Experiment design. MIMO systems. Subspace

methods. Introduction to non-linear and/or time-varying systems.

Prerequisite(s): Electrical Engineering 649.

Electrical Engineering 633 3 units; H(3-0)

Wireless Networks
Wireless networks' architectures and standards. Wireless communication protocols including network access control protocols, routing, congestion and flow control protocols, mobility and resource management protocols. Modelling and analysis of wireless network performance. Current and future research challenges in wireless networks.

Note: A senior undergraduate course in wireless communications is suggested as preparation for this course.

Electrical Engineering 635 3 units; H(3-0)

Cryptography and Number Theory with Applications
The topic of the course is to provide the students with vital information about the use of number theory in designing and implementing various public key cryptographic schemes. We will stress on the efficacy of the algorithms used and their application in areas outside cryptography and coding theory.

Antirequisite(s): Credit for Electrical Engineering 635 and 619.87 will not be allowed.

Electrical Engineering 637 3 units; H(3-0)

Arithmetic Techniques with DSP Applications
The course is aimed at the use of specific computer arithmetic techniques for efficient design of DSP algorithms. We will provide comprehensive information form the theory of computer arithmetic. We will show how the performance of different algorithms can be optimized by using efficient arithmetic techniques. Many examples will be provided.

Antirequisite(s): Credit for Electrical Engineering 637 and 619.88 will not be allowed.

Electrical Engineering 641 3 units; H(3-0)

Optimization for Engineers
Introduction to optimization techniques for solving engineering problems. Modelling engineering problems as optimization problems. Recognizing and solving convex sets, functions and optimization problems. Unconstrained optimization methodology and engineering applications. Constrained optimization techniques and engineering applications. Special topics in optimization such as multi-objective optimization and geometric programming.

Antirequisite(s): Credit for Electrical Engineering 641 and 619.05 will not be allowed.

Electrical Engineering 645 3 units; H(3-0)
(formerly Electrical Engineering 619.51)

Data Mining and Knowledge Discovery
Types of data mining: classification, clustering, association, prediction. Processes: data preparation, model building. Techniques: decision tree, neural network, evolutionary computing, Bayesian network. Applications: multi-media, text and web mining.

Electrical Engineering 647 3 units; H(3-0)

Analog Integrated Circuit Design
Review of static and dynamic models of bipolar and field effect transistors. Basics of analog integrated circuit design. Computer-aided modelling. Fabrication processes and their influence on analog design. Operational voltage amplifier and transconductance amplifier design techniques. Case studies of bipolar and complementary metal oxide semiconductor (CMOS) designs. CMOS analog integrated circuit design project.

Electrical Engineering 649 3 units; H(3-0)
(formerly Electrical Engineering 619.22)

Random Variables and Stochastic Processes
Axiomatic view of probability; continuous and discrete random variables; expectation; functions of random variables; conditional distributions and expectations; stochastic processes; stationarity and ergodicity; correlation and power spectrum; renewal processes and Markov chains; Markov and non-Markovian processes in continuous time.

Electrical Engineering 651 3 units; H(3-0)
(formerly Electrical Engineering 619.04)

Resource Management for Wireless Networks
Qualitative and mathematical formulation of the resource management problem in wireless networks; elements of radio resource management: power and Walsh code allocation and control. Call admission control, traffic load control, packet scheduling; radio resource management algorithms: fixed resource allocation, handover resource management, transmitter power management, dynamic resource allocation, and packet scheduling algorithms; quality-of-service (QoS) and resource management; joint radio resource management problem across heterogeneous wireless networks; applications and case studies: resource management in third generation (3G) and beyond 3G wireless Internet Protocol (IP) networks; open research challenges in resource management for wireless networks.

Electrical Engineering 653 3 units; H(3-1T-3/2)
(formerly Electrical Engineering 619.23)

Theory and Practice Advanced DSP Processor Architecture
Architecture and capabilities of SISD, SIMD and VLIW processors; Developing high speed algorithms: code timing, reliability, background DMA activity, maintainability; Developing a personal software process appropriate for embedded systems.

Electrical Engineering 657 3 units; H(3-0)
(formerly Electrical Engineering 619.73)

Detection of Signals in Noise
Detection of distorted and noise corrupted deterministic and random signals. Application to optimum statistical signal processing algorithms in data communications, GPS, radar, synchronization and image processing.

Prerequisite(s): At least one of Electrical Engineering 675, 649, or 625 or consent of the Department.

Electrical Engineering 659 3 units; H(3-0)

Active-RC and Switched-Capacitor Filter Design
The filter design problem; operational amplifier characteristics; cascade methods of RC-active filter design; filter design with the active biquad; active filter design based on a lossless ladder prototype. Switched-capacitor (SC) integrators; design of cascade, ladder, and multiple feedback SC filters; non-ideal effects in SC filters; scaling of SC filters; topics in fabrication of SC filters.

Electrical Engineering 661 3 units; H(3-0)
(formerly Electrical Engineering 619.18)

Grid-Connected Inverters for Alternative Energy Systems
Analysis and design of grid-connected inverters fed by an alternative energy source. Switch mode converters, inverter topologies, harmonics, drive electronics, control methodologies, implementation techniques, course project.

Electrical Engineering 663 3 units; H(3-0)
(formerly Electrical Engineering 619.09)

Numerical Electromagnetic Field Computation
Solution techniques for electromagnetic fields: finite difference, finite elements/volumes, boundary elements, finite difference time domain, and moment methods. Practical aspects concerning computer implementation: accuracy, speed, memory, and solvers.

Electrical Engineering 667 3 units; H(3-0)
(formerly Electrical Engineering 619.25)

Intelligent Control
Application of machine learning algorithms in control systems: neural networks, fuzzy logic, the cerebellar model arithmetic computer, genetic algorithms; stability of learning algorithms in closed-loop non-linear control applications.

Prerequisite(s): At least one undergraduate level course in control systems.

Electrical Engineering 671 3 units; H(3-0)

Adaptive Signal Processing
Fundamentals: Performance objectives, optimal filtering and estimation, the Wiener solution, orthogonality principle. Adaptation algorithms: MSE performance surface, gradient search methods, the Widrow-Hoff LMS algorithm, convergence speed and misadjustment. Advanced techniques: recursive least-squares algorithms, gradient and least-squares multiple filter, frequency domain algorithms, adaptive pole-zero filters. Applications: system identification, channel equalization, echo cancellation, linear prediction, noise cancellation, speech.

Electrical Engineering 675 3 units; H(3-0)

Digital Communications
Physical layer digital communications. Linear modulation and demodulation using signal space concepts. Optimal and sub-optimal detection of symbols and sequences. Pulse shaping and spectral analysis. Wireless propagation and system design. Error correction using channel codes. Advanced techniques for high speed communications.

Prerequisite(s): Electrical Engineering 571.

Electrical Engineering 683 3 units; H(3-0)
(formerly Electrical Engineering 619.19)

Algorithms for VLSI Physical Design Automation
Aspects of physical design including: VLSI design cycle, fabrication processes for VLSI devices, basic data structures and algorithms, partitioning, floor planning, placement and routing.

Electrical Engineering 685 3 units; H(3-1)

Software Defined Radio Systems
Advanced design aspects related to the design of Software Defined Radio (SDR) systems applicable to wireless and satellite communication systems. System level modelling and baseband design aspects of SDR systems. Transmitter and receiver architectures appropriate for SDR transceivers. Multi-band transmitters, sub-sampling receivers and six-port based receivers. Design strategies and calibration techniques for SDR systems.

Prerequisite(s): Electrical Engineering 574 or consent of the Department.

Antirequisite(s): Credit for Electrical Engineering 641 and 619.64 will not be allowed.

Electrical Engineering 687 3 units; H(3-0)

Switch Mode Power Converters
Design and analysis of dc-to-dc and ac-to-ac single-phase power converters. Device characteristics. Dc-to-dc topologies, dc-to-ac topologies and ac-to-ac topologies. Linearized models. Classical feedback control; introduction to state-space analysis methods. Input harmonic analysis, output harmonic analysis, and techniques to obtain unity input power factory.

Electrical Engineering 691 3 units; H(3-0)

Integrated Micro and Nanotechnology Sensory Systems
Integrated circuits for sensing. The physical process of sensing photons and ions. The circuitry of signal amplification. Considerations for integrated circuit implementation. Solid state sensors and development in CMOS technology. Analog to Digital conversion in sensory arrays. Technology scaling and impact. Low voltage and implications regarding signal processing. Other types of sensors such as pH sensing. MEMS technology and applications. Integrated Light sources. System examples.

Antirequisite(s): Credit for Electrical Engineering 691 and 619.26 will not be allowed.

Electrical Engineering 693 3 units; H(3-0)

Restructured Electricity Markets
Basics of power systems economics, vertically integrated power monopolies, models of competition, market design and auction mechanisms, players in restructured electricity markets, generation scheduling in restructured electricity markets, perspective of large consumers, transmission operation in competitive power markets, transmission rights, the need for ancillary services in electricity markets, procurement and pricing of ancillary services, transmission and generation expansion in competitive markets.

Prerequisite(s): Electrical Engineering 587 or 601 or consent of the Department.

Electrical Engineering 695 3 units; H(3-1T)

Applied Mathematics for Electrical Engineers
Understanding of vector spaces and function spaces; eigenvalues and eigenvectors in both the linear algebraic and differential equation sense; special functions in mathematics; advanced methods for solutions of differential equations.

Prerequisite(s): Electrical Engineering 327.

Antirequisite(s): Credit for Electrical Engineering 695 and either 519.42 or 619.95 will not be allowed.

Electrical Engineering 697 3 units; H(3-2)

Digital Image Processing
Image formation and visual perceptual processing. Digital image representation. Two dimensional Fourier transform analysis. Image enhancement and restoration. Selected topics from: image reconstruction from projections; image segmentation and analysis; image coding for data compression and transmission; introduction to image understanding and computer vision. Case studies from current applications and research.

Prerequisite(s): Electrical Engineering 327.

Electrical Engineering 698 6 units; F(0-4)

Graduate Project
Individual project in the student's area of specialization under the guidance of the student's supervisor.

Note: Open only to students in the MEng Courses Only Route.

Energy and Environmental Systems EESS

Graduate Courses

Energy and Environmental Systems 601 3 units; H(3-1T)

Introduction to Energy and Environmental Systems
The course provides a structured overview to the interactions of energy systems and the environment. The lectures are taught collaboratively by several EESS faculty. The course aims to foster a unified, scientific understanding of energy flows and transformations in industrial society and the natural world; a scientific overview of some of the most important links between energy and environmental systems; and an introduction to the business, legal and regulatory systems that shape the interactions between energy and environment.

Prerequisite(s): Graduate standing in Energy and Environmental Systems specialization or instructor permission.

Energy and Environmental Systems 603 3 units; H(1-3T)

Project Course
Projects are applied interdisciplinary problem-solving courses in which students work as leaders or as members of project teams. Most course time is devoted to project management and presentations from students. The project course gives students experience working on weakly-structured, real-world problems that require teamwork and contributions from diverse disciplines. They are co-managed by students and faculty advisors and should be responsive to an external "client" or expert panel. Problem areas are abstracted from local, provincial and national situations and involve the interaction of energy systems, the environment and public policy. Oral and written presentations concerning the results of project studies are required.

Prerequisite(s): Graduate standing in Energy and Environmental Systems specialization or instructor permission.

Energy and Environmental Systems 606 3 units; H(2S-0) (formerly Energy and Environmental Systems 605)

Graduate Seminar
The graduate research seminar fosters the development of presentation and communication skills as well as engagement in critical analysis and debate. Course time is primarily research presentations by faculty, research staff and students. All students must present their work.

Prerequisite(s): Graduate standing in Energy and Environmental Systems specialization or instructor permission.

Energy and Environmental Systems 607 3 units; H(3-0)

Tools for Systems Analysis
This course provides an introduction to analytical methods and software tools that are most frequently used for research in energy and environmental systems. Analytical methods include risk, uncertainty and decision analysis; an introduction to engineering economics; and an introduction to tools for environmental modelling. Software tools include Excel, and extensions such as Crystalball, general purpose systems such as Matlab and Mathematica; and GIS tools for non-specialists.

Prerequisite(s): Graduate standing in Energy and Environmental Systems specialization or instructor permission.

Energy and Environmental Systems 619 3 units; H(3-0)

Special Topics
Students will be provided with the opportunity to focus on advanced studies in specialized topics pertaining to energy system engineering, law, public policy or economics, or a combination of these issues.

Prerequisite(s): Graduate standing in Energy and Environmental Systems specialization or instructor permission.

MAY BE REPEATED FOR CREDIT

Engineering ENGG

Instruction offered by members of Schulich School of Engineering.

Graduate Courses

Engineering 601 1.5 units; Q(3S-0)

Professional Development I
Topics covered include: health and safety, communication styles, supervisory relationships and respect in the lab, presentation skills including presentation planning and voice projection, reference gathering and management, awareness of plagiarism, and writing abstracts.

NOT INCLUDED IN GPA

Engineering 603 1.5 units; Q(3S-0)

Professional Development II
Topics covered include: presentation skills, skills for writing scientific manuscripts, peer review process, defense and candidacy, engineering design, intellectual property, and networking basics.

NOT INCLUDED IN GPA

Engineering 681 3 units; H(3-2)

Engineering Tools
The theory and use of numerical computational procedures to solve engineering problems.

Engineering 682 3 units; H(3-0)

Sustainability
Explores the interaction between resources and the environment. Technical and environmental aspects within the energy and environment cycle for project evaluation and management.

Antirequisite(s): Credit for Engineering 682 and Civil Engineering 693 will not be allowed.

Engineering 683 3 units; H(3-3)

Innovation and Entrepreneurship
Definitions, contexts, language, dynamics, historical and contemporary examples of Engineering Innovation and Entrepreneurship; innovation process from a multidisciplinary perspective; Engineering inventive processes.

Engineering 684 3 units; H(3-3)

Introduction to Project Management
Application of management principles to the project environment; planning, control, scope, time and cost processes; project organization and human resource issues. Students review aspects of a current major capital project and submit and defend a project report.

English ENGL

Instruction offered by members of the Department of English in the Faculty of Arts.

Graduate Courses

English 603 **3 units; H(3S-0)**

Topics in Genre
Specialized study of a topic involving a single genre or multiple genres.

MAY BE REPEATED FOR CREDIT

English 605 **3 units; H(3S-0)**

Topics in National or Transnational Literatures
Specialized study of a topic in national or transnational literary studies, in a critical context.

MAY BE REPEATED FOR CREDIT

English 607 **3 units; H(3S-0)**

Topics in Theoretical and Cultural Studies
Specialized study of a topic involving theoretical inquiry.

MAY BE REPEATED FOR CREDIT

English 609 **3 units; H(3S-0)**

Topics in a Literary Period
Specialized study of a topic in a literary period in its critical context.

MAY BE REPEATED FOR CREDIT

English 677 **3 units; H(3S-0)**
(formerly English 676)

Topics in Canadian Literature
Specialized study of a topic in Canadian literature in its critical context.

MAY BE REPEATED FOR CREDIT

English 681 **3 units; H(3S-0)**
(formerly English 680)

Topics in Literary Criticism
Specialized study of a topic in the field of literary criticism.

MAY BE REPEATED FOR CREDIT

English 685 **3 units; H(3S-0)**
(formerly English 684)

Special Topics
Specialized study of a topic in the field of literary studies.

MAY BE REPEATED FOR CREDIT

English 691 **3 units; H(3S-0)**

Graduate Pro-seminar
Introduces incoming graduate students to critical skills and professional issues in graduate level literary studies.

NOT INCLUDED IN GPA

English 693 **3 units; H(3S-0)**

Topics in Creative Writing: Poetry
A close examination and discussion of the student's own work, with emphasis on advanced technique.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

English 694 **3 units; H(3S-0)**

Topics in Creative Writing: Prose Fiction
A close examination and discussion of the student's own work, with emphasis on advanced technique.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

English 695 **3 units; H(3S-0)**

Topics in Creative Writing: Creative Non-Fiction
A close examination and discussion of the student's own work, with emphasis on advanced technique.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

English 698 **6 units; F(3S-0)**

Topics in Creative Writing: The Book-Length Manuscript
A close examination and discussion of the student's own work, with emphasis on advanced technique in a selected genre(s).

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

English 710 **3 units; H(1-0)**

Capstone Project
Independent research and original work to be undertaken under the direction of a faculty member in English, after all required course work has been completed.

Prerequisite(s): Consent of the Department.

NOT INCLUDED IN GPA

Entrepreneurship and Innovation ENTI

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Entrepreneurship and Innovation 601
3 units; H(3-0)

Entrepreneurial Thinking
Business leaders are challenged to think entrepreneurially – to seek opportunities and find ways to turn opportunities into viable ventures. These may be for-profit, not-for-profit, or social ventures. Students will engage in experiential learning to complete a feasibility assessment of such an opportunity, including the concept of giving back to society.

Entrepreneurship and Innovation 731
3 units, H(3-0)

New Venture Law
Legal principles impacting business decisions regarding new venture creation, growth and routine business operations. Topics may include: corporate structure, directors' and officers' liability, financing, intellectual property law, contracts and regulations.

Antirequisite(s): Credit for Entrepreneurship and Innovation 731 and 797.02 will not be allowed.

Entrepreneurship and Innovation 735
3 units; H(3-0)

Cultivating Entrepreneurship and Innovation
Designed to leverage innovative and effective ideas so as to take advantage of opportunities, effectively incorporate innovation and entrepreneurship throughout the organization, and create an environment where new ideas that add value must be an organizational priority.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Entrepreneurship and Innovation 781
3 units; H(3-0)

Introduction to Entrepreneurship
An experience-based course covering the prestart-up stage of business development through group projects and case studies designed to provide experience-based skill development in creativity, idea generation, and feasibility analysis.

Entrepreneurship and Innovation 783
3 units; H(3-1)

Opportunity Development
A project- and case-based course designed to explore concepts of opportunity development.

Entrepreneurship and Innovation 785
3 units; H(3-0)

Venture Development
A project-based course designed around the formation of business concepts in the formalization of a business plan.

Entrepreneurship and Innovation 787
3 units; H(3-0)

Applied Business Analysis
Approaches to advising new and existing ventures on effective venture development. Projects will involve the student conducting analysis of several ventures and providing advice to them.

Prerequisite(s): Marketing 601 or consent of the Haskayne School of Business.

Entrepreneurship and Innovation 789
3 units; H(3S-0)

Seminar in Entrepreneurship and Innovation
Study and discussion of current research literature and contemporary issues on topics related to Entrepreneurship and Innovation.

MAY BE REPEATED FOR CREDIT

Entrepreneurship and Innovation 791
3 units; H(3-0)

Technology Commercialization
The process of taking a technology product or service from development to the market, including market strategies, finding investors and potential early customers, the role of advisors, legal issues and the importance of the exit strategy for founders and early stage investors. Students will be required to complete a major project to write a feasibility study for a new technology or a case study of a successful technology venture.

Entrepreneurship and Innovation 793
3 units; H(3-0)
(formerly Entrepreneurship and Innovation 797.03)

Technology and Innovation Management
The dynamics of innovation as the primary driving force within firms and modern industrialized economies. Potential concepts are: incremental versus radical innovations, market-pull versus technology-push theories, dominant designs, technological trajectories, key factors for successful innovation. The emergence of new technologies; the importance of national and regional innovation systems; the role of science, regulations and social pressure in innovations dynamics; knowledge management; and implications for firms in rapidly changing industrial settings may be discussed.

Entrepreneurship and Innovation 797 **3 units; H(3S-0)**

Advanced Seminar in Entrepreneurship and Innovation
Intensive study and discussion of current literature and research with respect to selected, advanced topics in Entrepreneurship and Innovation. May include formal academic or applied research project.

Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Entrepreneurship and Innovation 799 **3 units; H(3S-0)**

Doctoral Seminars in Venture Development
799.01. Entrepreneurship: The State of the Art

799.02. Conceptual Models and Theories of New Venture Development

799.03. Special Topics in Entrepreneurship and Innovation

799.04. Advanced Topics in Entrepreneurship

Environmental Design EVDS

The following list of courses, offered by members of the Faculty of Environmental Design and members of other departments in the University, is specific to this academic year. Students are advised that some of the courses listed below may not be offered every year depending upon circumstances. Students should consult with the EVDS Graduate Program Administrator before registering in the following courses.

Graduate Courses

Environmental Design 601 **3 units; H(3-0)**

Conceptual Bases of Environmental Design
Conceptual frameworks in Environmental Design and theories related to design and environment that influence environmental design thinking, research, and practice.

Note: Students are strongly encouraged to complete Environmental Design 601 prior to entering their second registration year.

Environmental Design 603 **3 units; H(0-8)**

Introduction to Design Thinking
Foundation concepts in design and form making involving a sequence of progress skill building, visual and spatial thinking and problem solving exercises.

Antirequisite(s): Credit for Environmental Design 603 and Environmental Design Architecture 580 will not be allowed.

Environmental Design 616 **3 units; H(3-0)**

Urban Infrastructure and Land Use
Acquaints students with the key infrastructure systems of a city. Examines current policies, standards and practices, challenges, and innovations in the following infrastructure sectors: water, sewage, waste management, open space, energy, transportation, and communication. Discusses the relationship between infrastructure systems and land use, and its impacts on quality of life, economic development, spatial structure, and the environment. Emphasis is given to green infrastructure development. The course also examines various financial and institutional frameworks for delivering infrastructure systems, and how they vary across different contexts.

Environmental Design 620 **6 units; F(0-8)**
(formerly Environmental Design 618)

Urban Design Studio
This studio aims to further develop skills in conceptualization and visualization through consideration of contemporary urban design issues. It includes documentation and analysis of urban form and process, and explores site planning and design of the public realm. Issues of local and regional identity and sustainability inform the approach of the studio.

Prerequisite(s): Environmental Design Planning 636 or 637, or Environmental Design Landscape 667.

Environmental Design 621 **3 units; H(3-0)**

Health in the Built Environment
Concepts of health in an environmental context; historic approaches to preventative medicine; medical basis of building-related illness; case studies in indoor air quality; strategies for prescription and design of healthy indoor environments.

Environmental Design 622 **3 units; H(3-0)**

Real Estate Development and Finance
Focuses on the principles of real estate development and finance. Provides hands-on experience through real-world simulations and case studies. Goal is for students to gain a basic understanding of the planning process in real estate development, including private public partnerships, and development impacts. Introduces fundamental tools for conducting an economic and fiscal analysis of real estate proposals. Students will have an opportunity to develop a pro forma as part of a risk assessment. Other topics include the use of GIS for location studies and market assessment.

Environmental Design 624 **3 units; H(3-0)**

Impact Assessment and Risk Management
EIA is the process of identifying, predicting, evaluating and mitigating the environmental effects of development proposals prior to major decision-making. Biophysical, economic and social impact assessment will be reviewed in an integrated, interdisciplinary approach which will include lectures, studies of methodologies, theory and practical problems, and discourse with practitioners. Federal and various Provincial environmental impact assessment policies and procedures will be critically analyzed.

Environmental Design 628 **3 units; H(3-0)**

Housing and Neighbourhood Change
Considers urban growth management, affordable housing, suburban growth and inner-city redevelopment, current suburban development patterns, as well current municipal goals regarding density and intensification and precedents/best practices. Theoretical understanding and practical insights into these issues through assessment of the social, economic, and spatial aspects related to housing and neighbourhood change.

Environmental Design 630 **3 units; H(3-0)**

Geography of Crime
Introduces the fields of environmental criminology and the social and geographic aspects of crime. Explores the reasons why certain neighborhoods, and certain features of neighborhoods, tend to promote or discourage criminal activity. Special emphasis is placed upon the relationship between crime and the environment, crime prevention, spatial dynamics of crime, the criminality of place and the decision processes involved in criminal events. Ethical considerations and privacy aspects will be addressed throughout.

Prerequisite(s): Admission to the Certificate in Designing Smart and Secure Communities.

Environmental Design 632 **3 units; H(3-0)**

Designing Safe Communities
Based on the established training curriculum for certification of the SAFE Design Council, with supplementary material to increase the theoretical foundations of the topics. The SAFE Design Standard® begins with the assessment of the risk posed to a site by outside factors, and then includes an assessment of site access points, wayfinding and signage, pathways and roadways, barriers and fencing, visibility and illumination, mechanical and electronic security, and other design elements intended for controlling access and movement within a building or site.

Prerequisite(s): Environmental Design 630.

Environmental Design 634 **3 units; H(3-0)**

Designing Smart Communities
Provides an introduction to the emerging field of Smart Communities, showcasing groups and individuals that have made a conscious and deliberate effort to use information and communications technology (ICT) to transform the community's life and work in significant and fundamental ways. Smart Communities may be physical or virtual, and the concept is more about the creative use of ICT infrastructure than merely building it. The social, economic, technical, design and ethical aspects of Smart Communities will all be considered.

Prerequisite(s): Environmental Design 630.

Environmental Design 636 **3 units; H(3-0)**

Integrative Project
A capstone project course involving an independent, guided research project, which builds on student interests and faculty expertise. The projects may be completed individually or in small groups. The course will involve an initial face-to-face project definition session, online mentoring throughout the project, and final presentations on lessons learned and future research directions.

Prerequisite(s): Environmental Design 630, 632 and 634.

Environmental Design 640 **6 units; F(0-8)**
(formerly Environmental Design 623)

Regional Planning Studio
An overview of the history and theory of regional planning and an overview of regional planning institutional frameworks and issues in a Canadian regional planning context. Understanding current regional planning issues and institutional, legislative and policy frameworks in a Canadian land use planning context related to growth management, resource extraction, infrastructure and services, transportation, strategic planning, water and airshed management. A review and examination of regional land use planning and policy tools and role of regional planners in inter-jurisdictional and transboundary government and public-private stakeholder engagement mechanisms. Preparation of a plan.

Prerequisite(s): Environmental Design Planning 636 or 637, or Environmental Design Landscape 677.

Environmental Design 643 **3 units; H(3-0)**

Field Studies
Introduction to the architecture, urban landscape, planning issues, design culture and other relevant faculty topics in an international setting. Specific destination and itinerary in any given year are

dependent on availability and interest. Through a week long field trip students will learn about the built and natural environment of the selected city and its context.

Prerequisite(s): Admission to Environmental Design graduate degree program.

Environmental Design 650 3 units; H(3-0)

Theories of Sustainable Urban Design
Covers contemporary urban design history as well as seminal urban design theory. Also includes a review of the most up-to-date research in sustainable urban design, including its relationship to public health, global warming and adaptability to climate change trends.

Prerequisite(s): Admission to the Certificate in Sustainable Urban Design.

Environmental Design 652 6 units; F(0-6)

Site/Context Analysis and Sustainable Design Studio
Introduces the student to an analytical and comprehensive approach for understanding a project's site and context. Provides the student with tools and methods for the implementation of a sustainable urban design proposal in different climatic, environmental and cultural settings.

Prerequisite(s): Environmental Design 650.

Environmental Design 654 3 units; H(3-0)

Green Infrastructure and Land Use
Acquaints the student with the latest knowledge and technology in green urban infrastructure and sustainable practices of land use planning, including aspects of winter city design. Includes various site visits to state-of-the-art infrastructure facilities and lectures from invited experts.

Prerequisite(s): Environmental Design 652.

Environmental Design 656 6 units; F(0-6)

Advanced Urban Design Studio
Provides the opportunity for the integration of all the knowledge acquired in Environmental Design 650, 652 and 654. Includes the development of a comprehensive sustainable urban design proposal based on site and context analysis. The project site will be situated in Calgary and will involve local community advocates, developers, planners and engineers.

Prerequisite(s): Environmental Design 654.

Environmental Design 660 3 units; H(3-0)

Principles of Historic Conservation
Provides a foundation to historic conservation. Focuses on principles and theories pertaining to preservation and restoration practices; recognition of architectural periods, styles, and construction methods in context of the evolution of cultural landscapes; the definition of significance and integrity in buildings and districts; strategies by which buildings and their settings have been preserved and used; and methods of reading and interpreting the cultural environment. Also includes a review of the most up-to-date research in heritage conservation.

Environmental Design 662 3 units; H(3-0)

Heritage Conservation Policy and Planning
This practice-based course prepares students to act in some capacity as manager, architect, planner, and policy maker for historic sites and buildings. Provides an overview of the aspects of heritage conservation related to policy and planning. Reviews preservation policy and jurisdictional issues within a community development context, addresses complex social equity considerations associated with historic designation, examines economic incentives, and explores preservation philosophy and historic impact assessments. Includes visits to heritage sites and lectures from invited experts.

Environmental Design 664 3 units; H(3-0)

Sustainability and Historic Preservation
Examines the role of historic preservation in the context of pragmatic, social, economic and environmental imperatives of sustainable community development. Topics to be addressed include a range of historic examples of sustainable cultural practices, building envelope assessments, pathology and retrofit of heritage buildings, current trends of adaptive reuse of historic sites and case studies of effective implementation of heritage legislation in historic buildings. Although grounded in international experience and precedents, the course emphasizes relevance to western Canadian history and regional building traditions. Includes visits to heritage sites and lectures from invited experts.

Environmental Design 668 3 units; H(3-0)

Advanced Heritage Conservation Project
Provides an opportunity to work in an interdisciplinary manner to address real issues related to heritage conservation. Includes the development of a comprehensive heritage conservation proposal based on site and context analysis of a site in Alberta. The project will use the framework of the Historic Places Initiative (Identify, Protect and Preserve) to document buildings, districts and cultural landscapes and to interpret their historical and architectural significance. An Identification component will consider heritage resource documentation and evaluation; a Protection component will review heritage legislation, regulatory frameworks, and incentive programs; and a Preservation component will examine standards and guidelines, and preservation strategies and techniques.

Environmental Design 671 3 units; H(3-0)

Urban Design Theory
Intended to provide students with an introduction to theories, concepts, methods and contemporary issues in urban design. The course consists of lectures, case studies, seminars and short projects.

Environmental Design 675 3 units; H(3-0)

Urban Systems
Provides a general overview of urban history, development and planning traditions. Lectures and field studies give a chronological overview of urban, architectural and design history and the inter-relation to political programs, economic and strategic planning as well as cultural nationalism. The course will extract a number of more general issues about contemporary cities for debate.

Prerequisite(s): Admission to Environmental Design graduate degree program.

MAY BE REPEATED FOR CREDIT

Environmental Design 683 3 units; H(3-0)

Advanced Special Topics in Environmental Design
Thematic inquiry and design related to environmental design topics.

MAY BE REPEATED FOR CREDIT

Environmental Design 697 1.5 units; Q(3-0)

Advanced Special Topics in Environmental Design
Thematic inquiry and design related to environmental design topics.

MAY BE REPEATED FOR CREDIT

Environmental Design 703 1.5 units; Q(0-3)

Directed Study in Environmental Design
Thematic research, readings or design studio project related to environmental design topics.

Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Environmental Design 711 3 units; H(0-8)

Theoretical Basis for Interdisciplinary Intervention and Design
Comparisons and contrasts among disciplinary, multidisciplinary and interdisciplinary intervention and research. Focus on interdisciplinary teamwork knowledge and skills, on the ability to integrate research into professional real world contexts and on the ability to communicate research results effectively. This course is open only to students registered in a PhD program.

Environmental Design 723 3 units; H(0-6)

Interdisciplinary Intervention in Environmental Design
Interdisciplinary teams will tackle client-based real world environmental design problems. Intervention strategies and design as a problem-solving approach to complex urban, ecological, social, and technological interactions will be addressed.

723.02. Sustainable Futures and Planning Scenarios

723.03. People and Technology

Environmental Design 753 3 units; H(3-0)

Research Skills and Critical Thinking
Exploration of the research process in an environmental design context and using design as a method of research. Design of innovative research methods appropriate for environmental design research. Development of skills in research design and critical thinking while writing a research proposal.

MAY BE REPEATED FOR CREDIT

Environmental Design 783 3 units; H(0-3)

Directed Study in Environmental Design
Thematic research, readings or design studio project related to urban design, architecture, environmental design topics.

Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Environmental Design 793 3 units; H(0-8)

Workshop in Environmental Design
Instruction and supervised experience in the use of tools and equipment for the development of study models, prototypes and graphic material related to student projects.

Prerequisite(s): Consent of the Faculty.

Environmental Design 797 3 units; H(3-0)

Preceptorship
A Preceptorship is a study and training arrangement made between a student and an employer or an equivalent supervisor which has specific educational objectives, a method of evaluation, and is an integral part of a student's Program of Studies. Preceptorships offer a number of benefits: acquiring skills and knowledge which may be better obtained outside the University; developing first-hand experience of professional design practice; preparing for more focused studies in the Faculty; and conducting research.

Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Environmental Design Architecture EVDA

Instruction offered by members of the Faculty of Environmental Design.

Environmental Design Architecture courses are only open to students in the Master of Architecture program or with consent of the Instructor. Priority will be given to students in the MArch program.

Graduate Courses

Environmental Design Architecture 611
3 units; H(3-0)

Building Science and Technology II
Theory and principles of structural, foundation and building service systems. Application of building science principles to building structure and enclosure, examination of the types and manufacture of building elements and the application of building components to specific problems in architecture.

Environmental Design Architecture 613
3 units; H(3-0)

Structures for Architects I
Fundamentals of Structural Analysis including the characteristics and performance of the various components of structures; the terminology and notation necessary for effective teamwork with structural engineering consultants; and basic design calculations for simple structures.

Environmental Design Architecture 615
3 units; H(3-0)

Environmental Control Systems
Approaches to the design of heating, cooling, and ventilation systems for buildings. Issues in system design such as energy efficiency and indoor air quality.

Environmental Design Architecture 617
1.5 units; Q(3-0)

Architectural Lighting Design
Fundamentals of light and visual perception. Approaches to the design of non-uniform and uniform lighting systems for buildings. Issues in system design such as human satisfaction, performance, and energy efficiency. Development of skills in the selection and design of lighting systems.

Environmental Design Architecture 619
3 units; H(3-0)

Structures for Architects II
Advanced structural systems for buildings including: structural connections and composite structures; system characteristics and architectural intent; and case studies in contemporary building structures.

Environmental Design Architecture 621
3 units; H(3-0)

Introduction to Design Theories
The contemporary cultural, social, and philosophical arenas in which architecture exists are examined through lectures, readings and seminars.

Environmental Design Architecture 661
3 units; H(3-0)

Architectural Professional Practice
The nature of the building industry, stakeholders and many of the participants and their responsibilities. Brings together the theoretical framework of the architect's role in society with the practicality of managing a practice. Project management and office administration, trends, liabilities and systems for project control such as building economics; cost analysis and estimating techniques; and cost controls during design and construction.

Environmental Design Architecture 665
1.5 units; Q(3-0)

Leadership in Architecture
The practice of architecture deals with complex design requirements, diverse groups of people, changing processes, evolving contexts, and a range of modes of production. This course introduces students to a broad set of contemporary themes around the concept of leadership and architecture.

Environmental Design Architecture 682
6 units; F(0-8)

Intermediate Architectural Design Studio
An intermediate design studio in which students work on projects defined by the instructor. Topics may vary from year to year. They are determined by the creative interests of the faculty assigned to the course. Enrolment may be limited.

682.02 Intermediate Studio

682.04 Comprehensive Design Studio

Prerequisite(s): For EVDA 682.02: Environmental Design Architecture 582 or consent of the Faculty. For EVDA 682.04, the prerequisite is EVDA 682.02.

Environmental Design Architecture 703
3 units; H(0-3)

Directed Study in Architecture
Research and readings in architecture and design related to the Senior Research Studio in Architecture.

MAY BE REPEATED FOR CREDIT

Environmental Design Architecture 782
6 units; F(0-8)

Senior Research Studio in Architecture
A research design studio in which students collaborate with design faculty in exploring projects that engage contemporary issues defining the built and natural environments.

MAY BE REPEATED FOR CREDIT

Environmental Design Landscape EVDL

Instruction offered by members of the Faculty of Environmental Design.

Environmental Design Landscape courses are only open to students in the Master of Landscape Architecture program or with consent of the Instructor.

Graduate Courses

Environmental Design Landscape 603
3 units; H(2-2)

Site Technology I: Grading and Landform
Provides a working knowledge of grading, landform and storm water management systems and techniques. Covers fundamentals and advanced technologies including GPS grading and landform manipulation.

Environmental Design Landscape 605
3 units; H(2-2)

Site Technology II: Construction and Materials
Provides a working knowledge of landscape construction methods and materials through practical application of theories and techniques via a design project.

Environmental Design Landscape 607
3 units; H(2-2)

GIS for Landscape Architecture
Application of GIS modelling techniques to landscape planning, design and management issues. Advanced consideration of GIS for spatial planning and application to studio and research projects.

Environmental Design Landscape 609
3 units; H(0-3)

Advanced Digital Design, Representation and Communication for Landscape Architecture
Digital media offers a variety of tools and techniques to experiment, communicate and visualize their ideas and to collaborate with colleagues, allied professionals, and the public. Provides instruction in current methods and techniques of digital media used in the research and practice of landscape architecture, as well as state-of-the-art communication, collaboration and visualization hardware and software.

Environmental Design Landscape 629
3 units; H(3-0)

Landscape Architecture History and Theory
An introduction to the history, theory and contemporary issues of landscape architecture. Develop a critical awareness of major conceptual frameworks, and the socio-political contexts in which they developed, both conceptually and in realized projects.

Environmental Design Landscape 639
3 units; H(2-2)

Landscape Responses to Climate Change, Energy and Water
Identifies landscape-oriented solutions to local and global issues of climate change, energy, and water problems through research and project proposals. Provides the opportunity to identify the most pressing local, regional or international issues and develop solutions.

Environmental Design Landscape 641
3 units; H(2-2)

Green Infrastructure/Winter City Design
An introduction to the systems of urban and regional resource management through targeted green infrastructure projects, particularly in a winter city context. Provides background on current methods, the state-of-the-art, and research and development that will shape future technologies. Identifies contemporary approaches, sociocultural, and ecological concepts for using plant material in landscapes, green roofs and biomass.

Environmental Design Landscape 643
3 units; H(3-0)

Professional Practice and Project Management for Landscape Architecture
An introduction to the professional practice of landscape architecture. Includes the legal and ethical frameworks for practice, as well as project management.

Environmental Design Landscape 645
3 units; H(3-0)

Plants in the Landscape
Introduces students to plant taxonomy, plant identification, and planting design. Covers both natural and designed landscapes, and focuses on plant materials appropriate in the context of Calgary and region.

Environmental Design Landscape 667
6 units; F(0-8)

Landscape Architecture Studio I
An integration of skills and processes developed to this point in the program through an investigation into a topical, issue-based problem, and development of solution(s) in a landscape context.

Prerequisite(s): Environmental Design Planning 625.

Environmental Design Landscape 668
6 units; F(0-8)
(formerly Environmental Design Landscape 677)

Landscape Architecture Studio II
An integration of skills and processes developed to this point in the program through an investigation into a topical, issue-based problem, and development of solution(s) in a landscape context. Builds on skills and knowledge from previous studios and is a progression in terms of complexity and design process.

Environmental Design Landscape 767
6 units; F(0-8)

Regional Landscape Systems Studio
An introduction to landscape planning and design at the regional scale. Particular emphasis on the interrelationships between biophysical (i.e. ecological, geological) systems and anthropogenic (i.e. social, political, economic) systems and processes as agents of landscape transformation, and determinants of form.

Environmental Design Landscape 777
6 units; F(0-8)

Senior Research Studio in Landscape Architecture
A research-oriented project studio that explores contemporary themes in landscape architecture. Centres on a real world problem or project; the analysis of issues and context, and the formulation of a comprehensive design solution involving advanced methods, techniques and practices.

Environmental Design Planning EVDP

Instruction offered by members of the Faculty of Environmental Design.

Environmental Design Planning courses are only open to students in the Master of Planning program or with consent of the Instructor.

Graduate Courses

Environmental Design Planning 602
3 units; H(2-2)
(formerly Environmental Design 602)

Computer Modelling for Urban Design
Introduction to the use of computer modelling, animation and virtual reality in urban design. Professional CAD and rendering applications will be used to explore the aesthetic and technical aspects of design. Emphasis given to developing sensitivity to the application appropriate to communicating three dimensional urban and natural form using computer generated images.

Corequisite(s): Environmental Design Planning 625.

Environmental Design Planning 611
3 units; H(2-2)
(formerly Environmental Design 611)

Geographic Information Systems for Environmental Design
Introduction to the use of GIS in urban planning and environmental management. GIS modelling focusing on population projection, location theory, land use modelling and environmental and ecological management. Case studies from both the public and private sector provide the basis of assignments. Emphasis given to developing sensitivity to the application appropriate for specific GIS problems.

Environmental Design Planning 621
3 units; H(3-0)

Professional Planning Practice
Considers various plans, policies, regulatory processes, legal institutions and administrative frameworks involved in urban and regional planning. Examines the role of planners in municipal development processes related to land use re-designations, development permits, subdivision and appeals. Discusses professional planning issues including ethics, relationships with clients, the public, and other professions. Discusses practice options for graduates including professional certification/registration.

Environmental Design Planning 625
3 units; H(0-8)

Site Planning Studio
Introduction to urban design practice. Emphasizes sense of place, human behaviour/built form relationships and sustainability. Completion of a series of progressively complex site planning projects. Skills development in hand and computer-aided drawing to describe, document and analyze urban form and processes and to develop physical plans.

Corequisite(s): Environmental Design Planning 602.

Environmental Design Planning 626
3 units; H(4-4)
(formerly Environmental Design 626)

Landscape Ecology and Planning
Key concepts in ecology, landscape ecology and environmental science relevant to planning at landscape scales. Principles of urban ecology, regional landscape ecology, watershed management and parks and protected area design are coupled with knowledge of landscape processes, ecosystem services, ecological infrastructure, and habitat to assess planning interventions in the built and natural environments. Skills are developed in geographic information systems (GIS) for monitoring the current state of landscapes and potential challenges to landscape function and for proposing solutions to these challenges. Includes guest speakers from government and industry, GIS exercises and field visits to various areas within the region.

Environmental Design Planning 627
3 units; H(3-0)

Planning History and Theory
An introduction to theories and practices of planning with a focus on the late nineteenth century to the present. Explores the forces that shaped cities/regions and key ideas/models invented in response. Examines the relationship between theory/practice and past/present. Explores the influence of planners, architects, landscape architects, and others on planning theory and resulting physical form. Presents case studies and examples in the Canadian context. Develops a critical awareness of the roles of environmental design professionals within a framework that of technical, social, environmental and political factors.

Environmental Design Planning 631
3 units; H(3-0)

Planning and Public Engagement
Overview of key principles and theories, and contemporary issues and tools of participation and public engagement as it applies to planning. Consideration of public engagement, facilitation, negotiation and conflict resolution processes from the point of view of community activists, city planners, developers and planning/design professionals. Development and implementation of public engagement plans.

Antirequisite(s): Credit for Environmental Design Planning 631 and 632 will not be allowed.

Environmental Design Planning 632
1.5 units; Q(3-0)
(formerly Environmental Design Planning 631)

Planning and Public Engagement
Overview of key principles and theories, and contemporary issues and tools of participation and public engagement as it applies to planning. Consideration of public engagement, facilitation, negotiation and conflict resolution processes from the point of view of community activists, city planners, developers and planning/design professionals. Development and implementation of public engagement plans.

Environmental Design Planning 633
3 units; H(3-1)

Project Management for Planners
Principles, techniques and tools of project management. Development, administration, monitoring and evaluation of implementation plans, including financial aspects are discussed. Project risk analysis and management.

Antirequisite(s): Credit for Environmental Design Planning 633 and 634 will not be allowed.

Environmental Design Planning 634
1.5 units; Q(3-1)
(formerly Environmental Design Planning 633)

Project Management for Planners
Principles, techniques and tools of project management. Development, administration, monitoring and evaluation of implementation plans, including financial aspects are discussed. Project risk analysis and management.

Environmental Design Planning 635
3 units; H(3-0)

Analytic Methods for Planners
Approaches to identify, gather and critically analyze strategic information needed to assess planning situations and support decision-making. Focuses on both quantitative and qualitative planning methods. Techniques to present information effectively.

Environmental Design Planning 636
6 units; F(0-8)
(formerly Environmental Design Planning 637)

Community Planning Studio
Introduction to land use planning and development issues. Provides a step-by-step introduction to community planning processes and essential planning policies to create development that is economically feasible, socially inclusive and environmentally sustainable.

Prerequisite(s): Environmental Design Planning 625.

Environmental Design Planning 644 6 units; F(0-8)

Advanced Professional Planning Studio
An advanced studio exploring contemporary themes in planning and professional planning practice. Centres on a real world problem or client project; involves analysis, synthesis, and formulation of a planning or urban design solution. Culminates in a professional report and presentation.

Prerequisite(s): Environmental Design Planning 625; Environmental Design Planning 636 or 637; and one of Environmental Design 618, 620, 623 or 640.

Environmental Engineering ENEN

Instruction and services offered by Centre for Environmental Engineering Research & Education (CEERE), Schulich School of Engineering.

Graduate Courses

Environmental Engineering 603 3 units; H(3-0)

Principles of Environmental Engineering
Mass and energy balance for reacting and non-reacting environmental engineering systems under steady state and unsteady state conditions. Fundamentals of momentum, heat and mass transfer as applied in air and water pollution. Thermodynamic and phase equilibria considerations. Contaminant partitioning and transport in air, surface water and groundwater. Chemical reaction kinetics. Application of ideal continuously stirred tank reactor (CSTR) and plug flow reactor (PFR) concepts in environmental engineering. Residence time distribution (RTD) and reactor non-idealities. Introduction to life cycle analysis.

Environmental Engineering 605 3 units; H(3-0)

Environmental Chemistry and Microbiology
Chemistry of organic and inorganic contaminants in the environment. Natural chemical cycles in the biosphere, geosphere, hydrosphere and atmosphere, and consequences of anthropogenic disturbances. Aquatic, atmospheric and soil chemistry. The fate of hazardous, refractory and heavy metal pollutants in the environment. Introductory toxicological chemistry and atmospheric chemistry. Analytical techniques for contaminants in air, water, energy and soil. Introductory microbiology: characteristics and classification of microorganisms, kinetics and mathematical models of microbial growth, applications in environmental engineering. Introduction to ecology.

Environmental Engineering 619 3 units; H(3-0)

Special Topics
New courses on specialized topics relevant to environmental engineering. It may also be offered to doctoral degree students to enable them to pursue advanced studies in particular areas under the direction of a faculty member, which must be arranged and approved prior to registration.

MAY BE REPEATED FOR CREDIT

Environmental Engineering 620 3 units; H(3-0)

Water Quality
Water quality parameters, indicators of water pollution, pesticides, nutrients and other contaminants in water, fate and distribution of effluents in water bodies, water treatment options.

Environmental Engineering 621 3 units; H(3-0) (Chemical Engineering 701)

Experimental Design and Error Analysis
Statistical analysis and design of engineering experiments. Random variables and sampling distributions; estimation and hypothesis testing; concepts of central tendency, variability, confidence level; correlation, regression and variation analysis; robust estimation; experiments of evaluation; experiments of comparison; factorial experiments (analysis of variance); experimental designs (involving randomization, replication, blocking and analysis of covariance).

Antirequisite(s): Credit for Environmental Engineering 621 and Chemical Engineering 701 will not be allowed.

Environmental Engineering 623 3 units; H(3-0)

Air Dispersion Modelling
Regulations and policy. Mathematical models of contaminant transport in the atmosphere. Atmospheric thermodynamics. Turbulence in the planetary boundary layer. Turbulence and air pollution meteorology. Gaussian plume. Gradient transport and higher-order closure models. Point, area and line sources. Similarity theories. Basic statistical methods applied to turbulent flows. Urban air shed modelling. Theoretical development and practical applications to engineering problems. Air dispersion modelling using computer software.

Environmental Engineering 625 3 units; H(3-0)

Computational Methods for Environmental Engineering
Taylor series, numerical integration. Linear and non-linear algebraic equations and solvers. Ordinary and partial differential equations. Finite difference methods: explicit, implicit and Crank-Nicholson methods. Finite difference, finite element or finite volume numerical approximations. Initial and boundary value problems. Boundary conditions, discretization considerations, and design of approximations, accuracy and error reductions. Applications in environmental engineering, such as pollutant dispersion and transport, will be discussed.

Antirequisite(s): Credit for Environmental Engineering 625 and any of Chemical Engineering 639, Civil Engineering 743 or Mechanical Engineering 631 will not be allowed.

Environmental Engineering 627 3 units; H(3-0)

Contaminant Transport
Mathematical models for contaminant transport in ground water. Flow/transport through porous media, advection, dispersion, diffusion. Sources and sinks. Applications of analytical finite element and finite difference equations, Environmental modelling using computer software.

Environmental Engineering 631 3 units; H(3-0)

Spatial Statistics for Environmental Modelling
Spatial statistics for topological, geometric and geographic properties. Spatial statistical models for data having an explicit spatial distribution. Basic and advanced methods in geo-spatial statistics for point, area and continuous variables. All levels (from visual to analytical) of possible spatial analysis techniques are examined for each type of variable and applications in environmental modelling are used to illustrate the concepts.

Environmental Engineering 633 3 units; H(3-0)

Fuzzy Logic for Environmental Engineering
Complex, non-linear, or ambiguous system models. Fuzzy set theory, fuzzy logic operations, fuzzification and de-fuzzification. Development of membership functions, fuzzy system simulation, Rule-based reduction methods, Fuzzy classification and pattern recognition, Fuzzy arithmetic and extension principle, Fuzzy Control and Fuzzy cognitive mapping, applications in environmental engineering.

Environmental Engineering 635 3 units; H(2-2) (Geomatics Engineering 583)

Environmental Modelling
Nature and purpose of environmental modelling; the top-down and the bottom-up approaches; typology of environmental models; definition of fundamental concepts; steps involved in designing and building a model; calibration, verification and validation of models; scale dependency; sensitivity analysis; characteristics, architecture and functioning of selected environmental models.

Environmental Engineering 637 3 units; H(3-0) (Geomatics Engineering 637)

Earth Observation for the Environment
An introduction to environmental earth observation systems in particular to satellite platforms. Topics include: discussion of physical principles; imaging system geometries; radiometric corrections, including calibration and atmospheric correction; spatial filtering for noise removal and information extraction; geometric corrections, including rectification and registration; fusion of multi-dimensional datasets; and application of satellite images in addressing selected environmental issues.

Antirequisite(s): Credit for Environmental Engineering 637 and Geomatics Engineering 637 or 655 will not be allowed.

Environmental Engineering 641 3 units; H(3-0) (Chemical Engineering 643)

Air Pollution Control Engineering
Introduction to air quality and air pollution. Energy and air pollution. Fossil fuel combustion and related air pollution. Industrial air pollution control. Control of particulate matter. Control of VOCs, SOx, and NOx. Adsorption, absorption and biofiltration of air pollutants. GHG emission control. Recent advances on related topics.

Antirequisite(s): Credit for Environmental Engineering 641 and Chemical Engineering 643 will not be allowed.

Environmental Engineering 643 3 units; H(3-0)

Air Pollutant Sampling and Characterization
Fundamentals and principles of air pollutant sampling and characterization. Kinematics of gases. Principles of gaseous pollutant sampling. Aerosol technology. Isokinetic sampling. Statistics and data analyses for airborne particulate matter. Particle size and concentration measurements. Indoor air quality assessment.

Environmental Engineering 651 3 units; H(3-0)

Solid Waste Engineering
Analysis and implementation of solid waste minimization strategies. Aerobic biological treatment of waste. Landfill bioreactors for energy recovery. Performance-based design of landfills, soil-chemical interactions and implications. Leachate migration in unsaturated/saturated zones. Design and construction of barrier systems. Leachate collection systems. Landfill closure issues. Life cycle assessment of waste management systems.

Environmental Engineering 653 3 units; H(3-0) (Civil Engineering 747)

Contaminated Soil Remediation
Overview of soil remediation engineering. Contaminant partitioning in air, water and gas phases. Phases of site assessments, Physical and chemical treatment processes, soil vapour

extraction, air sparging, soil washing, soil flushing, thermal desorption and incineration, solidification and stabilization, vitrification, biological treatment processes, bioremediation kinetics, ex situ and in situ techniques. Liquid phase bioremediation as it pertains to soil remediation.

Antirequisite(s): Credit for Environmental Engineering 653 and Civil Engineering 747 will not be allowed.

Environmental Engineering 655 3 units; H(3-0) (Civil Engineering 745)

Hazardous Waste and Contaminated Sites Management
Integrated waste management. Functional and fundamental properties of hazardous waste. Toxicological properties of contaminants. Contaminant release mechanisms. Fate and transport of contaminants in the environment. Contaminated site assessment principles. Quantitative human health risk assessment (QHHRA) as applied to contaminated sites. Hazard identification, exposure pathway analysis, risk characterization. Risk management and site remediation. Methods of hazardous waste treatment and contaminated site remediation. Secure land disposal of hazardous waste and contaminated soils and sludges.

Antirequisite(s): Credit for Environmental Engineering 655 and Civil Engineering 745 will not be allowed.

Environmental Engineering 661 3 units; H(3-0) (Chemical Engineering 645)

Industrial and Produced Wastewater Treatment
Sources and characterization of industrial wastewater. Treatment objectives and regulations. Unit and process design. Physical/chemical treatment including sedimentation, coagulation, filtration, absorption, adsorption, ion exchange, membrane processes and pH adjustment.

Antirequisite(s): Credit for Environmental Engineering 661 and Chemical Engineering 645 will not be allowed.

Environmental Engineering 663 3 units; H(3-0) (Civil Engineering 741)

Biological Processes for Wastewater Treatment
Specialized biological wastewater treatment processes for removal of impurities not effectively removed by conventional secondary wastewater treatment systems, such as nutrients (e.g. nitrogen and phosphorus), residual organics, residual solids, bacteria and viruses. Wetlands. Activated sludge modelling. Biological nutrient removal. Sludge management. Disinfection.

Antirequisite(s): Credit for Environmental Engineering 663 and Civil Engineering 741 will not be allowed.

Environmental Engineering 665 3 units; H(3-0) (Chemical Engineering 665)

Wastewater Issues for the Oil and Gas Industry
Specialized biological wastewater treatment processes for removal of impurities not effectively removed by conventional secondary wastewater treatment systems, such as nutrients (e.g. nitrogen and phosphorus), residual organics, residual solids, bacteria and viruses. Wetlands. Activated sludge modelling. Biological nutrient removal. Sludge management. Disinfection.

Antirequisite(s): Credit for Environmental Engineering 665 and Chemical Engineering 665 will not be allowed.

Environmental Engineering 671 3 units; H(3-0)

Energy and Environment
Introduction to formation, extraction, transportation and conversion of fossil fuels; electricity generation, transmission and distribution; thermal power and cogeneration; nuclear power; renewable energy sources; energy efficiency and conservation; exergy analysis; greenhouse gas emissions; air, land and water pollution and their mitigation.

Environmental Engineering 673 3 units; H(3-0) (Mechanical Engineering 637)

Thermal Systems Analysis
Fundamentals of thermodynamics, fluid mechanics, heat transfer and combustion; Modelling of thermophysical properties; Second law of thermodynamics, concept of entropy generation and exergy analysis; Minimizing environmental impact; Advanced design and analysis of heat exchangers, co-generation, renewable energy systems, and propulsion systems.

Antirequisite(s): Credit for Environmental Engineering 673 and Mechanical Engineering 637 will not be allowed.

Environmental Engineering 681 3 units; H(0-6)

Project in Environmental Engineering I
Allows course-based MEng degree students with the opportunity of pursuing advanced studies or a design project in environmental engineering under the direction of one or more faculty members, which must be arranged and approved prior to registration. A written proposal, progress reports, and a final report are required.

Prerequisite(s): Consent of the Centre.

Antirequisite(s): Credit for Environmental Engineering 681 and 682 will not be allowed.

Note: Available to course-based MEng degree students only after completing most other courses for the degree.

Environmental Engineering 682 6 units; F(0-6)

Project in Environmental Engineering II
Allows course-based MEng degree students with the opportunity to work on a comprehensive research or design project under the supervision of one or more faculty members, which must be arranged and approved prior to registration. A written proposal, progress reports, and a final report are required.

Prerequisite(s): Consent of the Centre.

Antirequisite(s): Credit for Environmental Engineering 682 and 681 will not be allowed.

Note: Available to course-based MEng degree students only after completing most other courses for the degree.

Environmental Engineering 691 3 units; H(3-0)

Environmental Policy Analysis
An examination of the policy tools used in decision-making related to the environment, the course aims to facilitate dialogue between political scientists and engineers. Topics include: risk analysis; decision analysis; uncertainty assessment; and benefit-cost analysis. The structure and evolution of environmental regulation will be used as a theme with an emphasis on energy.

Antirequisite(s): Credit for Environmental Engineering 691 and Political Science 755.31 will not be allowed.

Environmental Engineering 693 3 units; H(3-0)

Life Cycle Assessment
Concepts of life cycle assessment. Consideration of environmental and economic impacts from the extraction of resources to the disposal of unwanted residuals. Review and evaluation of tools and frameworks (e.g. process, input-output, hybrid life cycle assessment). Relative merits of various methods for interpreting and valuing the impacts. Examples of applications in environmental engineering and the energy industry.

Antirequisite(s): Credit for Environmental Engineering 693 and Environmental Design 683.85 will not be allowed.

Finance FNCE

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Finance 601 3 units; H(3-0)

Managerial Finance
The major decision-making areas confronting modern financial managers today. Provides a general understanding of financial markets and how they can be used for personal finance. Covers traditional subjects such as capital budgeting, net present value, risk/return, capital structure and dividend policy. Topical areas covered are IPOs, mergers and acquisitions, derivatives and options. The course is integrated with current events from the financial world.

Prerequisite(s): Accounting 601.

Finance 737 3 units; H(3-0)

Finance and Governance for Managers
Introduction to basic and advanced concepts of financial management, and application of the tools of financial analysis from the standpoint of the CEO and C-level executives. Topics include ratio analysis, risk concepts, valuation principles, capital budgeting, cost of capital, interest rates, time value of money, leverage, capital structure, dividend policy, financial instruments, working capital management, short- and long-term financing, mergers and acquisitions, and long-range financial planning. The relationship between financial policy and corporate strategy is examined. The broad framework of corporate governance, including incentive structures, monitoring systems, agency problems, payout policies, capital structure, board and ownership structure, executive compensation and corporate control is also covered, with a special focus on accounting and auditing as corporate governance devices.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Finance 745 3 units; H(3-0)

Futures and Options
After presenting basic definitions, institutional details, and strategies, a general theory of derivative pricing based on the principle of No Arbitrage will be developed. This theory will then be applied to the basic derivative contracts (futures, forwards, put options and call option) as well as exotic options. Using the binomial model, as well as the continuous time model of Black Scholes, hedging and replication will also be examined.

Prerequisite(s): Finance 601.

Finance 751 3 units; H(3-0)

Advanced Topics in Financial Administration
Classical and contemporary topics in the theory and practice of financial management including capital structure, cost of capital, real options valuation, bankruptcy costs and debt holder-equity holder conflicts, corporate financial strategy, managerial incentives and financial decisions,

information conveyed by financial decisions, and mergers and acquisitions.

Prerequisite(s): Finance 601.

Finance 753 **3 units; H(3-0)**

Problems in Financial Management
The application of financial management principles to actual problems mainly in the corporate sector, including such areas as working capital, management, short, intermediate and long-term financing problems, dividend policy and reorganization.

Prerequisite(s): Finance 601.

Finance 755 **3 units; H(3-0)**

Capital Budgeting
Capital investment policies, real options, required rate of return calculation, tax factors, risk analysis, buy versus lease, abandonment considerations.

Prerequisite(s): Finance 601.

Finance 757 **3 units; H(3-0)**

Management of Financial Institutions
Financial intermediaries such as banking and brokerage. Explains the risks faced by institutions and the integration through modern financial markets. Covers issues such as lending, trading, securitization, deposit insurance and the regulatory environment. Concludes with modern bank management from the shareholder value point of view.

Prerequisite(s): Finance 601.

Finance 759 **3 units; H(3-0)**

Investment and Portfolio Management
Theory and analysis of investment and portfolio management decisions. Evaluation of performance of individual and professional investors and portfolio managers.

Prerequisite(s): Finance 601.

Finance 765 **3 units; H(3-0)**

Mergers and Acquisitions
A study of economic theory and practical issues around takeover strategies, and takeover defence strategies. Valuation issues, corporate restructuring, corporate governance, and methods of ensuring congruence between management and shareholder goals are also discussed.

Prerequisite(s): Finance 601.

Finance 767 **3 units; H(3-0)**

Financial Risk Management
A framework for evaluating financial risks and managing them with the use of financial securities including derivatives. Includes firm valuation with risk management, value-at-risk, testing financial models, optimal hedging strategies, energy risk management, market risk, static versus dynamic strategies, interest rate risk, credit risk and liquidity risk. Case analysis of financial disasters due to risk management failures.

Prerequisite(s): Finance 601.

Finance 777 **3 units; H(3-0)**
(formerly Management Studies 761)

Personal Financial Management in Canada
Introduction to personal financial management in Canada. Goal setting, personal financial statements analysis, the time value of money, the Canadian personal income tax system, taxation issues for small businesses, risk management, an overview of investments, retirement planning and estate planning. Completion of a personal financial plan by the end of the course.

Prerequisite(s): Finance 601.

Note: May not be used as part of a student's major in Finance.

Finance 785 **3 units; H(3-0)**

New Venture Finance
Problems of valuing and financing new ventures. Emphasis on financial theory, best practices and modelling of new ventures. Case studies and opportunities to develop detailed financial plan for live new venture.

Prerequisite(s): Finance 601 or consent of the Haskayne School of Business.

Finance 789 **3 units; H(3S-0)**

Seminar in Financial Management
Intensive study and discussion of current literature and research with respect to selected, advanced topics in Finance.

MAY BE REPEATED FOR CREDIT

Finance 795 **3 units; H(3-0)**

International Finance
A study of the international financial environment and the issues firms face when operating in this environment. Currency regimes, currency crises, balance of payments, exchange rate and interest rate parity conditions, supernational agencies, political risks, management of foreign exchange exposure are some of the major topics studied.

Prerequisite(s): Finance 601.

Finance 797 **3 units; H(3S-0)**

Advanced Seminar in Finance
Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Finance 799 **3 units; H(3S-0)**

Doctoral Seminars in Finance
799.01. Theory of Finance

799.02. Empirical Methods in Finance

799.03. Topics in Finance

799.04. Financial Engineering

799.05 Theory of Corporate Finance

799.06 Asset Pricing

799.07 Topics in Asset Pricing and Corporate Finance

Fine Arts FINA

Instruction offered by the Faculty of Arts.

Graduate Courses

Fine Arts 601 **3 units; H(0-3)**

Studies at the Banff Centre
Interdisciplinary fine arts studies. Although the Banff Centre does not provide credit course instruction, students with advanced experience in art, dance, drama or music at the Banff Centre may apply for graduate-level credit from the University of Calgary.

Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Fine Arts 603 **3 units; H(3-0)**

Topics in Fine Arts: Interdisciplinary Seminar
Interdisciplinary seminar in the advanced study and interpretation of the interrelationships between music, the fine arts, and the history of ideas, using a theme-oriented approach.

Note: This is a required course in the PhD program for Music Education, Composition and Musicology.

MAY BE REPEATED FOR CREDIT

Fine Arts 607 **3 units; H(3-0)**

Topics in Multi-Media Research
Concentrated instruction in computer applications in the Fine Arts.

Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

French FREN

Programme offert par L'École de langues, linguistique, littératures et cultures de la Faculté des Arts.

Il est recommandé aux étudiants de consulter l'École chaque étape de la planification de leur programme.

Instruction offered by members of the School of Languages, Linguistics, Literatures and Cultures in the Faculty of Arts.

Students are encouraged at all times to seek guidance from the School in planning any aspect of their programs.

Graduate Courses

(Dans des cas considérés comme exceptionnels, le Département accordera des crédits au niveau supérieur pour des cours de niveau 500. L'autorisation du Département sera alors indispensable. Les étudiants qui suivront un cours de niveau 500 dans le but d'obtenir des crédits comptant pour leurs études supérieures seront tenus d'effectuer des travaux supplémentaires.)

(The Department will give graduate credit for 500-level courses in cases it deems exceptional. This option is subject to the approval of the Department. Graduate students taking a 500-level course for graduate credit will be asked to complete additional requirements.)

French 605 **3 units; H(3-0)**

Problématiques littéraires
MAY BE REPEATED FOR CREDIT

French 609 **3 units; H(3-0)**

Problématiques linguistiques
MAY BE REPEATED FOR CREDIT

French 625 **3 units; H(3-0)**

Études cinématographiques
MAY BE REPEATED FOR CREDIT

French 635 **3 units; H(3-0)**

Le texte narratif
MAY BE REPEATED FOR CREDIT

French 637 **3 units; H(3-0)**

Études théâtrales
MAY BE REPEATED FOR CREDIT

French 639 **3 units; H(3-0)**

Poésie de langue française
MAY BE REPEATED FOR CREDIT

French 655 **3 units; H(3-0)**

Francophonies
MAY BE REPEATED FOR CREDIT

French 675 **3 units; H(3-0)**

Féminismes et Gender
MAY BE REPEATED FOR CREDIT

French 685 **3 units; H(3-0)**

Voix québécoises et canadiennes
MAY BE REPEATED FOR CREDIT

French 689 **3 units; H(3-0)**

Arts et Cultures
MAY BE REPEATED FOR CREDIT

French 691 **3 units; H(3-0)**

Autour d'un auteur
MAY BE REPEATED FOR CREDIT

French 695 **3 units; H(3-0)**

Profession et recherche
MAY BE REPEATED FOR CREDIT

Geography GEOG

Instruction offered by members of the Department of Geography in the Faculty of Arts.

Graduate Courses

Geography 601 **3 units; H(0-1.5S)**

Graduate Research Seminar
Presentation and evaluation of graduate research seminars.

Prerequisite(s): Consent of the Department.

Note: Normally offered in fall and winter terms. Normally open to Geography thesis-based graduate students only.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Geography 603 **3 units; H(3-3)**

Remote Sensing: Basics and Beyond
Introduction to the theory and practice of remote sensing. Topics include physics of remote sensing, sensor systems, resolutions, geometric and radiometric correction, image analysis (enhancements, filtering, texture analysis, principal components, classification approaches and algorithms and accuracy). May include specific image acquisition systems and their methodological requirements. Emphasis is on fundamental concepts. Laboratory provides experience with fundamental image processing techniques.

Prerequisite(s): Consent of the Department.

Geography 605 **3 units; H(3-3)**

Statistical Analysis: Basics and Beyond
Introduction to applied statistics, particularly as they are used in geographical analysis. Topics include sampling design, summary statistics, probability theory, inferential statistics, and multivariate analysis. Laboratory exercises give students hands-on experience in computer-based statistical analysis.

Prerequisite(s): Consent of the Department.

Geography 607 **3 units; H(3-3)**

Geographic Information Systems: Basics and Beyond
Introduction to the world of Geographic Information Systems (GIS). Includes: representing reality in the digital realm, georeferencing, data structures, software history and comparison, and the full spectrum of analytical approaches associated with advanced GIS software. A major part of the work will be hands on. Software is used as a vehicle for taking the theory and concepts into a working reality.

Prerequisite(s): Consent of the Department.

Geography 621 **3 units; H(2-2)**

The Politics of Environment
Contemporary issues in environmental conflict, management and governance with case-specific applications from global to local.

Prerequisite(s): Consent of the Department.

Note: May not be offered every year. Consult the department for more information.

Geography 633 **3 units; H(3-3)**

Research and Applications in Remote Sensing
Review of basic and advanced principles of image analysis; advanced laboratory techniques. Integration of remote sensing with GIS; current research in remote sensing. Project organization; data sources for remote sensing.

Prerequisite(s): Consent of the Department.

Geography 639 **3 units; H(3-3)**

Advanced Spatial Analysis and Modelling
History of spatial modelling in geography; comprehensive coverages of techniques, spatial analysis and spatial modelling as currently used within GIS and remote sensing.

Prerequisite(s): Consent of the Department.

Geography 647 **3 units; H(3-3)**

Advanced Research and Applications in Geographic Information Systems
Focus on advanced GIS applications in core areas; methodological developments in GIS, and current research directions in GIS.

Prerequisite(s): Consent of the Department.

Geography 681 **3 units; H(3-0)**

Geographic Information Systems Project: Theoretical Issues
A critical and comprehensive review of information and literature on a GIS research topic This course provides the conceptual basis for Geography 683.

Prerequisite(s): Geography 633, 639 and 647 and consent of the Department.

Geography 683 **3 units; H(3-0)**

Geographic Information Systems Project: Application
Implementation of a project on a GIS topic which will involve demonstrating mastery of GIS project design and the implementation and presentation of results commensurate with graduate-level work. This topic will relate to material covered by the student in Geography 681.

Prerequisite(s): Geography 681 and consent of the Department.

Geography 685 **3 units; H(3-0)**

Arctic System Science
This course investigates the process linkages at various spatiotemporal scales between the atmosphere, lithosphere and hydrosphere operating within high latitude environments of the Northern Hemisphere. Of particular interest is the response of the terrestrial and marine cryosphere to climate variability and change, including methods for its detection and quantification.

Prerequisite(s): Consent of the Department.

Geography 687 **3 units; H(3-3)**

Advanced Glacial Geomorphic Systems
Contemporary topics in glacial geomorphology and sedimentology. Course consists of lecture, seminar and field trip components.

Prerequisite(s): Consent of the Department.

Geography 689 **3 units; H(3-3)**

Advanced Topics in Geocryology
Contemporary topics in the science and engineering of seasonally and perennially frozen ground. Course consists of lectures and seminars.

Prerequisite(s): Consent of the Department.

Geography 691 **3 units; H(3-3)**

Advanced Fluvial Geomorphology
Advanced theory and research issues in fluvial geomorphology. Topics may include flow hydraulics, sediment transport, river morphology, channel networks, sediment routing, drainage basin evolution, and channel response to environmental change.

Prerequisite(s): Consent of the Department.

Note: May not be offered every year. Consult the department for more information.

Geography 695 **3 units; H(3-0)**

Seminar in Geographic Research Methods
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Geography 696 **3 units; H(3-0)**

Urban, Regional and Global Political Economy Seminar
Spatial and power relations that shape urban, regional and global processes. Investigation of a wide range of processes, ranging in scale from the local to the global: capital investment and disinvestment; state power and policymaking; planning, governance and governmentality; political struggle, all in multiple forms of spatiality: place, scale, territory, networks.

Prerequisite(s): Consent of the Department.

Note: Intended for students enrolled in a Geography graduate degree program or a graduate degree program of a cognate discipline.

Geography 697 **3 units; H(3-0)**

Seminar in the Philosophy and Nature of Human Geography
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Geography 699 **3 units; H(3-0)**

Seminar in the Philosophy and Nature of Physical Geography
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

A list of specific subtitles for the 700-level courses listed below is available in the Department.

Geography 795 **3 units; H(3-0)**

Selected Topics in Geographic Research Methods
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Geography 797 **3 units; H(3-0)**

Selected Topics in Human Geography
Prerequisite(s): Consent of the Department.
MAY BE REPEATED FOR CREDIT

Geography 799 **3 units; H(3-0)**

Selected Topics in Physical Geography
Prerequisite(s): Consent of the Department.
MAY BE REPEATED FOR CREDIT

Geology GLGY

Instruction offered by members of the Department of Geoscience in the Faculty of Science.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599. Courses numbered 600 are available to fourth-year students who obtain Departmental approval and who have credit for the prerequisite courses.

Geology 601 **3 units; H(3-2)**

Advanced Physical Hydrogeology
An advanced treatment of topics covered in Geology 401.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 601 and 401 will not be allowed.

Geology 602 **3 units; H(3-3)**

Advanced Aqueous Geochemistry and Environmental Microbiology
An advanced treatment of aqueous geochemistry and environmental microbiology.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 602 and either Geology 403 or 699.10 will not be allowed.

Geology 605 **3 units; H(3-2T)**

Groundwater Flow and Transport Modelling
Review of the partial differential equations and boundary conditions that describe groundwater flow and transport. Introduction to numerical methods. The course emphasizes the practical aspects of building groundwater and transport models using computer exercises and a groundwater modelling project.

Prerequisite(s): Geology 401 or 601.

Geology 607 **3 units; H(3-0)**

Advanced Physical Hydrology
Coverage of more advanced topics in the physical hydrology of surface and subsurface waters including land-atmosphere exchange, vadose zone processes, and watershed hydrology.

Prerequisite(s): Mathematics 253 or 267 or 277 or 283 or Applied Mathematics 219 and Geography 415 and Geology 401.

Geology 609 **3 units; H(3-3)**

Advanced Contaminant Hydrogeology
An advanced treatment of topics covered in Geology 505.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 609 and Geology 505 will not be allowed.

Geology 611 **3 units; H(2-2)**

Groundwater Resource Management
Advanced topics related to groundwater resource development and management, including exploration methods, aquifer test analysis, aquifer-aquitard systems, groundwater recharge, and the role of models. Fundamental issues related to regional integrated management of water resources.

Prerequisite(s): Mathematics 253 or 267 or 277 or 283 or Applied Mathematics 219 and Geology 401 or Geography 415.

Geology 615 **3 units; H(3-2)**

Advanced Laboratory Methods in Geoscience
An overview of analytical methods in geoscience and their applications. Provides the theoretical background of the techniques as well as opportunities for practical experience. Particular emphasis will be placed on analytical techniques available within the department.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Geology 699.57

Note: Students must complete appropriate safety training prior to commencing lab related work.

Geology 623 **3 units; H(3-3)**

Modern Diffraction and Scattering Techniques
Space groups and principles of X-ray, neutron, and electron diffraction and their applications. Crystal structure determination and refinement using single crystal and Rietveld methods. X-ray and neutron scattering techniques (using the Pair Distribution Function, PDF) to examine local disorder in nano-materials and glasses. Phase transition and structural evolution with pressure, temperature, and composition. Analyses of experimental data sets and extensive use of computers.

Prerequisite(s): Geology 523.

Geology 633 **3 units; H(3-3)**

Advanced Petrologic Methods
Theoretical and applied problems in petrology, including some or all of: numerical techniques in petrology, phase equilibria, geothermometry and geobarometry, kinetics in petrology, physics and chemistry of magmatic processes. Laboratory will consist of petrographic study of rock suites.

Prerequisite(s): Geology 543.

Geology 637 **3 units; H(80-100 hours)**

Advanced Geoscience Field Studies
Application of advanced concepts and/or methods to field problems of current interest.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 637 and any of Geology 435, 537, or 545 will not be allowed.

Note: A maximum of 6 units may be taken in Geology 637.

MAY BE REPEATED FOR CREDIT

Geology 639 **3 units; H(80-100 hours)**

Field Laboratory in Groundwater Hydrogeology
Entails a week at a hydrogeology field site in Alberta or British Columbia. Hydrogeology and geotechnical techniques will be demonstrated and will involve hands-on participation by students. After the field work, students will conduct extensive analysis and interpretation of data gathered during the field session, complete exercises and prepare a written report. Relative to Geology 441, Geology 639 requires more sophisticated analyses of data and additional exercises. Geology 639 normally runs for two to three weeks following Winter Term Final Examinations or prior to the Fall Term.

Prerequisite(s): Geology 401 or 601 and consent of the Department.

Antirequisite(s): Credit for Geology 639 and 441 will not be allowed.

Note: This course has limited enrolment. This course occurs in rugged field conditions and varying weather, for which participants must be prepared and equipped. Students will be required to cover food and accommodation costs. A supplementary fee will be assessed to cover additional costs associated with this course. Students will require consent of the department to drop this course.

Geology 641 **3 units; H(3-3)**

Advanced Structural Methods
Analysis of mesoscopic and megascopic structural data; the construction and analytical use of cross-sections, subsurface maps and 3-dimensional models; structural analysis of the Canadian Cordillera.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 641 and 541 will not be allowed.

Note: There may be a weekend field excursion during the term.

Geology 647 **3 units, H(2-2-2T)**

Geology Well Log Applications
Geological applications of petrophysical well logs and integration with core descriptions and core analysis data. Derivation of reservoir properties from single-well and multi-well studies.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 647 and any of Geology 449, 699.71, or Geophysics 449 will not be allowed.

Geology 655 **3 units; H(3-0)**

Unconventional Gas Reservoir Characterization and Evaluation
Overview of the unique storage and production mechanisms associated with coalbed methane, tight gas and shale gas reservoirs; adsorbed gas storage and modelling; gas-in-place determination and volumetric reserves estimation; material balance techniques; fracture and matrix flow mechanisms; completion/stimulation methods; reservoir characterization methods including core analysis, rate-transient and pressure-transient analysis; exploration and development concepts.

Prerequisite(s): Petroleum Engineering 523 or consent of the Department.

Antirequisite(s): Credit for Geology 655 and Geology 699.37 will not be allowed.

Geology 660 **3 units; H(3-3)**

Advanced Sequence Stratigraphy
Concepts and application of sequence stratigraphy to seismic, outcrops, cores, and well logs, with a focus on siliciclastic depositional systems.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 660 and either Geology 561 or 699.34 will not be allowed.

Geology 663 **3 units; H(2-1)**
(Physics 663)

Applications of Stable Isotopes
Application of stable isotope techniques with special focus on Hydrogeology, Geology and Environmental Sciences. The use of isotopes to understand the water, carbon, nitrogen and sulphur cycles is demonstrated. Topics include hydrology,

paleoclimates, geothermometry, fossil fuels exploration and recovery, pollutant tracing, food webs, forensic investigations, among others.

Prerequisite(s): Consent of the Department.

Geology 675 **3 units; H(3-0)**

Advanced Topics in Dinosaur Paleontology
Topics related to the paleobiology, paleoecology, and paleoenvironments of the Dinosauria will be covered.

Prerequisite(s): Consent of the Department or enrolment in a paleontology-based graduate program.

Geology 683 **3 units; H(3-3)**

Advanced Carbonate Sedimentology
Advanced coverage of carbonate sedimentology, including the origin of carbonate sediments, modern and ancient, and their depositional and diagenetic environments.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 683 and either Geology 483 or 699.02 will not be allowed.

Geology 691 **3 units; H(3-2)**

Geological Applications of Well Logs
Geological applications of petrophysical well logs and integration with core descriptions and core analysis data. Derivation of reservoir properties from single-well and multi-well studies.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 691 and any of Geology 699.71, 449, 649, Geophysics 449, or 649 will not be allowed.

Geology 697 **3 units; H(3-3)**

Advanced Geostatistics
Advanced treatment of the topics covered in Geology 597.

Prerequisite(s): Mathematics 253 or 267 or 277 or 283 or Applied Mathematics 219 and Mathematics 211.

Antirequisite(s): Credit for Geology 697 and 597 will not be allowed.

Note: Completion of Mathematics 331 and/or Statistics 357 or 327 is recommended prior to taking this course.

Geology 698 **6 units; F(3-0)**
(Chemical Engineering 698)

Reservoir Characterization for Field Development
A team-based, integrated reservoir description experience working with geophysical, geological, petrophysical, and engineering data to produce a field development plan.

Prerequisite(s): Chemical Engineering 621 and Geology 697 and Organizational Behaviour and Human Resources 789.

Note: This course is intended for graduate students in the Master of Science in Geology or Geophysics with a specialization in Reservoir Characterization.

Geology 699 **3 units; H(3-3) or H(3-0)**

Selected Topics in Geology
Courses are offered in specific topics in areas such as geochemistry, hydrogeology, mineralogy, paleontology, petroleum geology, petrology, quantitative geology, sedimentology, structural geology, and surficial geology.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Geology 701 **3 units; H(0-6)**

Advanced Independent Study
A written report based on laboratory and field studies is required.

Note: Open only to graduate students in the Department of Geoscience.

Geology 703 **3 units; H(0-6)**

Readings in Geology
A written report based on a literature review is required.

Note: Open only to graduate students in the Department of Geoscience.

Geology 705 **3 units; H(3-3)**
(Geophysics 705)

Graduate Skills in Geoscience
Provides an overview of professional skills that are key to success in graduate school and beyond. Presentation skills, writing scientific manuscripts, the peer review process, defence and candidacy exams, intellectual property and innovation, and networking basics.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geology 705 and Geology 699.56 will not be allowed.

Geology 707 **3 units; H(2-2)**

Geology and Geophysics of Western Canada
Topics include stratigraphy, sedimentology, structure, petrology, geophysics and economic geology. Laboratories contain a field component.

Note: Open only to graduate students in the Department of Geoscience.

Geology 733 **3 units; H(3-0)**

Analytical Methods in Petrology
Topics may include scanning electron microscope, electron probe, X-ray diffraction and X-ray fluorescence.

Geomatics Engineering ENGO

Instruction offered by members of the Department of Geomatics Engineering in the Schulich School of Engineering.

Graduate Courses

Following are the graduate courses normally offered in the Department. Additional courses are also offered by visiting international lecturers. Please refer to the Department website (geomatics.ucalgary.ca) for current course listings.

Geomatics Engineering 601 **3 units; H(0-4)**

Graduate Project
Individual project in the student's area of specialization under the guidance of the student's supervisor. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course.

Note: Open only to students in the course-based MEng.

Geomatics Engineering 615 **3 units; H(3-0)**

Advanced Physical Geodesy
Potential theory and geodetic boundary value problems (GBVPs). Solution approaches to the Molodensky problem. Least-squares collocation (LSC). Hilbert spaces with kernel functions. Variational principles, improperly posed problems and regularization. The altimetry-gravimetry and overdetermined GBVPs. Solution of GBVPs by integral techniques, fast Fourier transforms and LSC. Use of heterogeneous data sets and noise propagation. Applications to gravity prediction, geoid determination, deflection estimation, satellite altimetry and airborne gravimetry and gradiometry. Current research activities.

Geomatics Engineering 617 **3 units; H(3-0)**

Participatory Geographic Information Systems (PGIS)
Introduction of methods to engage in effective dialogue and advocacy through the adoption of Participatory Geographic Information Systems (PGIS). Approaches learned to safeguard culturally sensitive information from external misuse and exploitation; methods to ensure traditional custodians maintain control of their spatial information; methods for producing, georeferencing and visualizing (indigenous) spatial knowledge that promote peer-to-peer dialogue, and their aspirations and concerns with higher-level authorities. The course will be a workshop forward that incorporates readings and various group exercises to provide students with a road make to undertaking PGIS.

Geomatics Engineering 620 **3 units; H(2-2)**

Estimation for Navigation
Overview of estimation fundamentals including stochastic processes, covariance matrices, autocorrelation functions, power spectral densities, and error propagation. Review of least-squares estimation, summation of normals and sequential least-squares formulations, and role of measurement geometry in least-squares position estimation. Constraints and implementations. Concept of Kalman filtering; relationship between Kalman filtering and least-squares; linear, linearized and extended Kalman filter formulations; system model formulation; process noise model determination; measurement models, and effect of time-correlated measurements and possible remedies. Numerical stability issues in estimation and possible solutions. Statistical reliability in least-squares and Kalman filtering and related RAIM concepts. Introduction to other estimation techniques including unscented Kalman filters and particle filters. Application of above topics to relevant navigation estimation problems.

Geomatics Engineering 623 **3 units; H(3-0)**

Inertial Surveying and INS/GPS Integration
Inertial sensors and their application in inertial navigation, existing inertial systems, new developments in strapdown technology. Practical aspects of inertial positioning definition of an operational inertial frame, inertial error models. Effect of inertial sensor errors on the derived navigation parameters, performance characteristics of inertial sensors, calibration of inertial sensors. Mechanization equations in different co-ordinate frames, step by step computation of the navigation parameters from the inertial sensor data introduction to Kalman filtering for optimal error estimation, modelling INS errors by linear state equations, practical issues for the implementation of update measurements (ZUPT, CUPT, Integrated systems), current research activities.

Geomatics Engineering 625 **3 units; H(3-2)**

Advanced GNSS Theory and Applications
Overview of space positioning and navigation systems; concepts and general description. Global Navigation Satellite System signal description. Receiver and antenna characteristics and capabilities; signal measurements indoor; GNSS error sources and biases; atmospheric delays, signal reflection and countermeasures. Mathematical models for static point and relative positioning. Kinematic single point and differential post mission and real time positioning, navigation and location. Augmen-

tation methods. Land, marine, airborne and indoor applications. Case studies.

Geomatics Engineering 629 3 units; H(3-0)

Advanced Estimation Methods and Analysis
Introduction of different estimation criteria, error sources in estimation, modelling and testing requirements. Advanced least squares method, estimation equations and analysis. Random processes, dynamic models, Kalman filter equations and analysis. Implementation aspects. Concept of signal, least squares collocation equations and applications. Robust estimation principle and robustified least squares and Kalman filter. Data modelling issue in estimation, functional and stochastic model development for least squares and Kalman filter. Error analysis, conventional and robust statistical testing methods and analysis. Applications to geomatics engineering problems in geodesy, positioning and navigation, photogrammetry, etc.

Geomatics Engineering 633 3 units; H(3-0)

Atmospheric Effects on Satellite Navigation Systems
Theoretical and observed aspects of radio wave propagation in the ionosphere and troposphere, with an emphasis on L-band (GPS) signals. Fundamentals of absorption, attenuation, depolarization, and defraction will be covered, in addition to characteristics and physical properties of the propagation medium and atmospheric constituents. The impact of such effects, and methods of mitigation, will be interpreted with respect to satellite navigation applications.

Geomatics Engineering 637 3 units; H(3-0)
(Environmental Engineering 637)

Earth Observation for the Environment
Earth Observation for the Environment An introduction to environmental earth observation systems in particular to satellite platforms. Topics include: discussion of physical principles, including governing equations; imaging system geometries; radiometric corrections, including calibration and atmospheric correction; spatial filtering for noise removal and information extraction; geometric corrections, including rectification and registration; fusion of multi-dimensional datasets (i.e., multi-spectral, multi-temporal, multi-resolution, and point-source ground data); and application of satellite images in addressing selected environmental issues.

Antirequisite(s): Credit for Geomatics Engineering 637 and any of Geomatics Engineering 619.04, Environmental Engineering 637 or 619.05 will not be allowed.

Geomatics Engineering 638 3 units; H(2.5-1)

GNSS Receiver Design
Global Navigation Satellite System signal structure, overview of receiver architecture, measurements, antenna design, receiver front-end, reference oscillator, sampling and quantization, phase lock loops, frequency lock loops and delay lock loops, tracking loop design and errors, signal acquisition and detection, interference effects.

Geomatics Engineering 639 3 units; H(3-0)

Advanced Topics in Digital Image Processing
Review of basic digital imaging; advanced topics in multispectral or hyperspectral analysis, multiresolution analysis, image segmentation, image transform, data fusion, pattern recognition or feature matching; current research applications especially in Geomatics.

Geomatics Engineering 642 3 units; H(3-0)

Optical Imaging Metrology
Optical imaging methods for precise close-range measurement. Photogrammetric techniques with emphasis on the bundle adjustment. Photogrammetric datum definition, network design and quality measures. Principles of laser rangefinding and laser scanning. Imaging distortions, sensor modelling and system self-calibration for a variety of imaging sensors including digital cameras, panoramic cameras, 3D laser scanners and 3D range cameras. Automated point cloud processing methods; registration, modelling and segmentation. Selected case studies.

Geomatics Engineering 645 3 units; H(3-0)

Spatial Databases and Data Mining
Comprehensive overview of spatial database management systems and issues related to spatial data mining. The topics that will be covered include: overview of spatial databases, spatial concepts and data models, spatial query languages, spatial storage and indexing, spatial networks, spatial data mining, and trends in spatial databases.

Note: Background in programming and statistics is required.

Geomatics Engineering 658 3 units; H(3-0)

Geocomputation
Overview of the fundamental concepts, approaches, techniques, and applications in the field of Geocomputation. Topics being discussed include Geocomputation, Computational intelligence, Complex Systems theory, Cellular automata modelling, Multi-agent system modelling, Calibration and validation of dynamic models, Scale, Artificial neural network, Data mining and knowledge discovery, Geovisualization, and Post-normal science. Individual projects involving the application of Geocomputational techniques and models are conducted.

Geomatics Engineering 667 3 units; H(3-0)

Advanced Topics in Photogrammetry
Overview of aerial triangulation procedures (strip triangulation, block adjustment of independent models, bundle block adjustment, automatic aerial triangulation, direct versus indirect orientation). Mapping from space (modelling the perspective geometry of line cameras, epipolar geometry for line cameras). Multi-sensor aerial triangulation (integrating aerial and satellite imagery with navigation data). Photogrammetric products (Digital Elevation Models, ortho-photos). The role of features in photogrammetric operations (utilizing road network captured by terrestrial navigation systems in various orientation procedures).

Geomatics Engineering 675 3 units; H(3-0)

Spatial Statistics
Spatial phenomena and spatial processes. Spatial data analysis and the importance of spatial data in scientific research. Methods will range from exploratory spatial data analysis through to recent developments such as nonparametric semivariogram modelling, generalized linear mixed models, estimation and modelling of nonstationary covariances, and spatio-temporal processes.

Geomatics Engineering 681 3 units; H(3-0)
(Geophysics 681)

Advanced Global Geophysics and Geodynamics
Elasticity, figure of the Earth, Earth structure and seismology, gravity and its temporal variations, isostasy, tides, Earth rotation and orientation, time, plate flexure, glacial rebound, continental drift, geodetic observation methods for geodynamics.

Geomatics Engineering 691 3 units; H(3-0)

Polarimetric Synthetic Aperture Radar
Introduction to image formation with polarimetric synthetic aperture radar (POLSAR), theory of polarized electromagnetic waves, polarimetric scattering from targets, POLSAR data models, speckle filtering, data decomposition, classification, and segmentation

MAY BE REPEATED FOR CREDIT

Geomatics Engineering 693 3 units; H(3-0)

Cadastral Information Systems
Cadastral Systems, cadastral data, land registration, data structures and schemas for land administration information, ISO standards, evolutionary models, land tools, effectiveness metrics.

Geomatics Engineering 694 3 units; H(3-0)

Advanced Topics in Sensor Web and Internet of Things
Overview of the sensor web architecture and algorithms, with a focus on Internet of Things. The topics that will be covered include: sensor web data management, sensor web search and discovery, sensor web server design and implementation, interoperability issues, sensor-based analytics and visualization, introduction to sensor networks, and trends in sensor web and Internet of Things.

Geomatics Engineering 697 3 units; H(3-0)

Directed Studies
Individual project study conducted under the guidance of a faculty member and intended to familiarize the student with the literature and techniques that are required for their research program, but are not available in regular courses.

Prerequisite(s): Consent of the Department Head or Associate Head Graduate Studies.

MAY BE REPEATED FOR CREDIT

Geomatics Engineering 698 3 units; H(3S-0)

Professional Development Seminar
This professional development seminar aims at providing relevant skills to be a successful graduate student and to make a smooth transition to a rewarding professional career. In addition to efficient communication skills, this course will place an emphasis on research methodologies such as formulating research problems, preparing a scholarship application, writing a paper for publication, and defending a thesis. How to prepare for a successful interview in industry or academia and the required process for becoming a professional engineer will also be discussed.

NOT INCLUDED IN GPA

Geomatics Engineering 699 3 units; H(3-0)

Special Studies
Focus on advanced studies in specialized topics that are not offered in the regular graduate curriculum of the Department.

MAY BE REPEATED FOR CREDIT

Geophysics GOPH

Instruction offered by members of the Department of Geoscience in the Faculty of Science.

Graduate Courses

Graduate students are urged to read the Geoscience Department section in the Graduate Studies calendar. Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599. Courses numbered 600 are available to fourth-year students who

obtain Departmental approval and who have credit for the prerequisite courses.

Geophysics 619 **3 units; H(3-3)**

Advanced Computational Methods for Geophysicists
Review of important mathematical models in geophysics (Poisson equation, acoustic wave equation, elastic wave equation) and typical boundary conditions for elliptic and parabolic partial differential equations. Numerical solutions using finite difference, finite volume and finite element approaches. Algorithms for nonlinear constitutive behaviour and introduction to nonlinear optimization/inversion algorithms.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geophysics 619 and Geophysics 699.09 will not be allowed.

Geophysics 645 **3 units; H(3-0)**

Seismic Wave Propagation
Seismic body and surface waves, reflection, refraction, diffraction, anelasticity, anisotropy, ray methods, point and line source solutions to the equation of motion, finite-difference methods for seismic waves, additional topics depending on current research interests.

Prerequisite(s): Geophysics 551.

Geophysics 657 **3 units; H(3-0)**

Seismic Signal Analysis
Advanced methods of seismic data analysis in exploration and production geophysics. Topics include velocity analysis, polarization filtering, median filtering, migration, inversion and tomography.

Geophysics 665 **3 units; H(3-0)**

Theoretical Seismology
Seismic ray theory, inverse theory, full-wave methods, matrix methods, numerical methods, additional topics depending on current research interests.

Prerequisite(s): Geophysics 551.

Geophysics 667 **3 units; H(3-0)**

Introduction to Microseismic Methods
Use of microseismic methods as surveillance technology during hydraulic-fracture treatment of tight reservoirs. Methods for acquiring, processing and interpreting microseismic data. Methods for picking events, determining hypocenter location and magnitude, and interpreting the stimulated rock volume.

Prerequisite(s): Consent of the Department.

Geophysics 669 **3 units; H(3-0)**

Global Seismology
An introduction to theory and practice of global seismology. Topics include: seismograph systems, global wave propagation, moment tensors, shear-wave splitting, surface waves, receiver functions, seismic tomography and teleseismic receiver functions.

Prerequisite(s): Admission to the graduate program in geophysics.

Geophysics 671 **3 units; H(3-0)**

Inverse Theory and Applications I
An introduction to the mathematical and numerical techniques of geophysical inversion. Topics include least squares, singular value decomposition, and Tikhonov regularization. Development of numerical codes to solve real inverse problems is stressed.

Prerequisite(s): Admission to the graduate program in geophysics.

Geophysics 673 **3 units; H(3-0)**

Inverse Theory and Applications II
Multidimensional real-world inverse problems, such as constrained seismic, gravity, or resistivity inversion. Fourier, maximum entropy, Bayesian approaches and iterative solution techniques such as Kaczmarz and conjugate gradient are covered.

Prerequisite(s): Consent of the Department.

Geophysics 681 **3 units; H(3-0)**
(Geomatics Engineering 681)

Advanced Global Geophysics and Geodynamics
Elasticity, figure of the Earth, Earth structure and seismology, gravity and its temporal variations, isostasy, tides, Earth rotation and orientation, time, plate flexure, glacial rebound, continental drift, geodetic observation methods for geodynamics.

Geophysics 687 **3 units; H(3-0)**

Theory of Seismic Imaging
The theories of wave propagation in acoustic and elastic media are used to develop the major algorithms used in seismic imaging (migration). Green's theorem, Huygen's principle, Kirchhoff diffraction theory, raytracing, wavetracking, multidimensional Fourier analysis, and Radon transforms are explored.

Note: Elementary knowledge of vector calculus and partial differential equations is assumed.

Geophysics 695 **3 units; H(3-0)**

Research Topics and Tools
An introduction to seismic structural imaging and interpretation, seismic velocity anisotropy, and multicomponent seismology, including seismic survey design for PS converted waves. Discussion of software packages used for graduate research programs.

Prerequisite(s): Consent of the Department.

Geophysics 699 **3 units; H(3-3)**

Selected Topics in Geophysics
Courses are offered in specific topics in areas such as seismology, environmental geophysics, potential methods, integrated geophysical studies, and geodynamics.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Geophysics 701 **3 units; H(0-6)**

Advanced Independent Study
A written report based on laboratory and field studies is required.

Prerequisite(s): Admission to a graduate program in Geoscience.

Geophysics 703 **3 units; H(0-6)**

Readings in Geophysics
A written report based on a literature review is required.

Prerequisite(s): Admission to a graduate program in Geoscience.

Geophysics 705 **3 units; H(3-3)**
(Geology 705)

Graduate Skills in Geoscience
Provides an overview of professional skills that are key to success in graduate school and beyond. Presentation skills, writing scientific manuscripts, the peer review process, defence and candidacy exams, intellectual property and innovation, and networking basics.

Prerequisite(s): Consent of the Department.

Antirequisite(s): Credit for Geophysics 705 and Geology 699.56 will not be allowed.

German GERM

Instruction offered by members of the School of Languages, Linguistics, Literatures and Cultures in the Faculty of Arts. Students are encouraged to consult the School's website (https://slllc.ucalgary.ca/) for more details on course descriptions and titles of decimalized courses.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

German 627 **3 units; H(3S-0)**

Seminar in German Literature and Culture
Selected topics in literary history.

MAY BE REPEATED FOR CREDIT

German 629 **3 units; H(3S-0)**

Seminar in German Language and Linguistics
MAY BE REPEATED FOR CREDIT

German 631 **3 units; H(3S-0)**

Seminar in German Language Pedagogy
MAY BE REPEATED FOR CREDIT

German 696 **6 units; F(1-0)**

Bibliography, Research Methods and Grant Proposal Writing
Note: Required of all graduate students who have not had an equivalent course.

NOT INCLUDED IN GPA

German 699 **3 units; H(3-0)**

Conference Course
Meets the needs of individual students. It may include a general or specific linguistic topic; or the detailed study of an author, period, genre; or any literary problem not dealt with in the honours or graduate courses listed above.

MAY BE REPEATED FOR CREDIT

Greek GREK

Instruction offered by members of the Department of Classics and Religion in the Faculty of Arts.

Note: For courses on Greek Literature in translation, Greek History, Art, Archaeology, etc., see Greek and Roman Studies (GRST).

Graduate Courses

Greek 601 **3 units; H(3S-0)**

Graduate Seminar
MAY BE REPEATED FOR CREDIT

Greek 602 **3 units; H(3-1T)**

Introductory Ancient Greek for Graduate Students
Introduction to grammar, vocabulary and translation skills.

Greek 602.01 Ancient Greek I

Greek 602.02 Ancient Greek II

Prerequisite(s): Greek 602.01 must be taken before Greek 602.02.

Antirequisite(s): Credit for Greek 602 and either Greek 201 or 203 will not be allowed.

Greek 604 **3 units; H(3-0)**

Intermediate Ancient Greek for Graduate Students
Consolidation of grammar, vocabulary and translation skills.

MAY BE REPEATED FOR CREDIT

Greek 607 **1.5 units; Q(0-1T)**

Directed Studies
MAY BE REPEATED FOR CREDIT

Greek and Roman Studies GRST

Instruction offered by members of the Department of Classics and Religion in the Faculty of Arts.

For courses in the ancient Greek and Latin languages see listings under Greek and Latin.

Graduate Courses

Greek and Roman Studies 601 **3 units; H(3S-0)**

Graduate Seminar
MAY BE REPEATED FOR CREDIT

Greek and Roman Studies 603 **3 units; H(1S-0)**

Research and Professional Training
NOT INCLUDED IN GPA

Greek and Roman Studies 651 **3 units; H(0-2T)**

Directed Studies
Qualified students will undertake supervised research projects individually or in small groups.

Prerequisite(s): Consent of the Department

MAY BE REPEATED FOR CREDIT

History HTST

Instruction offered by members of the Department of History in the Faculty of Arts.

Graduate Courses

Note: Only a limited number of these 600-level courses will be offered in any one year. Students may obtain further information from the Department.

Graduate students outside of the department are required to have department approval to register for any of the following courses:

History 601 **3 units; H(3-0)**

Topics in Imperial History
MAY BE REPEATED FOR CREDIT

History 603 **3 units; H(3-0)**

Topics in Religious History
MAY BE REPEATED FOR CREDIT

History 607 **3 units; H(3-0)**

Topics in Western Canadian History
MAY BE REPEATED FOR CREDIT

History 623 **3 units; H(3-0)**

Topics in Canadian History
An examination of crucial issues in Canada's political, economic, social and cultural history.

MAY BE REPEATED FOR CREDIT

History 633 **3 units; H(3-0)**

Topics in Modern European History
MAY BE REPEATED FOR CREDIT

History 637 **3 units; H(3-0)**

Topics in Military History
MAY BE REPEATED FOR CREDIT

History 639 **3 units; H(3-0)**

Topics in History of Science
Topics may include the scientific revolution, science and religion, and the reception of scientific ideas.

MAY BE REPEATED FOR CREDIT

History 641 **3 units; H(3-0)**

Topics in Medieval or Early Modern European History
MAY BE REPEATED FOR CREDIT

History 645 **3 units; H(3-0)**

Topics in U.S. History
MAY BE REPEATED FOR CREDIT

History 647 **3 units; H(3-0)**

Topics in Latin American History
MAY BE REPEATED FOR CREDIT

History 651 **3 units; H(3S-0)**

Research Essay I
Provides course-based students an opportunity to propose their MRE projects to the other students, critique as a group their methods, sources and bibliographies, and present drafts of their projects for peer comment.

NOT INCLUDED IN GPA

History 653 **3 units; H(3S-0)**

Research Essay II
In consultation with their supervisor, the student completes an essay modelled on a scholarly research article, to be evaluated on use of primary sources, historiographical framing, and argumentation.

History 655 **3 units; H(3-0)**
(Strategic Studies 655)

Classics of Strategy
Strategic thought from Sun Tzu to Clausewitz, Mahan to Corbett. Analyzes the writings of classic strategic thinkers, and then by way of case studies examines their theories as they pertain to military and political planners from the Peloponnesian War to the present.

History 673 **3 units; H(3-0)**

Topics in Legal History
MAY BE REPEATED FOR CREDIT

History 675 **3 units; H(3-0)**

Selected Topics in History
MAY BE REPEATED FOR CREDIT

History 690 **3 units; H(3-0)**

Historiography and the Theories of History

History 691 **3 units; H(3-0)**

Conference Course in Special Topics
Note: Open only to graduate students.

MAY BE REPEATED FOR CREDIT

History 791 **3 units; H(3S-0)**

Conference Course in Special Topics (Advanced Level)
Note: Open only to graduate students.

MAY BE REPEATED FOR CREDIT

History 795 **3 units; H(3S-0)**

Advanced Seminar in Historiographical Interpretations

Information Security ISEC

Instruction is offered by members of the Department of Computer Science.

Registration in all courses requires admission to the Post-Baccalaureate Certificate in Network Security or the Post-Baccalaureate Certificate in Software Security, or the approval of the Department of Computer Science.

Information Security 601 **3 units; H(3-0)**

Applied Cryptography
The basics of cryptographic algorithms and protocols including encryption and authentication algorithms and key establishment protocols. Security evaluation in computational and information theoretic settings, and attacks on cryptographic applications and systems.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Network Security.

Information Security 603 **3 units; H(3-0)**

Network Security
Review of cryptographic algorithms and protocols used in network security. Network security protocols. Network security architecture. Web and Internet security. Wireless security. Approaches and tools for network intrusion detection and prevention. Traffic analysis and privacy enhancing systems. Applications of artificial intelligence and data analytics. Network system virtualization.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Network Security.

Information Security 605 **3 units; H(3-0)**

System and Application Security
Operating systems security. Software vulnerabilities and their exploits. Malware. Computer system virtualization. Application-level security. Access control models. Identity and access management.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Software Security.

Information Security 621 **3 units; H(1-3-2T)**

Ethical Hacking Laboratory
Offensive security, including technical and social methods. Legal and ethical frameworks as well as best practices. Automation and tool use, and defensive techniques.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Network Security.

Information Security 623 3 units; H(1-3-2T)

Software Security Laboratory
Practices and tools for preventing vulnerabilities in the software development life cycle, including threat modelling, secure coding idioms and secure design patterns, static analyzers for detecting vulnerabilities, fuzzing and other quality assurance practices.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Software Security.

Information Security 625 3 units; H(1-3-2T)

Mobile and Smart Device Security Laboratory
Security architecture of common smartphone platforms and Internet-of-Things environments. Selected topics on threat modelling, penetration testing, and security-aware design for smartphones, home automation, wearables, vehicles and industrial control systems.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Software Security.

Information Security 641 3 units; H(3-0)

Governance and Risk Management
Information security strategy and its alignment with business goals. Business cases for information security investment. Legal and regulatory requirements. Roles and responsibilities in information security management. Security risk assessment and management.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Network Security or the Post-baccalaureate Certificate in Software Security.

Information Security 643 3 units; H(3-0)

Policies, Standards and Programs
Development of security policies. Policy compliance and enforcement. Policy considerations for social engineering and insider attacks. Information security standards. Security awareness and training programs. Privacy policies and compliance. Privacy Impact Assessment.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Network Security or the Post-baccalaureate Certificate in Software Security.

Information Security 645 3 units; H(3-0)

Incident Management and Forensics
Design and implementation of process for identifying, analyzing and responding to information security incidents. Computer forensics. Organization and management of the incident response and forensics team. Tools and best practices.

Prerequisite(s): Admission to the Post-baccalaureate Certificate in Network Security or the Post-baccalaureate Certificate in Software Security.

International Foundations Program IFPX

International Foundations Program 651 3 units; H(3-0)

Advanced Academic Written Communication for Engineering
Facilitate the synthesis of written discourse adhering to the characteristics of academic language in the Master of Engineering program. Focus on writing and research skills required for graduate level academic studies.

Prerequisite(s): Admission to IFP Pathways in the Master of Engineering program or consent of the program.

Note: GRADED, NOT INCLUDED IN GPA, NO CREDIT TOWARDS DEGREES.

International Foundations Program 655 3 units; H(3-0)

Advanced Academic Oral Communication for Engineering
Facilitate applied language skills for communication in the Master of Engineering program. Focus on oral communication skills required for graduate level academic studies.

Prerequisite(s): Admission to IFP Pathways in the Master of Engineering program or consent of the program.

Note: GRADED, NOT INCLUDED IN GPA, NO CREDIT TOWARDS DEGREES.

International Foundations Program Engineering IFPE

International Foundations Program Engineering 621 1 unit; (1-0)

Language Enrichment for ENPE 621
English language support for IFP Pathways students taking Petroleum Engineering 621. Facilitate the development of language and academic skills in conjunction with the course outcomes of Petroleum Engineering 621.

Prerequisite(s): Admission to IFP Pathways in the Master of Engineering program, or consent of the program.

Corequisite(s): Petroleum Engineering 621.

Note: GRADED AS CR/F, NOT INCLUDED IN GPA, NO CREDIT TOWARDS DEGREES

International Foundations Program Engineering 682 1 unit; (1-0)

Language Enrichment for ENGG 682
English language support for IFP Pathways students taking Engineering 682. Facilitate the development of language and academic skills in conjunction with the course outcomes of Engineering 682.

Prerequisite(s): Admission to IFP Pathways in the Master of Engineering program, or consent of the program.

Corequisite(s): Engineering 682.

Note: GRADED AS CR/F, NOT INCLUDED IN GPA, NO CREDIT TOWARDS DEGREES

International Foundations Program Engineering 683 1 unit; (1-0)

Language Enrichment for ENGG 683
English language support for IFP Pathways students taking Engineering 683. Facilitate the development of language and academic skills in conjunction with the course outcomes of Engineering 683.

Prerequisite(s): Admission to IFP Pathways in the Master of Engineering program, or consent of the program.

Corequisite(s): Engineering 683.

Note: GRADED AS CR/F, NOT INCLUDED IN GPA, NO CREDIT TOWARDS DEGREES

International Foundations Program Engineering 684 1 unit; (1-0)

Language Enrichment for ENGG 684
English language support for IFP Pathways students taking Engineering 684. Facilitate the development of language and academic skills in conjunction with the course outcomes of Engineering 684.

Prerequisite(s): Admission to IFP Pathways in the Master of Engineering program, or consent of the program.

Corequisite(s): Engineering 684.

Note: GRADED AS CR/F, NOT INCLUDED IN GPA, NO CREDIT TOWARDS DEGREES

Internship INTE

Graduate Courses

Internship 601 1.5 units

Graduate Internship (Thesis-based, full-time)
Students registered full-time in a thesis-based master's or doctoral program who undertake an approved full-time internship (of 21 hours/week or more) should register in this course during all terms that coincide with the internship. This course cannot be used to substitute for other course requirements for a graduate degree program. Not available to students enrolled in programs with their own internship or co-op course. To comply with Canada Immigration regulations, this course is not available to international students unless their proposed internship is outside Canada or is a Mitacs internship.

601.01 Graduate Internship I

601.02 Graduate Internship II

601.03 Graduate Internship III

Prerequisite(s): Consent of the Faculty of Graduate Studies.

NOT INCLUDED IN GPA

Internship 602 1.5 units

Graduate Internship (Thesis-based, part-time)
Students registered in a thesis-based master's program who undertake an approved part-time internship (of 20 hours/week or less) should register in this course during the term that coincides with the internship. This course cannot be used to substitute for other course requirements for a graduate degree program. Not available to students enrolled in programs with their own internship or co-op course.

602.01 Graduate Internship I

602.02 Graduate Internship II

602.03 Graduate Internship III

Prerequisite(s): Consent of the Faculty of Graduate Studies.

NOT INCLUDED IN GPA

Internship 603 1.5 units

Graduate Internship (Course-based, full-time)
Students registered in a course-based master's program who undertake an approved full-time internship (of 21 hours/week or more) should register in this course during the term that coincides with the internship. This course cannot be used to substitute for other course requirements for a graduate degree program. Not available to students enrolled in programs with their own internship or co-op course. To comply with Canada Immigration regulations, this course is not available to interna-

tional students unless their proposed internship is outside Canada or is a Mitacs internship.

603.01 Graduate Internship I

603.02 Graduate Internship II

603.03 Graduate Internship III

Prerequisite(s): Consent of the Faculty of Graduate Studies.

NOT INCLUDED IN GPA

Internship 604 **1.5 units**

Graduate Internship (Course-based, part-time)
Students registered in a course-based master's program who undertake an approved part-time internship (of 20 hours/week or less) should register in this course during the term that coincides with the internship. This course cannot be used to substitute for other course requirements for a graduate degree program. Not available to students enrolled in programs with their own internship or co-op course.

604.01 Graduate Internship I

604.02 Graduate Internship II

604.03 Graduate Internship III

Prerequisite(s): Consent of the Faculty of Graduate Studies.

NOT INCLUDED IN GPA

Interprofessional Health Education IPHE

Graduate Courses

Interprofessional Health Education 601
3 units; H(3-0)
(Interprofessional Health Education 501)

Interprofessional Practice in Mental Health
Students from different helping professions come together to examine selected issues of interprofessional practice in the area of mental health and co-occurring addictive disorders, focusing on the experience of mental illness, treatment alternatives, practice implications, advocacy and policy issues, and future challenges and change. Incorporates in-class and field experiences with consumers and families, employers and professionals, services and organizations.

Prerequisite(s): Consent of the instructor(s).

Interprofessional Health Education 603
3 units; H(3-0)
(Interprofessional Health Education 503)

Interprofessional Practice in Addictions
Students from different helping professions come together to examine aspects of addictions assessment, treatment and recovery, and issues of co-occurring mental health disorders in an interprofessional context. Studies include the complex array of treatments, programs and supports available in a Canadian context, and critical examination of the ancillary issues of community care, and other support services that are required for successful recovery and relapse prevention for those with addictive disorders and co-occurring mental health issues.

Prerequisite(s): Consent of the instructor(s).

Interprofessional Health Education 605
3 units; H(3-2)

Interprofessional Approaches to Assessment, Diagnosis and Treatment in Mental Health and Addictions: The Major Disorders - Part A
Complex facets of assessment and diagnosis (using DSM classification system) of depressive, anxiety, psychotic and alcohol disorders. Team investigation of treatment programs and supports available within a Canadian context.

Prerequisite(s): Consent of the instructor(s).

Interprofessional Health Education 607
3 units; H(3-2)

Interprofessional Approaches to Assessment, Diagnosis and Treatment in Mental Health and Addictions: Personality Disorders and Special Populations - Part B
Complex facets of assessment and diagnosis of personality disorders, developmental disorders, special populations and addictive disorders. Team investigation of treatment programs and supports available within a Canadian context.

Prerequisite(s): Consent of the instructor(s).

Interprofessional Health Education 609
3 units; H(3-2)

Psychiatric, Psychosocial and Recovery Approaches in Mental Health and Addictions
Interprofessional approaches to culture, relationships, teams and roles in the delivery of mental health and addictions care.

Prerequisite(s): Consent of the instructor(s).

Interprofessional Health Education 611
3 units; H(3-1)

Special Topics in Interprofessional Mental Health Addictions
Topics such as age or special populations, methods and systems will be added from existing faculty offerings or will be created as needed through interfaculty collaboration.

Prerequisite(s): Consent of the instructor(s).

MAY BE REPEATED FOR CREDIT

Kinesiology KNES

Instruction offered by members of the Faculty of Kinesiology.

Graduate Courses

Kinesiology 603 **3 units; H(3-0)**

Special Topics
Intensive study of selected topics in human physical activity and related subjects as follows: Applied Sport Psychology; Biomechanics; Cognitive Science: Vision and Motor Behaviour; Exercise and Health Physiology; Health and Exercise Psychology; Motor Learning; Multi-Media Applications in Learning; Neuro-Motor Psychology; Nutrition, Metabolism and Genetics; Sport and Exercise Psychology; Sport History; Sport Medicine; Sport Sociology.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

MAY BE REPEATED FOR CREDIT

Kinesiology 604 **3 units; H(0-3)**

Directed Study
Intensive self-directed study of selected topics in Kinesiology.

Prerequisite(s): Admission to a graduate program in the Faculty of Kinesiology and consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Kinesiology 605 **1.5 units; Q(2S-0)**

Nutrition for Performance and Active Living
Nutritional requirements for sport performance and active living, including an overview of basic nutritional principles. Designed to use current research findings as a basis to examine the role of nutrition in sport performance. Nutrition for an active lifestyle will also be examined.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

Kinesiology 606 **6 units; F(3T-3)**

Practical Skills for Applied Exercise Physiology
To develop practical skill and techniques associated with applied exercise physiological measurement vs. measurements in the areas of body composition, cardio-respiratory and musculoskeletal fitness.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

Kinesiology 609 **3 units; H(3-1T)**

Statistical Techniques in Kinesiology
Basic concepts of statistical analysis as they apply to research methods used in various disciplines in kinesiology.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

Antirequisite(s): Credit for Kinesiology 609 and 603.84 will not be allowed.

Kinesiology 611 **3 units; H(3-0)**

Research Methods in Kinesiology
An overview of research methods including study design, data collection, measurement, interpretation of data, scientific writing, and critical appraisal of the literature relevant to kinesiology.

Prerequisite(s): One graduate course in Biostatistics or Statistics (including Kinesiology 609, Medical Science 643.01, Psychology 615, or equivalent) and admission to a Graduate Program in Kinesiology.

Kinesiology 615 **1.5 units; Q(2S-0)**

Seminar in Applied Exercise Physiology I
Lectures and seminar presentations, discussion and critique of current research in applied exercise physiology and related subjects.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

NOT INCLUDED IN GPA

Kinesiology 617 **1.5 units; Q(2S-0)**

Seminar in Applied Exercise Physiology II
Lectures and seminar presentations, discussion and critique of current research in applied exercise physiology and related subjects. Focus on chronic disease.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

NOT INCLUDED IN GPA

Kinesiology 637 **3 units; H(3-0)**

Nutrition for Physically Active Populations
The nutritional requirements of specific athletic and/or physically active groups such as cardiac rehabilitation patients and child athletes.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

Kinesiology 663 **3 units; H(3-0)**
(Mechanical Engineering 663)/(Medical Science 663)

Advanced Muscle Mechanics and Physiology
A look at problems associated within muscle mechanics and contractility. Also the use of muscle mechanics as a scientific discipline to critically learn and evaluate the scientific process. Basic

anatomy and physiology of muscle contraction including the cross-bridge theory, and the force-length, force-velocity and force-time relationships of actively and passively contracting muscles will also be covered.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

Kinesiology 673 **3 units; H(3-3)**

Exercise Physiology
Topics in exercise physiology will include the effects of exercise on muscle, metabolism, hormones, respiration, and the cardiovascular system. Nutrition, body composition, ergogenic aids, and environmental factors will also be examined.

Prerequisite(s): Kinesiology 373 and admission to a Graduate Program in Kinesiology.

Kinesiology 691 **3 units; H(1T-8)**
(formerly Kinesiology 690)

Practicum I
The practicum will consist of multiple experiences in applied physiology environments.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

NOT INCLUDED IN GPA

Kinesiology 692 **3 units; H(1T-8)**
(formerly Kinesiology 690)

Practicum II
The practicum will consist of multiple experiences in applied physiology environments.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

NOT INCLUDED IN GPA

Kinesiology 697 **1.5 units; Q(2S-0)**

Exercise and Sport Psychology
Addresses the determinants and consequences of exercise and sport engagement within clinical and athletic populations. The focus will be on the translation of research to practice, with hands-on skills and effective practice guidelines shared with the students.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

Kinesiology 703 **3 units; H(3-0)**

Special Topics
Intensive study of selected topics in Kinesiology as follows: Applied Sport Psychology; Biomechanics; Exercise and Health Physiology; Health and Exercise Psychology; Motor Learning; Multi-Media Applications in Learning; Neuro-Motor Psychology; Nutrition, Metabolism and Genetics; Physiology of Skeletal Muscle; Sport and Exercise Psychology; Sport History; Sport Medicine; Sport Sociology.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

MAY BE REPEATED FOR CREDIT

Kinesiology 704 **3 units; H(0-3)**

Directed Study
Intensive self-directed study of selected topics in Kinesiology.

Prerequisite(s): Admission to a Graduate Program in the Faculty of Kinesiology and consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Kinesiology 715 **1.5 units; Q(2S-0)**

Seminar in Applied Exercise Physiology III
An advanced level of presentation and critical appraisal of research in applied physiology. Students will assume a leadership role in a seminar setting.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

NOT INCLUDED IN GPA

Kinesiology 717 **1.5 units; Q(2S-0)**

Seminar in Applied Exercise Physiology IV
An advanced level of presentation and critical appraisal of research in applied physiology. Students will assume a leadership role in a seminar setting.

Prerequisite(s): Admission to a Graduate Program in Kinesiology.

NOT INCLUDED IN GPA

Kinesiology 773 **3 units; H(3-3)**

Integrative Exercise Physiology
The effects of exercise on the complex physiological interactions between different systems in the human body.

Prerequisite(s): Kinesiology 673 and admission to a Graduate Program in Kinesiology.

Kinesiology 775 **3 units; H(3-3)**

Clinical Exercise Physiology
Exercise for clinical populations: exercise assessment and prescription for disease modification.

Prerequisite(s): Kinesiology 773 and admission to a Graduate Program in Kinesiology.

Kinesiology 785 **3 units; H(3-3)**

Training Strategies for Health and Sport
The science of improving health and athletic performance with appropriate periodized stress and recovery.

Prerequisite(s): Kinesiology 773 and admission to a Graduate Program in Kinesiology.

Language LANG

Instruction and services offered by the School of Languages, Linguistics, Literatures and Cultures in the Faculty of Arts and the Werklund School of Education.

For program information please contact either the Faculty of Arts or Werklund School of Education.

Graduate Courses

Language 605 **3 units; H(3-0)**

Second Language Learning and Pedagogy
Theoretical and practical overview of the processes involved in acquiring a second language, with a focus on naturalistic language acquisition and on classroom strategies and classroom language learning.

Prerequisite(s): Consent of the School.

Language 615 **3 units; H(3-0)**

Second Language Learning and Technology
Theoretical and practical aspects of incorporating technology into the language classroom. A general overview in the context of theories of second language acquisition of using the web, electronic mail, on line chat discussion, and videoconferencing as tools in language teaching/learning; students will also learn to create their own websites and web activities for teaching.

Prerequisite(s): Consent of the School.

Language 625 **3 units; H(3-0)**

Second Language Learning and Cultural Understanding
An introduction to the interdisciplinary nature of "culture" as it pertains to second language teaching and learning.

Prerequisite(s): Consent of the School.

Language 699 **3 units; H(3-0)**

Research Seminar in Second Language Learning
Centred round a professor's current research project, the course will engage students as members of a collaborative research team that will serve as a practical exposure to research methods in the area of second language learning and acquisition.

Prerequisite(s): Consent of the School.

MAY BE REPEATED FOR CREDIT

Languages, Literatures and Cultures LLAC

Instruction offered by members of the School of Languages, Linguistics, Literatures and Cultures in the Faculty of Arts.

Languages, Literatures and Cultures 601 **3 units; H(3-0)**

Additional Language Pedagogy
An introduction to the field of second language teaching and learning with a historical overview of the field. Presents concepts from the related fields of applied linguistics, psychology and education. Students will have the opportunity to observe university language courses, analyze language textbooks, and develop a statement of teaching philosophy.

Prerequisite(s): Admission to the LLAC graduate program.

Languages, Literatures and Cultures 602 **3 units; H(3-0)**

Research Methods and Applied Linguistics
An overview of theory and research methods with a focus on empirical research in the field of applied linguistics. Students will read and critique recent studies, develop research questions, and explore ways in which to answer their questions. They will be introduced to research information sources, including the library; source citation; and grant and conference proposal writing.

Prerequisite(s): Admission to the LLAC graduate program.

Languages, Literatures and Cultures 603 **3 units; H(3-0)**

Research Methods and Literary and Cultural Theory
Examines methodologies in literary, cultural and film criticism; and approaches such as formalism, structuralism, post-structuralism, semiotics, hermeneutics, the Frankfurt School, collective memory, gender studies, post-colonialism, transnationalism, and transculturalism. Students will develop research questions and explore ways in which to answer these questions as they relate to source texts (literary and filmic) in languages other than English. They will be introduced to research information sources, including the library; source citation; and grant and conference proposal writing.

Prerequisite(s): Admission to the LLAC graduate program.

Latin LATI

Instruction offered by members of the Department of Classics and Religion in the Faculty of Arts.

Note: For courses in Latin Literature in translation, Roman History, Art, Archaeology, etc., see Greek and Roman Studies.

Graduate Courses

Latin 601 **3 units; H(3S-0)**

Graduate Seminar
MAY BE REPEATED FOR CREDIT

Latin 602 **3 units; H(3-1T)**

Introductory Language Class for Graduate Students
Introduction to grammar, vocabulary and translation skills.

Latin 602.01 Latin I

Latin 602.02 Latin II

Prerequisite(s): Latin 602.01 must be taken before Latin 602.02.

Antirequisite(s): Credit for Latin 602 and either Latin 201 or 203 will not be allowed.

Latin 604 **3 units; H(3-0)**

Intermediate Latin for Graduate Students
Consolidation of grammar, vocabulary and translation skills.

MAY BE REPEATED FOR CREDIT

Latin 607 **1.5 units; Q(0-1T)**

Directed Studies
MAY BE REPEATED FOR CREDIT

Law LAW

Instruction offered by members of the Faculty of Law.

For course descriptions and details of the transition from the old to the new curriculum, consult the electronic Faculty of Law Calendar available at: law.ucalgary.ca.

600-Level Courses

Law 601 **3 units; H(3-0)**

Advanced Criminal Law
An in-depth examination of case authorities, primarily through an examination of case authorities, certain concepts in criminal law the understanding of which is essential for a criminal practitioner Topics covered may include mens rea, sexual offences, assault, sentencing, conspiracy, driving offences, and identification.

Law 602 **4 units; H(3-0)**

Advocacy
A development of core competencies through the practice of advocacy. Each student will apply legal knowledge, critical analysis, communication and resolution skills as well as ethical understanding, to trial fundamentals situated in real trial scenarios. Participants will choose to represent parties in either a civil or criminal trial.

Note: This course is graded CR, D or F.

Law 605 **3 units; H(3-0)**

Oil and Gas Contracts
Selected problems in oil and gas law including industry contracts (pooling, farmout, joint operating, purchase and sale and royalty agreements); fiduciary duties; and title review.

Corequisite(s): Prerequisite or Corequisite: Law 571.

Law 607 **3 units; H(3-0)**

Advanced Legal Research
This course builds on legal research instruction in the first year of the program and affords further opportunities to learn and practice research skills. The course provides instruction in research methodology, citation, print and electronic research/databases, covering case law, statute law, texts, periodicals and web-based materials.

Law 612 **3 units; H(3-0)**

Advanced Private Law
Advanced issues in private law (property, contract, tort, unjust enrichment and equity), including contemporary controversies over appropriate rights and remedies when different causes of action either converge or intersect.

Corequisite(s): Prerequisite or Corequisite: Law 402, 406 and 551.

Law 613 **3 units; H(3-0)**

Conflict of Laws
The doctrines and rules governing legal disputes cutting across provincial or national boundaries. Topics include jurisdiction, distinctions between substantive and procedural rules, the recognition and enforcement of foreign judgments, domicile, proof of foreign law, and the choice of law rules relating to private law (torts, contracts, property, succession and family law).

Law 615 **3 units; H(3-0)**

Advanced Civil Procedure
The strategic use of the Alberta Rules of Court in civil proceedings with reference to related legislation and ethical requirements. Topics include commencement of proceedings, interlocutory and ex parte applications, discovery of persons and records, trial preparation, and the roles of the court.

Corequisite(s): Prerequisite or Corequisite: Law 505.

Law 617 **3 units; H(3-0)**

Alternative Energy Law: Renewable Energy and Energy Efficiency
The renewable energy and energy efficiency sectors. Topics include federalism, wind, small hydro, solar, biomass etc., energy conservation and demand side management, and access to energy infrastructure.

Corequisite(s): Prerequisite or Corequisite: Law 503.

Law 618 **3 units; H(3-0)**

Corporate Finance Law
Legal aspects of corporate finance transactions, including applicable regulatory frameworks. Topics may include equity and debt financing, secured transactions, assess and/or share purchase and sale agreements, and takeover bids.

Corequisite(s): Prerequisite or Corequisite: Law 509.

Law 619 **3 units; H(3-0)**

Estate Planning
Personal dispositions of property, both inter vivos and on death, to achieve estate and succession planning objectives. Topics include trusts, corporations, wills, life insurance, buy-sell arrangements, income splitting, estate freezing, and tax deferral plans.

Corequisite(s): Prerequisite or Corequisite: Law 527, 533 and 598.

Law 621 **3 units; H(3-0)**

Corporate Governance and Litigation
The principal concepts in corporate governance and their evolution in Canada; the Sarbanes-Oxley Act of 2002 and the related rules of the U.S. Securities and Exchange Commission and the New York Stock Exchange; the securities regulatory response of Canada to the adoption of Sarbanes-Oxley in the United States; and other current topics in corporate governance.

Corequisite(s): Prerequisite or Corequisite: Law 505 and 509.

Law 623 **3 units; H(3-0)**

Environmental Impact Assessment Law
Environmental impact assessment (EIA) law and practice in Canada. Topics include the role of EIA in the regulatory process and as a planning tool, federalism, triggers, equivalency, harmonization, joint assessment, implementation of assessment decisions, adaptive management, strategic environmental assessment, the role of traditional knowledge, and public participation.

Corequisite(s): Prerequisite or Corequisite: Law 503.

Law 624 **3 units; H(3-0)**

Environmental Law and Ethics
The ethical underpinning of environmental law, with a consideration of various views, including the land ethic, deep and shallow ecology, instrumental and utilitarian approaches, and inherent value.

Law 625 **3 units; H(3-0)**

Intellectual Property Transactions
Intellectual property transactions and strategies in a variety of industries in energy, information technology, and life sciences. Topics include open source IP, IP governance, management and best practices, valuation, ownership, improvements, co-ownership and collaboration, patent pools and standard setting organizations, software licensing and IT transactions, licensing, infringement management, and warranties.

Corequisite(s): Prerequisite or Corequisite: Law 543.

Law 626 **3 units; H(3-0)**

International Development Law
The role of law in promoting social and economic growth, with a focus on the rule of law as an instrument of development and the dialogue between the developed and less developed worlds through international agreements. Topics include the rules of international trade and finance, intellectual property, the environment and natural resources, and the war on terrorism.

Corequisite(s): Prerequisite or Corequisite: One of Law 549, 597 or 563.

Law 627 **3 units; H(3-0)**

International Environmental Law
The customary and treaty law rules applicable to global and transboundary environmental issues. Topics include air pollution, climate change, international wildlife law and trade, the international chemicals agreements liability regimes, and shared resources.

Law 628 **3 units; H(3-0)**

International Investment Law
Investor protection in customary law and treaties, in particular NAFTA Chapter 11, bilateral investment treaties (BITs), and the Energy Charter; the main disciplines, including national treatment, most favoured nation treatment, fair and equitable treatment, and the rules pertaining to expropriation; soft law norms pertaining to investment; and relevant domestic law, including the Investment Canada Act.

Corequisite(s): Prerequisite or Corequisite: Law 549 or 597.

Law 630 **3 units; H(3-0)**

International Petroleum Transactions
International business transactions in the context of the petroleum industry, including the various forms of state agreements; confidentiality agreements; study and bidding agreements; international joint operating agreements; agency agreements; and participation agreements; with attention to the key legal, business and ethical issues raised in negotiations.

Law 631 **3 units; H(3-0)**

International Tax Law
The tax implications of both inbound and outbound investment and implications for structuring affiliates, with consideration of international tax treaties and foreign tax credit mechanisms.

Corequisite(s): Prerequisite or Corequisite: Law 527.

Law 634 **3 units; H(3-0)**

Law of Species and Spaces
The principal federal and provincial laws governing the management of biological diversity, including protected area legislation and endangered species legislation. Explores the constitutional and common law fundamentals of wildlife law as well as contemporary disputes about species protection, ecosystem-level land management, and game ranch operations.

Corequisite(s): Prerequisite or Corequisite: Law 503.

Law 636 **3 units; H(3-0)**

Municipal Law
The legal position of local governments, including cities and regional governments. Topics include the powers of Municipal Councils and Districts, the duties and responsibilities of elected and appointed municipal officials, conflicts of interest, elections, the regulation and licensing of businesses, proprietary and contractual powers, tort and the public body, subdivision, land use planning, and the role of the courts.

Corequisite(s): Prerequisite or Corequisite: Law 503.

Law 637 **3 units; H(3-0)**

Energy Law
An overview of energy regulation, focusing on competition and pricing. Topics include the theory and process of energy regulation, regulatory jurisdiction, judicial review of energy regulation, regulation of natural gas and electricity prices, market restructuring, and deregulation. The course will familiarize students with the legal issues that arise when the legislature and regulators respond to market failures, and/or protect the public interest, in the provision of natural gas and electricity services.

Corequisite(s): Prerequisite or Corequisite: Law 503.

Law 641 **3 units; H(3-0)**

Oil and Gas and Mining Taxation
The resource regime rules of the Income Tax Act as applied to the oil and gas and mining sectors. Topics include: operations subject to the resource regime; the treatment of property costs and common industry expenditures (i.e. applicable "tax pools" and their characteristics): resource industry "subsidies" (e.g. flow-through share financing, investment tax credits); the avoidance provisions (e.g. the successor rules); and the treatment of foreign operations of a Canadian resident taxpayer.

Corequisite(s): Prerequisite or Corequisite: Law 697.

Law 645 **3 units; H(3-0)**

Pollution Control and Waste Management Law
The provincial and federal pollution control regimes for air and water pollution and for the handling, storage, treatment, and disposal of hazardous and non-hazardous wastes. Topics include federalism; regulatory and non-regulatory approaches to pollution from “point” and “non-point” sources; cumulative pollutant loads; the “precautionary” and “polluter pays” principles; and liability for contaminated sites.

Corequisite(s): Prerequisite or Corequisite: Law 503 and 531.

Law 647 **3 units; H(3-0)**

Regulatory Theory and the Law
The main theories that explain or justify government regulation, including correction for market failure, political economy or public choice, and deliberative democracy. The relationship between those theories and the development and implementation of regulatory legislation, regulation, and public policy.

Corequisite(s): Prerequisite or Corequisite: Law 503.

Law 648 **3 units; H(3-0)**

Securities Law
The regulation of capital market participants; the issuance of, and trades in, securities of companies, with an emphasis on Alberta and the National Instruments enacted by the Canadian securities regulator; the theory of securities regulation; as well as enforcement and compliance.

Law 650 **3 units; H(3-0)**

Business Skills for Lawyers
The non-legal skills required by lawyers working in-house or with business clients. Topics may include reading and analyzing financial statements; understanding cash flow models; business valuation; negotiation; capital markets; crisis management; project management.

Law 653 **3 units; H(0-3)**

Directed Research
A supervised research project involving the in-depth examination of a legal problem or area of concern not normally covered in a substantive or procedural course and which provides the basis for an article, research paper, brief, memorial, draft legislation, etc. Admission to this course depends on the availability of supervising faculty.

Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Law 656 **3 units; H(3-0)**

Mergers and Acquisitions
Key legal and financial concepts for mergers and acquisitions. Topics may include structuring transactions, the required legal documentation, securities legislation, director and officer responsibilities, negotiations, financing, defensive tactics, due diligence, employment and other issues.

Law 663 **3 units; H(3-0)**

Dispute Resolution Clinical
Interest-based, consensus-building dispute resolution processes to enhance understanding of dispute resolution theory, which will be applied through placements drawing on the mentorship of lawyers and dispute resolution practitioners engaged in court-annexed or private mediation, facilitation, collaborative law, and other processes.

Corequisite(s): Prerequisite or Corequisite: Law 508.

Note: This course is graded CR, D or F.

Law 667 **3 units; H(3-0)**

Advanced Public Law
Selected issues in constitutional law at the advanced level. Topics may include constitutional amendment, comparative approaches to rights, comparative federalism, the role of international law in constitutional interpretation, the legitimacy of judicial review, evidentiary issues in constitutional litigation, the role of social movements, and strategic litigation in securing constitutional rights.

Prerequisite(s): Law 400.

Law 673 **3 units; H(3-0)**

Jessup Moot
Preparation for and participation in the Philip C. Jessup International Law Moot Court Competition.

Prerequisite(s): Consent of the Faculty.

Law 674 **3 units; H(3-0)**

Business Venture Clinic
A clinical seminar where students work with startup companies and entrepreneurs. Students may prepare memos and drafts of business agreements. Students receive feedback on their written work from practicing lawyers.

Note: This course is graded CR, D or F.

Law 677 **3 units; H(3-0)**

Canadian Corporate/Securities Law Moot
The development of appellate advocacy and other lawyering skills in the context of corporate and securities law in Canada.

Prerequisite(s): Consent of the Faculty.

Law 678 **3 units; H(3-0)**

The Gale Cup Moot
The development of appellate advocacy and other lawyering skills in the context of preparation for and participation in the national Gale Cup Moot.

Prerequisite(s): Consent of the Faculty.

Law 683 **3 units; H(3-0)**

Advanced Family Law
Selected topics in family law, including matrimonial property; division of pensions; international family law; and the law relating to children, including regulatory aspects (e.g. child welfare).

Corequisite(s): Prerequisite or Corequisite: Law 515.

Law 685 **3 units; H(3-0)**

Business Clinical
The skills employed by a corporate solicitor in the context of one or more transactions. Skills covered may include drafting, negotiating, research, advo-

cacy, and transaction management, in simulated or real transactions.

Corequisite(s): Prerequisite or Corequisite: Law 509.

Note: This course is graded CR, D or F.

Law 686 **3 units; H(3-0)**

Clinical Theory
An opportunity to explore and reflect on what it means to be a good lawyer. Topics include the formation of professional identity and legal, ethical and practical issues in poverty law

Corequisite(s): Law 688.

Law 687 **3 units; H(3-0)**

Criminal Justice Clinical
A clinical seminar in elements of criminal law covering topical, practical, and ethical issues in the practice of criminal law. Three short placements with Crown and defence lawyers and a provincial court judge.

Corequisite(s): Prerequisite or Corequisite: Law 511.

Note: This course is graded CR, D or F.

Law 688 **3 units; H(3-0)**

Clinical Practice
Advanced experiential learning in a clinic setting. Students learn how to effectively manage clients and files while developing interviewing, counselling and advocacy skills in a variety of areas.

Corequisite(s): Law 686.

Note: This course is graded CR, D or F.

Law 689 **3 units; H(3-0)**

Family Law Clinical Seminar
A clinical seminar in elements of family law practice. The clinical experience may be obtained through simulated exercises, supervised handling of files and/or placements. Topics include Chambers advocacy, marital dispute consultations and drafting of a settlement.

Corequisite(s): Prerequisite or Corequisite: Law 515.

Note: This course is graded CR, D or F.

Law 690 **3 units; H(3-0)**

Western Canada MacIntyre Cup Trial Competition
The development of trial advocacy and other lawyering skills in the context of preparation for and participation in the Western Canada Trial Competition. Credit for this competition does not preclude credit for the Sopinka Cup.

Prerequisite(s): Consent of the Faculty.

Law 691 **3 units; H(3-0)**

Natural Resources, Energy and Environmental Law Clinical
A clinical seminar involving placements in any one of the following practice areas: energy law, resources law, water law, and environmental law.

Corequisite(s): Prerequisite or Corequisite: One of Law 531, 571, 573, 583 or 637.

Note: This course is graded CR, D or F.

Law 692 **2 units; H(2-0)**

Selected Topics I
A variety of subject areas, either doctrinal or theoretical.

MAY BE REPEATED FOR CREDIT

Law 693 **3 units; H(3-0)**

Selected Topics II
A variety of subject areas, either doctrinal or theoretical.

MAY BE REPEATED FOR CREDIT

Law 694 **4 units; H(4-0)**

Selected Topics III
A variety of subject areas, either doctrinal or theoretical.

MAY BE REPEATED FOR CREDIT

Law 695 **3 units; H(3-0)**

External Competitions
The development of advocacy and other lawyering skills in the context of preparation for and participation in an external competition not otherwise the subject of a course. A written component is generally required.

Prerequisite(s): Consent of the Faculty.

Law 696 **3 units; H(3-0)**

Clinical Studies
Participation in a clinical experience not otherwise the subject of a clinical course.

Prerequisite(s): Consent of the Faculty.

Note: This course is Graded CR, D or F.

MAY BE REPEATED FOR CREDIT

Law 697 **3 units; H(3-0)**

Corporate Tax
The provisions of the Income Tax Act applicable to corporations and their shareholders. Topics include the classification of corporations for tax purposes, the taxation of corporate income, the taxation of corporate distributions, and the taxation of various types of corporate reorganizations.

Corequisite(s): Prerequisite or Corequisite: Law 509 and 527.

Law 698 **3 units; H(3-0)**
(formerly Law 539)

Immigration and Refugee Law
Basic principles, policies, and procedures governing immigration and refugee law. Topics include refugee law and status; selection and admission of immigrants; inadmissible and removable classes; exemptions and minister's permits; and appeals and judicial review in the federal court, including Charter issues.

Corequisite(s): Prerequisite or Corequisite: Law 503.

Law 699 **3 units; H(3-0)**
(formerly Law 517)

Labour Law
The law governing unionized workplaces in Canada. Topics include freedom of association, the status of participants, union organization and certification, unfair labour practices, collective bargaining, the collective agreement and arbitration, industrial conflict, the duty of fair representation, and interaction between the labour law regime and the common-law of employment.

Corequisite(s): Prerequisite or Corequisite: Law 503.

700-Level Courses

Law 703 **3 units; H(3-0)**

Graduate Seminar in Legal Research and Methodology
Preparation for developing, researching and writing a thesis or major research paper. The distinctive nature of legal scholarship and its professional context will be explored. Students will be introduced to specific research techniques and to the challenges of comparative and cross-cultural work.

Prerequisite(s): Admission to the LLM program or consent of the Graduate Director.

Law 705 **3 units; H(0-3)**

Graduate Seminar in Legal Theory
An exploration of schools of legal theory, with the goal of helping students situate their graduate research within one or more of those approaches to legal scholarship. The seminar is structured around a series of readings describing different theoretical approaches and applying these approaches to areas of research.

Prerequisite(s): Admission to the LLM program or consent of the Graduate Director.

Law 706 **5 units; F(0-5)**

Major Research Paper
Under the supervision of a member of the Faculty of Law or other suitable person appointed by the Graduate Co-ordinator, students will complete a major research paper, approximately 50 to 60 pages (15,000 – 18,000 words) in length. The paper must reflect extensive research on a topic in natural resources, energy or environmental law, and it must propose a solution to a problem or present a critical evaluation of an issue in this area of law. The paper will be evaluated on a Pass/Fail basis by the supervisor and one other person appointed by the Graduate Co-ordinator. In the event of disagreement between the supervisor and the other appointee, the Graduate Co-ordinator shall determine whether the paper is a Pass or Fail after reading the paper and then consulting with the supervisor and other appointee.

Prerequisite(s): Admission to the LLM program or consent of the Graduate Director.

Linguistics LING

Instruction offered by members of the School of Languages, Linguistics, Literatures and Cultures in the Faculty of Arts.

Note: A student may not register in any Linguistics course unless a grade of at least "C-" has been achieved in each prerequisite for that course.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599. Admission to all 600-level courses is with consent of the School in addition to any other prerequisites which may be stated.

Linguistics 600 **1.5 units; Q(2-0)**

Introduction to Graduate Studies in Linguistics
This course provides an introduction to areas of research and theoretical orientations in which faculty in this department specialize, as well as to research and professional skills.

NOT INCLUDED IN GPA

Linguistics 605 **3 units; H(3-0)**

Field Methods
Prerequisite(s): Consent of the program.

MAY BE REPEATED FOR CREDIT

Linguistics 611 **3 units; H(3-0)**

Advanced Syntactic Analysis
An advanced course in syntactic theory with focus on analytical and critical skills required for conducting syntactic research.

Prerequisite(s): Linguistics 511 and consent of the program.

Linguistics 613 **3 units; H(3-0)**

Advanced Phonological Analysis
An advanced course in phonological theory with focus on analytical and critical skills required for conducting phonological research.

Prerequisite(s): Linguistics 403 and consent of the program.

Linguistics 631 **3 units; H(3-0)**

Topics in Linguistic Theory
Seminar in any area of theoretical linguistics, including phonetics, phonology, morphology, syntax, and semantics.

631.01. Phonetics

631.02. Phonology

631.03. Morphology

631.04. Syntax

631.05. Semantics

Prerequisite(s): Consent of the program.

Note: Consult the program regarding topics offered in any given year as topics vary. Not offered every year.

Linguistics 633 **3 units; H(3-0)**

Topics in Language Acquisition
Seminar in language acquisition.

633.01. First Language Acquisition

633.02. Second Language Acquisition

Prerequisite(s): Consent of the program.

Note: Consult the program regarding topics offered in any given year as topics vary. Not offered every year.

Linguistics 635 **3 units; H(3-0)**

Analysis of a Language or Language Family
Seminar in the analysis of a selected language or language family

Prerequisite(s): Consent of the program.

Note: Consult the program regarding topics offered in any given year as topics vary. Not offered every year.

MAY BE REPEATED FOR CREDIT

Linguistics 651 **3 units; H(3-0)**

Topics in Historical Linguistics
Seminar in historical linguistics.

Note: Consult the program regarding topics offered in any given year as topics vary. Not offered every year.

MAY BE REPEATED FOR CREDIT

Linguistics 660 **3 units; H(3-0)**

Quantitative Modelling of Linguistic Data
Introduction to basic statistical concepts, methods of analysis, and quantitative modelling techniques, with a focus on their application to the unique properties of language research and linguistics data.

Prerequisite(s): Consent of the program.

Linguistics 697 **3 units; H(3-0)**

Thesis Research Development

Linguistics 699 **3 units; H(3S-0)**

Conference and Reading Course
MAY BE REPEATED FOR CREDIT

Linguistics 797 **1.5 units; Q(2-0)**

Senior Doctoral Seminar
A forum for discussing and presenting candidacy paper research, thesis research, and conference presentations/publications in preparation.

NOT INCLUDED IN GPA

Management Studies MGST

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Management Studies 611 **3 units; H(3-0)**

Managerial Economics
Introduction to economic models for business decision making. Models from microeconomics are applied to provide insight in understanding costs, pricing, industry structure, and competitive interaction. Information economics is used to illustrate principal-agent problems that commonly arise in a business context. Macroeconomic models of supply and demand are applied to illustrate how government policy affects inflation and exchange rates.

Management Studies 613 **3 units; H(3-0)**

Managerial Decision Modelling
The transformation of raw data into useful information for decision-making. Quantitative models are implemented with spreadsheets to develop skills in generating managerial insight from data and in dealing with uncertainty. Topics covered include basic probability and statistics, decision trees, regression analysis, optimization, and simulation.

Management Studies 703 **3 units; H (3-0)**

Philosophy of Science for Business Administration
Examines processes of development and discussion of theories, with a focus on business management research. Exploration of three main questions: (i) what is the role of theory in science; (ii) what makes good management theories; and (iii) how can theories in management or related disciplines be developed and tested. Classical philosophy of science, management research papers focused on scientific theory and explanation, and prescriptive studies with strategies or methods for theory development in management and related disciplines, are reviewed.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Management Studies 705 **3 units; H (3-0)**

Critical Research Assessment
Development of skills associated with the evaluation and use of extant research. Emphasis is on the critical reading of methods and results sections of experimental and non-experimental research papers. Discussions regarding the appropriateness and limitations of the methodologies utilized, and statistical treatment of the data, will facilitate an understanding of research contributions. Studies using experimental and non-experimental design are included.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Management Studies 709 **3 units; H (3-0)**

Qualitative Research Methods
Development of skills to conduct qualitative research in the context of business. Focus on research design and the processes of collecting and analyzing qualitative data as well as drawing conclusions and reporting research findings. Specific emphasis is given to case study research, ethnographic, and focus group research. Grounded theory, action research, narrative, and discursive research is also introduced.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Management Studies 711 **3 units; H (3-0)**

Quantitative Design and Analysis
Development of skills associated with the design and implementation of experimental and non-experimental research. Specific emphasis on questionnaire design and psychometric properties, multiple regression, logistic regression, discriminant function analysis, factor analysis and structural equation modelling. Focus is on building capacity to conduct quantitative research.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Management Studies 713 **3 units; H (3-0)**

Seminars in Advanced Business Management
Introduces to advanced topics in business management research. Consisting of a series of 3-hour lectures on different topics, given by different senior faculty members, students will gain insights into the broad perspectives of issues being studied. Course material will be based on the instructors' selection of top research in the fields of human resources, organizational dynamics, global strategy, international business, entrepreneurship, operations management, marketing, finance and governance.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Management Studies 715 **3 units; H(3-0)**
(formerly Management Studies 615)

Strategic Business Analysis
Introduction to strategic analysis. Integration of learning from various management disciplines through a "field experience" study of a business firm.

Prerequisite(s): Strategy and Global Management 601.

Antirequisite(s): Credit for Management Studies 715 and 615 will not be allowed.

Management Studies 741 **3 units; H(3-0)**

Business Process Improvement and Creative Problem Solving
Business process improvement and creative problem solving as critical components of competitiveness. The adjective "business" is used to indicate that the course emphasizes improvements in non-manufacturing processes (of relevance to all organizations) in such areas as development, distribution, financial accounting/planning, order entry, personnel, and purchasing. Topics covered include the relationship to Total Quality Management and Time-Based Competition, incremental versus radical improvement, selection of key processes for study (including bench-marking and the role of capacity constraints), process flow diagramming, Pareto analysis, cause-and-effect analysis, statistical control charts, affinity diagrams, and steps in creative problem solving. Team exercises and projects make up a substantial portion of the course.

Prerequisite(s): Operations Management 601.

Management Studies 743 3 units; H(3-0)

International Logistics
The management functions of physical distribution, procurement and production are examined in a global context. International purchasing and logistics activities, global sourcing and production, and supply chain management to provide excellent, cost-effective service on a world-wide basis. Both theoretical and practical approaches are applied.

Prerequisite(s): Operations Management 601.

Management Studies 745 3 units; H (3-0)

Knowledge Dissemination to Enhance Managerial Practice
Focuses on how to properly place and convey knowledge through appropriate outlets so that it is utilized and valued by the management community. Results in the dissemination of one or two research papers (qualitative or quantitative) through different media.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Management Studies 747 3 units; H (3-0)

Business Economics in the Global Context
Examines long-term economic trends; trends that are guided by considerations such as the changing demographics of developing countries, rising nationalism, religion-based conflicts, climate change, and growing tensions between old and aspiring superpowers; and the implications of these trends for the world economy and the multi-national enterprises that operate in it.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Management Studies 751 3 units; H(3-0)

Global Energy Finance and Accounting
Problems related to evaluating and financing energy enterprises. Financial and accounting principles applied to valuing and financing energy projects. Financial reporting, managerial control systems, theory of financing, valuation, and deal structuring. Focus on private sector energy enterprises.

Prerequisite(s): Accounting 603 and Finance 601.

Management Studies 770 1.5 units; Q(3-0)

Topics in Leadership
Students near graduation must prepare for the transition from individual contributor to team and organization leader. This course is a comprehensive assessment of leadership from the dimensions of creating a leadership mindset and managing relationships (subordinates, peers, superiors and stakeholders). The topics may be addressed through theory development, simulation, case and experiential methods to provide to a full awareness and appreciation of the corporate responsibility, ethical dilemmas, and societal impacts of decision-making within business, not-for-profit, and institutional leadership environments.

Prerequisite(s): Management Studies 601.

Antirequisite(s): Credit for Management Studies 770 and 790.02 will not be allowed.

Management Studies 773 3 units; H(3-0)

Multivariate Analysis in Management
Multivariate Analysis in Management is concerned with the study of association among sets of measurements. This multivariate statistics course is intended primarily for PhD students in Management although MBA (Thesis) students pursuing an empirical-based thesis can also benefit. The objective of this course is to introduce graduate students to a variety of multivariate statistical techniques and methods to enable them to effectively carry out an empirical research study in management including the business, public, and not-for-profit sectors. Topics include: introduction to research design and multivariate methods, linear regression, logistic regression, analysis of variance and covariance, multivariate analysis of variance, discriminant analysis, principal components analysis, common factor analysis, and additional multivariate topics if time permits. The technical level of treatment would require basic understanding of matrix and linear algebra and at least one first level course in statistics. Such preliminary technical understanding will be helpful to appreciate the theory and intuition behind the multivariate techniques. A good blend of technical, conceptual, and practical aspects (using SPSS software) of the course will be maintained.

Prerequisite(s): Consent of the Haskayne School of Business.

Management Studies 781 3 units; H(3-0)

Philosophy of Science in Management Studies
Historical and critical perspectives of classical issues in philosophy of science, nature of scientific explanation, confirmation of scientific theories, theories of truth, distinctions between science and non-science.

Prerequisite(s): Consent of the Haskayne School of Business.

Management Studies 783 3 units; H(3-0)

Advanced Research Methodology and Methods
Research methodology relevant to examination and testing of theoretical and applied issues in management. The development and testing of research concepts; research operations, designs and analysis.

Prerequisite(s): Consent of the Haskayne School of Business.

Management Studies 789 3 units; H(3S-0)

Seminar in Management Studies
Intensive study and discussion of current literature and research with respect to selected topics in Management Studies.

Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Management Studies 791 3 units; H(3-0)

Management Education Seminar
Curricular and course design, instructional techniques, instructional tools, teaching styles, career planning and professional ethics. Nature, role and function of universities, and business schools, business school relations.

Prerequisite(s): Consent of the Haskayne School of Business.

Note: Doctoral students whose supervisors are members of the Haskayne School of Business are required to register in this seminar in the second year of doctoral studies.

NOT INCLUDED IN GPA

Management Studies 793 3 units; H(3S-0)

Conceptual Frameworks of the Enterprise
Advanced, comparative institutional analysis to explain the choice of the firm's boundaries, the governance mechanisms to manage the interface with the external environment and the internal organizational design, so as to reduce transaction costs and facilitate value creation.

Prerequisite(s): Consent of the Haskayne School of Business.

Management Studies 794 3 units; H(3S-0)

Theory Development
Processes of building, testing, and disseminating business management theories. Focus on the elements that constitute a theory, requirements for theory validation, and the role of theory in business management research. Analysis of mainstream theories in business management research. Readings include philosophy of science and management research materials on theory development and dissemination.

Prerequisite(s): Consent of the Haskayne School of Business.

Management Studies 795 3 units; H(1-0)
(formerly Management Studies 792)

Research Development
Development of research skills through participation in a well-defined project under the direct supervision of an experienced researcher.

Prerequisite(s): Management Studies 781 or 783.

Management Studies 797 3 units; H(3-0)

Directed Graduate Study in Management
Coverage of various topics on the basis of student and faculty interest.

Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Management Studies 799 3 units; H(3-0)

Topics in Management Studies
Coverage of various topics on the basis of student and faculty interests.

Prerequisite(s): Consent of the Haskayne School of Business

MAY BE REPEATED FOR CREDIT

Manufacturing Engineering ENMF

Instruction offered by members of the Department of Mechanical and Manufacturing Engineering in the Schulich School of Engineering.

Graduate Courses

Manufacturing Engineering 605 3 units; H(3-0)

Planning and Control of Computer Integrated Manufacturing
Advanced techniques for the design, planning, and control of integrated manufacturing systems. Course elements include: a framework for manufacturing planning and control; data flow and structured modelling methodologies; hierarchical models of manufacturing; cellular manufacturing organization; databases and communications; forecasting, demand management, capacity planning and master production scheduling; materials requirements planning, manufacturing resource planning, Just-in-Time manufacture, and Optimized Production Technology; control of independent demand inventory items; production activity control, shop floor control, scheduling, order release and dispatching; simulation in planning and control.

Manufacturing Engineering 607 3 units; H(3-0)

Total Quality Management
Statistical Process Control (SPC) for discrete and continuous manufacturing processes. Acceptance Sampling. Process capability analysis. Introduction to design of experiments (DOE). Overview of quality economics, quality standards and management philosophy.

Manufacturing Engineering 609 3 units; H(3-0)

Design and Analysis of Experiments
Statistical Design of Experiments (DOE) techniques for efficient data collection, analysis and interpretation. Analysis of Variance (ANOVA), including blocking and nesting, in full and fractional factorial designs. Robust design, including classical response surface and Taguchi techniques. Applications to product and process improvement.

Manufacturing Engineering 613 3 units; H(3S-0)

Research Seminar I
Reports on studies of the literature or of current research. This course is compulsory for all MSc and thesis-route MEng students and must be completed before the thesis defence.

NOT INCLUDED IN GPA

Manufacturing Engineering 618 3 units; H(3-0)

Manufacturing Optimization
Application of operations research techniques in manufacturing engineering: linear manufacturing optimization problems; transportation, assignment and transshipment problems; dynamic manufacturing programming problems; network problems; manufacturing decision problems.

Antirequisite(s): Credit for Manufacturing Engineering 618 and 619.18 will not be allowed.

Manufacturing Engineering 619 3 units; H(3-0)

Special Problems in Manufacturing Engineering
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member. Students would be required to consider problems of an advanced nature.

MAY BE REPEATED FOR CREDIT

Manufacturing Engineering 621 3 units; H(3-0)

Optimization Methods with Robotics Applications
Designed for graduate and senior undergraduate students interested in advanced topics in robotics. Based on the students' research topics, contents may vary. These include: fundamental theory in robotics, mathematical toolbox for optimization, differential kinematics, kinematics and actuation redundancy, optimal control, co-operating manipulators, redundancy in force sensing and sensor fusion.

Manufacturing Engineering 623 3 units; H(3-0)

CAD/CAM/CAE
Components of CAD/CAM/CAE systems. Geometric modelling. Development of customized CAD systems. Complex shape modelling. Computer-aided process planning. CNC machining. Rapid prototyping. Finite element analysis and motion analysis. Engineering optimization. Virtual design and manufacturing.

Manufacturing Engineering 698 6 units; F(0-4)

Graduate Project
Individual project in the student's area of specialization under the guidance of the student's supervisor. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course. Open only to students in the MEng (courses only) program.

Manufacturing Engineering 713 3 units; H(3S-0)

Research Seminar II
Reports on studies of the literature or of current research. This course is compulsory for all PhD students and must be completed before the candidacy examination.

NOT INCLUDED IN GPA

Marine Science MRSC

Most formal courses in Marine Science are offered at the Bamfield Marine Sciences Centre that is owned by the Western Canadian Universities Marine Sciences Society. The Centre is situated in Bamfield on the Pacific Coast of Vancouver Island, B.C. Instructors are drawn generally from the staffs of the participating universities (University of Alberta, University of Calgary, University of British Columbia, Simon Fraser University, University of Victoria).

Appropriate courses at the 300 level (or higher) in Biology, Plant Biology (Botany) and/or Zoology are prerequisite to these courses.

Each full course will last six weeks (plus four days travelling time) with an average of 50 hours weekly of lectures, laboratories, tutorials and field trips.

Fall Program: The Western Canadian Universities Marine Sciences Society offers an integrated program of courses in Marine Biology at the Bamfield Marine Sciences Centre. Attendance at the program requires residence at Bamfield Marine Sciences Centre for an entire Fall Term. Details are available from the Department of Biological Sciences.

University of Calgary students must apply to and be accepted by the Centre before they are permitted to register for the Marine Science courses at the University of Calgary. For further information students should consult the Department of Biological Sciences.

†Numbers in parentheses are the course numbers listed by the Bamfield Marine Sciences Centre. In many cases these courses have been renumbered to fulfill University of Calgary requirements. The courses listed below are not necessarily offered every year. Other courses and specific titles in special topics courses will be offered yearly. Students are requested to check current listings in the Department of Biological Sciences.

Graduate Courses

Enrolment in any graduate course requires consent of the Department.

600-level courses are available with permission to undergraduate students in the final year of their programs.

Special Graduate Courses: Each year the Western Canadian Universities Marine Biological Society offers short (one-week) intensive courses especially for graduate students interested in Marine Biology. Topics vary from year to year. Details are available from the Department of Biological Sciences.

Marine Science 600 (Marine Science 500†) 6 units; F(0-6)

Directed Studies
A course of directed studies under the supervision of a member of faculty, involving a research project approved by the supervisor. Each study will be designed to take maximum advantage of laboratory and/or field opportunities offered by the Bamfield Marine Sciences Centre.

Prerequisite(s): Consent of the Department.

Marine Science 601 (Marine Science 502†) 3 units; H(3-3)

Special Topics (3 weeks)
Courses of a specialized nature offered, as opportunities arise, by distinguished scientists visiting the Bamfield Marine Sciences Centre.

Prerequisite(s): Consent of the Department.

Marine Science 602 (Marine Science 501†) 6 units; F(3-3)

Special Topics (6 weeks)
Courses of a specialized nature offered, as opportunities arise, by distinguished scientists visiting the Bamfield Marine Sciences Centre.

Prerequisite(s): Consent of the Department.

Marketing MKTG

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Marketing 601 3 units; H(3-0)

Marketing Management
An introductory course on marketing management with an emphasis on the marketing concept as the focus of business strategy. The decision variables as well as functional frameworks used by marketing managers are emphasized by concentrating on the relationship between business and consumers.

Marketing 735 3 units; H(3-0)

Marketing Communications
Evaluation of strategic roles of a variety of communication disciplines - such as advertising, direct response advertising, sales promotion and public relations - and how companies combine those disciplines to provide clarity, consistency, and maximum impact.

Prerequisite(s): Marketing 601.

Marketing 741 3 units; H(3-0)

Business-To-Business Marketing
Management issues in the marketing of products and services to business, government and industrial customers. Topics include organizational buying behaviour, industrial market segmentation, demand analysis and sales forecasting, development and implementation of an industrial marketing mix.

Prerequisite(s): Marketing 601.

Marketing 761 3 units; H(3-0)

Buyer Behaviour
Study of factors influencing buyer decision-making processes and purchase behaviours, with implications for marketing practice.

Prerequisite(s): Marketing 601.

Marketing 763 3 units; H(3-0)

Marketing Research
Study of research as a process for gathering market information to aid problem solving. Steps in the research process reviewed include problem definition, research design, data collection, data analysis and report preparation.

Prerequisite(s): Marketing 601.

Marketing 783 3 units; H(3-0)

Services Marketing and Management
Study of processes and practices relevant to strategic firms using service for competitive advantage. Focuses on the integration of market-

ing, operations, and human resources from the consumer's perspective.

Prerequisite(s): Marketing 601.

Marketing 785 **3 units; H(3-0)**

New Venture Marketing
Within the context of high-potential, high growth ventures, examines four pillars of new product/ new business opportunity. How to create value for the customer, solve significant problems through product and service design, measure sustainable financial value, and assess fit of new ideas with entrepreneur/organization. Emphasis on discovering market opportunities and exploring product or service feasibility.

Prerequisite(s): Marketing 601.

Marketing 789 **3 units; H(3S-0)**

Seminar in Marketing Management
Intensive study and discussion of current literature and research with respect to selected, advanced topics in marketing.

Prerequisite(s): Marketing 601 or consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Marketing 793 **3 units; H(3-0)**

Strategic Marketing
Strategic market planning in a corporate context. Developing marketing strategies and understanding implementation. Examining the market management process.

Prerequisite(s): Marketing 601.

Marketing 795 **3 units; H(3-0)**

International Marketing
Design and implementation of marketing strategies across countries. Focuses on the global marketing environment and decision issues on foreign market entry, local marketing and global management of marketing activities.

Prerequisite(s): Marketing 601.

Marketing 797 **3 units; H(3S-0)**

Advanced Seminar in Marketing
Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Marketing 799 **3 units; H(3S-0)**

Doctoral Seminars in Marketing
MAY BE REPEATED FOR CREDIT

Mathematics MATH

Instruction offered by members of the Department of Mathematics and Statistics in the Faculty of Science.

Graduate Courses

Mathematics 600 **1.5 units; Q(3S-0)**

Research Seminar
A professional skills course, focusing on the development of technical proficiencies that are essential to succeed as practicing mathematicians in academia, government, or industry. The emphasis is on delivering professional presentations and using modern mathematical research tools. A high level of active student participation is required.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Mathematics 601 **3 units; H(3-0)**

Measure and Integration
Abstract measure theory, basic integration theorems, Fubini's theorem, Radon-Nikodym theorem, Lp spaces, Riesz representation theorem.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 601 and either Mathematics 501 or Pure Mathematics 501 will not be allowed.

Mathematics 603 **3 units; H(3-0)**

Analysis III
Sequences and series of functions; Lebesgue integration on the line, Fourier series and the Fourier transform, pointwise convergence theorems, distributions and generalized functions.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 603 and either Mathematics 545 or Pure Mathematics 545 will not be allowed.

Mathematics 605 **3 units; H(3-0)**

Differential Equations III
Systems of ordinary differential equations. Existence and uniqueness. Introduction to partial differential equations.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 605 and Applied Mathematics 605 will not be allowed.

Mathematics 607 **3 units; H(3-0)**

Algebra III
A sophisticated introduction to modules over rings, especially commutative rings with identity. Major topics include: snake lemma; free modules; tensor product; hom-tensor duality; finitely presented modules; invariant factors; free resolutions; and the classification of finitely generated modules over principal ideal domains. Adjoint functors play a large role. The course includes applications to linear algebra, including rational canonical form and Jordan canonical form.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 607 and any of Pure Mathematics 511, 607 or 611 will not be allowed.

Mathematics 617 **3 units; H(3-0)**

Functional Analysis
Introduction to Hilbert and Banach spaces, linear operators, weak topologies, and the operator spectrum.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 617 and Applied Mathematics 617 will not be allowed.

Mathematics 621 **3 units; H(3-0)**

Complex Analysis
A rigorous study of function of a single complex variable. Holomorphic function, Cauchy integral formula and its applications. Conformal mappings. Fractional linear transformations. Argument principle. Schwarz lemma. Conformal self-maps of the unit disk.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 621 and 521 will not be allowed.

Mathematics 625 **3 units; H(3-0)**

Introduction to Algebraic Topology
Introduction to the algebraic invariants that distinguish topological spaces. Focus on the fundamental group and its applications, and homology. Introduction to the basics of homological algebra.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 625 and either Mathematics 525 or Pure Mathematics 607 will not be allowed.

Mathematics 627 **3 units; H(3-0)**

Algebraic Geometry
Introduction to modern algebraic geometry sufficient to allow students to read research papers in their fields which use the language of schemes. Topics will include Spectra of rings; the Zariski topology; affine schemes; sheaves; ringed spaces; schemes; morphisms of finite type; arithmetic schemes; varieties; projective varieties; finite morphisms, unramified morphisms; etale morphisms.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 631 **3 units; H(3-0)**

Discrete Mathematics
Discrete Geometry: Euclidean, spherical and hyperbolic n-spaces, trigonometry, isometries, convex sets, convex polytopes, (mixed) volume(s), classical discrete groups, tilings, isoperimetric inequalities, packings, coverings. Graph Theory: connectivity; trees; Euler trails and tours; Hamilton cycles and paths; matchings; edge colourings; vertex colourings; homomorphisms; plane and planar graphs; extremal graph theory and Ramsey theory.

631.01. Discrete Geometry

631.03. Graph Theory

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 635 **3 units; H(3-0)**

Geometry of Numbers
The interplay of the group-theoretic notion of lattice and the geometric concept of convex set, the lattices representing periodicity, the convex sets geometry. Topics include convex bodies and lattice points, the critical determinant, the covering constant and the inhomogeneous determinant of a set, Star bodies, methods related to the above, and homogeneous and inhomogeneous forms.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 637 **3 units; H(3-0)**

Infinite Combinatorics
An excursion into the infinite world, from Ramsey Theory on the natural numbers, to applications in Number Theory and Banach Spaces, introduction to tools in Model Theory and Logic, fascinating homogeneous structures such as the rationals and the Rado graph, and possibly further explorations into the larger infinite world.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 641 **3 units; H(3-0)**

Number Theory
Algebraic Number Theory: an introduction to number fields, rings of integers, ideals, unique factorization, the different and the discriminant. The main objective to the course will be to prove the finiteness of the class number and Dirichlet's Unit Theorem.

Analytic Number Theory: students will learn tools to aid in the study of the average behaviour of arithmetic functions, including the use of zeta functions, to prove results about the distribution of prime numbers.

641.01. Algebraic Number Theory

641.03. Analytic Number Theory

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 643 **3 units; H(3-0)**

Computational Number Theory
An investigation of major problems in computational number theory, with emphasis on practical techniques and their computational complexity. Topics include basic integer arithmetic algorithms, finite fields, primality proving, factoring methods, algorithms in algebraic number fields.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 643 and any of Mathematics 527, Pure Mathematics 527, or Pure Mathematics 627 will not be allowed.

Mathematics 647 **3 units; H(3-0)**

Modular Forms
Modular forms and automorphic representations and their L-functions. Modularity Theorem from two perspectives.

Classical Perspective on Modular Forms: introduction to modular curves as moduli spaces for elliptic curves and as differential forms on modular curves. A study of L-functions attached to modular forms and the modularity theorem.

An Introduction to Automorphic Representations: introduction to the Langlands Programme. A study of partial L-functions attached to automorphic representations and known instances of the Langlands Correspondence.

647.01. Classical Perspective on Modular Forms

647.03. An Introduction to Automorphic Representations

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 651 **3 units; H(3-0)**
(formerly Applied Mathematics 603)

Topics in Applied Mathematics
Topics will be chosen according to the interest of the instructors and students.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

MAY BE REPEATED FOR CREDIT

Mathematics 653 **3 units; H(3-0)**
(formerly Pure Mathematics 603)

Topics in Pure Mathematics
Topics will be chosen according to the interest of the instructors and students.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

MAY BE REPEATED FOR CREDIT

Mathematics 661 **3 units; H(3-0)**

Scientific Modelling and Computation I
Convex Optimization: an introduction to modern convex optimization, including basics of convex analysis and duality, linear conic programming, robust optimization, and applications.

Scientific Computation: an introduction to both the methodological and the implementation components underlying modern scientific computations, with a natural emphasis on numerical linear algebra, and including modern computing architectures and their implications for numerical algorithms.

Numerical Differential Equations: fundamentals of solving DEs numerically, addressing the existence, stability and efficiency of such methods.

661.01. Convex Optimization

661.03. Scientific Computation

661.05. Numerical Differential Equations

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 663 **3 units; H(3-0)**

Applied Analysis
Interior Point Methods: exposes students to the modern IPM theory with some applications, to the extent that at the end of the course a student should be able to implement a basic IPM algorithm.

Theoretical Numerical Analysis: provides the theoretical underpinnings for the analysis of modern numerical methods, covering topics such as linear operators on normed spaces, approximation theory, nonlinear equations in Banach spaces, Fourier analysis, Sobolev spaces and weak formulations of elliptic boundary value problems, with applications to finite difference, finite element and wavelet methods.

Differential Equations: essential ideas relating to the analysis of differential equations from a functional analysis point of view. General topics include Hilbert spaces and the Lax-Milgram's theorem, variational formulation of boundary value problems, finite element methods, Sobolev spaces, distributions, and pseudo-differential operators.

663.01. Interior Point Methods

663.03. Theoretical Numerical Analysis

663.05. Differential Equations

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 667 **3 units; H(3-0)**

Introduction to Quantum Information
Focus on the mathematical treatment of a broad range of topics in quantum Shannon theory. Topics include quantum states, quantum channels, quantum measurements, completely positive maps, Neumarkís theorem, Stinespring dilation theorem, Choi-Jamiolkowski isomorphism, the theory of majorization and entanglement, the Peres-Horodecki criterion for separability, Shannon's noiseless and noisy channel coding theorems, Lieb's theorem and the strong subadditivity of the von Neumann entropy, Schumacher's quantum noiseless channel coding theorem, and the Holevo-Schumacher-Westmoreland theorem.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 669 **3 units; H(3-0)**

Scientific Modelling and Computation II
Wavelet Analysis: covers the design and implementation of wavelet methods for modern signal processing, particularly for one- and two-dimensional signals (audio and images).

Mathematical Biology: introduction to discrete models of mathematical biology, including difference equations, models of population dynamics and the like. Topics include stability of models describe by difference equations, continuous spatially homogeneous processes and spatially distributed models.

669.01. Wavelet Analysis

669.03. Mathematical Biology

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 681 **3 units; H(3-0)**
(formerly Applied Mathematics 681)

Stochastic Calculus for Finance
Martingales in discrete and continuous time, risk-neutral valuations, discrete- and continuous-time (B,S)-security markets, the Cox-Ross-Rubinstein formula, Wiener and Poisson processes, Itô's formula, stochastic differential equations, Girsanov's theorem, the Black-Scholes and Merton formulas, stopping times and American options, stochastic interest rates and their derivatives, energy and commodity models and derivatives, value-at-risk and risk management.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 681 and any one of Mathematics 581, Applied Mathematics 681, or Applied Mathematics 581 will not be allowed.

Mathematics 683 **3 units; H(3-0)**
(formerly Applied Mathematics 683)

Computational Finance
Basic computational techniques required for expertise quantitative finance. Topics include basic econometric techniques (model calibration), tree-based methods, finite-difference methods, Fourier methods, Monte Carlo simulation and quasi-Monte Carlo methods.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 683 and any one of Mathematics 583, Applied Mathematics 683, or Applied Mathematics 583 will not be allowed.

Mathematics 685 **3 units; H(3-0)**

Stochastic Processes
Stochastic processes are fundamental to the study of mathematical finance, but are also of vital importance in many other areas, from neuroscience to electrical engineering. Topics to be covered: Elements of stochastic processes, Markov chains and processes, Renewal processes, Martingales (discrete and continuous times), Brownian motion, Branching processes, Stationary processes, Diffusion processes, The Feynman-Kac formula, Kolmogorov backward/forward equations, Dynkin's formula.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Mathematics 685 and Statistics 761 will not be allowed.

Mathematics 691 **3 units; H(3-0)**

Advanced Mathematical Finance I
Topics include specific areas of mathematical finance and build on Mathematics 681.

Lévy Processes (LP): fundamental concepts associated with LP such as infinite divisibility, the Lévy-Khintchine formula, the Lévy-Itô decomposition, subordinators, LP as time-changed Brownian motions, and also dealing with semi-groups and generators of LP, the Itô formula for LP, the Girsanov theorem, stochastic differential equations driven by LP, the Feynman-Kac formula, applications of LP and numerical simulation of LP.

Credit Risk: corporate bond markets, modelling the bankruptcy risk of a firm, and understanding how corporate bonds are priced.

691.01. Lévy Processes

691.03. Credit Risk

Prerequisite(s): Mathematics 681 and admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mathematics 693 **3 units; H(3-0)**

Advanced Mathematical Finance II
Topics include specific areas of mathematical finance and build on Mathematics 681 and 683.

Monte Carlo Methods for Quantitative Finance: random number generation, simulation of stochastic differential equations, option valuation, variance reduction techniques, quasi-Monte Carlo methods, computing 'greeks', valuation of path-dependent and early-exercise options; applications to risk management; Markov Chain Monte Carlo methods.

Energy, Commodity and Environmental Finance: energy and commodity markets; spot, futures, forwards and swap contracts; the theory of storage; stochastic models for energy prices; model calibration; emissions market modelling; weather derivatives; energy risk management; energy option valuation.

693.01 Monte Carlo Methods for Quantitative Finance

693.03 Energy, Commodity and Environmental Finance

Prerequisite(s): Mathematics 681 and 683 and admission to a graduate program in Mathematics and Statistics or consent of the Department.

Mechanical Engineering ENME

Instruction offered by members of the Department of Mechanical and Manufacturing Engineering in the Schulich School of Engineering.

Graduate Courses

Mechanical Engineering 603 **3 units; H(3-0)**

Physical Fluid Dynamics
Physical phenomena of incompressible fluid motion for a variety of flows, e.g. pipe and channel flow, flow past a cylinder, and convection in horizontal layers. The derivation of the basic equations of fluid mechanics using Cartesian tensor notation. High and low Reynolds number flows including some solutions of the viscous flow equations, inviscid flow, and elementary boundary layer theory. Thermal free convective flows.

Mechanical Engineering 605 **3 units; H(3-0)**

Combustion Processes
Review of thermodynamics and chemical kinetics of combustion. Fluid mechanics, heat and mass transfer in combustion phenomena. Autoignition and source ignition, flames and detonation. Quenching and explosion hazards, flammability and detonation limits. Heterogeneous combustion, combustion practical systems, combustion as affecting pollution and efficiency, some experimental combustion methods.

Mechanical Engineering 607 **3 units; H(3-0)**

Mechanics of Compressible Flow
One-dimensional steady and unsteady motion with application to the analysis of supersonic nozzles, diffusers, flow in conduits with friction, shock tubes. Two-dimensional flow of ideal fluid. Small perturbation theory, method of characteristics with application to design of supersonic nozzles. Waves in two-dimensional flow.

Mechanical Engineering 613 **3 units; H(3S-0)**

Research Seminar I
Students will develop written and oral communication skills required to disseminate their technical research results and to receive formative feedback on performance.

NOT INCLUDED IN GPA

Mechanical Engineering 615 **3 units; H(3-0)**

Instrumentation
Basic principles relating to measurement systems. Static and dynamic characteristics of signals. Measurement system behaviour. Application of probability and statistics to measurement systems. Uncertainty analysis. Data acquisition and conversion, analog/digital signals and associated sampling theory. Application of theory to various measurement systems such as pressure, velocity, strain, concentration, and temperature.

Mechanical Engineering 619 **3 units; H(3-0)**

Special Problems
Designed to provide graduate students, especially at the PhD level, with the opportunity of pursuing advanced studies in particular areas under the direction of a faculty member. Students would be required to consider problems of an advanced nature.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Mechanical Engineering 620 **3 units; H(3-0)**

Geomatics Engineering for Pipeline Systems
Provides both the classical basis to geomatics as a powerful tool in the design and management of pipelines as well as the cutting-edge view of the discipline as a digital technology.

Antirequisite(s): Credit for Mechanical Engineering 619.10 and 620 will not be allowed.

Mechanical Engineering 622 **3 units; H(3-0)**

Pump and Compressor Stations
Provides a comprehensive overview of the design, performance and operation of pump and compressor stations for pipeline applications. Other topics consist of SCADA operation, station valve operation, asset management, condition monitoring and equipment reliability.

Antirequisite(s): Credit for Mechanical Engineering 622 and 619.11 will not be allowed.

Mechanical Engineering 624 **3 units; H(3-0)**

Fundamentals of Pipeline Economics
Provides students with a fundamental understanding of engineering economics, including decision-making processes and life-cycle assessment in application to pipeline systems.

Antirequisite(s): Credit for Mechanical Engineering 624 and 619.12 will not be allowed.

Mechanical Engineering 626 **3 units; H(3-0)**

Corrosion Science in the Pipelines Industry
Overview of corrosion in the pipeline industry with emphasis on the underlying science, including thermodynamics and kinetics of electrochemical processes, corrosion prevention and mitigation by materials selection, inhibition, coatings and cathodic protection. Implications for integrity management will also be discussed.

Antirequisite(s): Credit for Mechanical Engineering 626 and 619.12 will not be allowed.

Mechanical Engineering 628 **3 units; H(3-0)**

Pipeline Coatings
Introduction to the fundamental properties and structure of coatings, as well as applications in the pipeline industry. Applications of coating technology in integrity maintenance of the various structural facilities. Computer assisted coatings project management programs will be introduced.

Antirequisite(s): Credit for Mechanical Engineering 628 and 619.27 will not be allowed

Mechanical Engineering 630 **3 units; H(3-0)**

Fundamentals of Liquid Hydraulics in Pipeline Systems
Introduction to the fundamentals of liquid hydraulics in pipeline systems. Topics include petroleum fluids, design elements and economics, mechanical design, fluid mechanics fundamentals, pipeline hydraulics, isothermal flow, pumping requirements, centrifugal and reciprocating pumps, operations and maintenance design, and design optimization.

Antirequisite(s): Credit for Mechanical Engineering 630 and 619.49 will not be allowed.

Mechanical Engineering 631 **3 units; H(3-0)**

Numerical Methods for Engineers
Introduction, mathematical modelling, sources of errors in the process of numerical analysis and solution methodology; Elements of numerical analysis, Taylor series, round-off error, truncation error, concept of stability, consistency and convergence; Linear algebra, normal forms, Gauss elimination method, LU-decomposition, tridiagonal systems of equations; iterative methods, Jacobi, Gauss-Seidel, SOR, SSOR methods, conjugate gradient methods and preconditioning and principles of the multi-grid methods; Elliptic "equilibrium" equation, Laplace and Poisson equations, finite difference and finite control volume concepts and stability analysis; Parabolic equations: explicit, implicit and Crank-Nicolson methods, time-splitting method, method of lines, Stability analysis; Hyperbolic equations; Introduction to other methods; future challenging problems.

Mechanical Engineering 632 3 units; H(3-0)

Fundamentals of Gas Hydraulics in Pipeline Systems

Applications of fundamental fluid mechanics concepts to pipelines conveying compressible media (gases). Strategies for describing the gas-dynamics of pipeline systems and networks are developed, as well as the influence of gas properties and pipeline operating characteristics on component selection and operating parameters.

Antirequisite(s): Credit for Mechanical Engineering 632 and 619.40 will not be allowed.

Mechanical Engineering 633 3 units; H(3-0)

Mathematical Techniques for Engineers

Application of mathematical techniques to the solution of ordinary and partial differential equations arising in engineering problems. Methods that will be considered are: separation of variables, method of characteristics, transform methods and complex variable methods.

Mechanical Engineering 634 3 units; H(3-0)

Pipeline Geotechnical Engineering

Introduction to applications of geotechnical engineering in design and construction of oil and gas pipelines. Geohazard assessment and mitigation methods and issues around pipe/soil interaction will be discussed, as well as the relevant codes, standards and industry guidelines for pipelines.

Antirequisite(s): Credit for Mechanical Engineering 634 and 619.57 will not be allowed.

Mechanical Engineering 636 3 units; H(3-0)

Structural Analysis of Buried Steel Pipeline Systems

An introduction to stress analysis of buried pipelines through hand calculations, spreadsheets, and stress analysis software. Pipeline code requirements are discussed. Individual practices and industry examples are used.

Antirequisite(s): Credit for Mechanical Engineering 636 and 619.67 will not be allowed.

Mechanical Engineering 637 3 units; H(3-0)
(Environmental Engineering 673)

Thermal Systems Analysis

Fundamentals of thermodynamics, fluid mechanics, heat transfer and combustion; Modelling of thermophysical properties; Second law of thermodynamics, concept of entropy generation and exergy analysis; Minimizing environmental impact; Advanced design and analysis of heat exchangers, co-generation, renewable energy systems, and propulsion systems.

Mechanical Engineering 638 3 units; H(3-0)

Failure and Fracture Mechanics in the Pipeline Industry

Covers the basic theory of failure and fracture mechanics in sufficient depth to allow its application to pipeline design, material requirements and integrity assessment. Overview of brittle and ductile fracture, fatigue and environmental processes, design basics, fracture mechanics theory, fracture mechanics testing, inspection issues, material issues, crack propagation and arrest, fitness for purpose methods, structural integrity assessment and material requirements.

Antirequisite(s): Credit for Mechanical Engineering 638 and 619.74 will not be allowed.

Mechanical Engineering 639 3 units; H(3-0)

Numerical Methods for Computational Fluid Dynamics

Review of solution techniques for ordinary differential equations. Stability, consistency and convergence. Order of accuracy. Fourier methods for stability. Numerical techniques for one-, two- and three-dimensional linear parabolic problems. Courant condition. Implicit and semi-implicit schemes. Boundary conditions for parabolic problems. Techniques for linear hyperbolic problems. CFL condition. Characteristics, domain of dependence and domain of influence. Boundary conditions for hyperbolic problems. Non-linear conservation laws. The Burger's equation as a test problem. Strong and weak solutions. Conservative and integral forms. Conservative schemes. Entropy condition. Godunov theorem and flux limiters. Godunov, ENO and TVD schemes. Implementation in gas dynamics.

Mechanical Engineering 640 3 units; H(3-0)

Stress Corrosion Cracking of Materials

Fundamentals of stress corrosion cracking (SCC) of materials and the factors contributing to SCC from environmental, metallurgical and mechanical sources. Various testing techniques to study and/or evaluate SCC will also be discussed.

Antirequisite(s): Credit for Mechanical Engineering 640 and 619.90 will not be allowed.

Mechanical Engineering 641 3 units; H(3-0)

Advanced Control Systems

Introduction to multivariable systems; state space models; analysis of linear systems; stability; Cayley-Hamilton theorem; controllability and observability; state feedback control; pole placement designs; introduction to linear optimal control and estimation; Kalman filtering; separation theorem and duality; performance specifications; controller reduction concepts; introduction to robust control.

Mechanical Engineering 643 3 units; H(3-0)

Optimal and Adaptive Control

Discrete time and sampled-data system models and properties; discrete time domain controller design principles; system identification using least-squares analysis; self-tuning control; indirect adaptive control; model reference adaptive control; sliding mode control in continuous and discrete time; optimal design of sliding mode controllers; sensitivity functions and their role in control theoretic performance specification; robust stability and robust performance objectives; Kharitonov stability.

Mechanical Engineering 650 3 units; H(3-0)

Mobile Robotics

Overview of unmanned vehicles, mobile robot locomotion systems, wheeled rovers, walking machines, mobile-manipulators, mobile robot sensors and actuators, simulation, modelling and analysis of mobile robot behaviour, robot-environment interaction analysis, 2D navigation techniques and localization, mobile robot simulation tools.

Prerequisite(s): Mechanical Engineering 505.

Mechanical Engineering 653 3 units; H(3-0)

Advanced Continuum Mechanics

Review of linear algebra and tensor analysis; kinematics of the deformation; deformation and strain tensors; strain rates; balance equations and equations of motion; stress principle; stress power and conjugated stress-strain couples; stress rates; elements of Lagrangian and Hamiltonian Mechanics for discrete and continuum systems; thermomechanics and constitutive theory; isotropic and anisotropic hyperelasticity; composite materials.

Mechanical Engineering 660 6 units; F(0-3)
(Mechanical Engineering 560)

Mechatronics Design Laboratory

A hands-on laboratory experience in the design and analysis of microprocessor-controlled electromechanical components. Laboratory projects in which teams will configure, design, and implement mechatronic systems. Aliasing, quantization, electronic feedback, power amplifiers, digital logic, encoder interfacing, and motor control leading to prototyping and design of commercially viable products. Lectures will cover comparative surveys, operational principles, and integrated design issues associated with mechanical, electrical and control components.

Mechanical Engineering 663 3 units; H(3-0)
(Medical Science 663)(Kinesiology 663)

Advanced Muscle Mechanics and Physiology

A look at problems associated within muscle mechanics and contractility. Also the use of muscle mechanics as a scientific discipline to critically learn and evaluate the scientific process. Basic anatomy and physiology of muscle contraction including the cross-bridge theory, and the force-length, force-velocity and force-time relationships of actively and passively contracting muscles will also be covered.

Prerequisite(s): Consent of the Faculty.

Mechanical Engineering 665 3 units; H(3-0)

Elements of Materials Engineering

Covers a variety of material aspects and provides a fundamental understanding of Materials Science and Engineering. Emphasizes the understanding of advanced dislocation theory and its application in illustration of diffusion, deformation and fracture of metals. Fundamentals of material strengthening mechanisms are covered. Practical aspects that are relevant to material uses and failures, such as environmental-induced cracking, creep, fatigue, strain aging and corrosion, are discussed. Typical surface analysis techniques for material characterization are introduced.

Mechanical Engineering 667 3 units; H(3-0)

Fracture Mechanics

Basic fracture theory, failure criteria, overview of fracture mechanics, brittle and ductile failure, crack tip parameters, geometric considerations, methods of analysis, fracture toughness and testing standards. Applications in design, fatigue subcritical crack growth, creep and impact.

Mechanical Engineering 669 3 units; H(3-0)

Fatigue of Materials

History and origin of fatigue. Stress life, strain life and fracture mechanics approaches. Low and high cycle fatigue. Low and high temperature fatigue. Combined stresses, initiation, and propagation of cracks. Environmental and statistical effects. Testing techniques and variables. Design and specific material behaviour. Mechanisms of fatigue.

Mechanical Engineering 683 3 units; H(3-0)

Applications of 3D Rigid Body Mechanics in Biomechanics

Applications of 3D motion analysis and rigid body mechanics to musculoskeletal system locomotion, and movement. Experimental, theoretical and numerical methods for optical motion imaging, 3D analysis of joint kinematics and kinetics, joint angle representations, prediction of joint forces, data analysis and filtering, error propagation, inverse and forward dynamics approaches, and applications to clinical and orthopaedic engineering.

Mechanical Engineering 685 3 units; H(3-3)
(Medical Science 685)

Biomechanics of Human Movement
Introduction to the measuring methods (accelerometry, goniometry, film and film analysis, video systems) of biomechanical analysis of human movement (force and force distribution). Description of the mechanical properties of bone, tendon, ligaments, cartilage, muscles and soft tissues. The relation between structure and function of biomaterials. Introduction to descriptive analysis of human movement.

Prerequisite(s): Consent of the Faculty.

Antirequisite(s): Credit for Mechanical Engineering 685 and either Medical Science 685 or Kinesiology 685 will not be allowed.

Mechanical Engineering 698 6 units; F(0-4)

Graduate Project
Individual project in the student's area of specialization under the guidance of the student's supervisor. A written proposal, one or more written progress reports, and a final written report are required. An oral presentation is required upon completion of the course. Open only to students in the MEng (courses only) program.

Mechanical Engineering 708 3 units; H(4-0)

Turbulence
Provides an overview of turbulence in incompressible flows of Newtonian fluids. Topics include: the nature of turbulence; classical methods of analysis (Reynolds-averaging, spectral representations); the concept of scales; a review of isotropic and homogeneous turbulence; the energy cascade and the role of vorticity in turbulence canonical flows: boundary layers, jets, wakes and mixing layers; modern views of turbulence including coherent motions and inter-scale energy transfer.

Note: Students are expected to be familiar with basic mathematical concepts including vector calculus, Gauss' theorem, Cartesian tensor notation, and basic fluid mechanical concepts, such as wakes, boundary layers, and jets. Basic knowledge in continuum mechanics is an asset.

Mechanical Engineering 713 3 units; H(3S-0)

Research Seminar II
Students will develop written and oral communication skills required to disseminate their technical research results and to receive formative feedback on performance.

NOT INCLUDED IN GPA

Medical Graduate Education MDGE

Instruction offered by members of the Cumming School of Medicine.

Medical Graduate Education 601
1 unit (13 hours)

Business Fundamentals
An overview of the primary business aspects involved in the health care product development industry, including company creation, intellectual property, financing, regulatory and clinical affairs, valuations and exit strategies. The principle objective is to develop a general understanding of how these different aspects integrate to form a functioning business.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 602
1 unit (13 hours)

Intellectual Property and Licensing
A hands-on look at intellectual property and licensing, including reviews of actual biotechnology patents, licenses, and term sheets. Following an overview discussion on intellectual property, a deeper dive into patent and license construction enables the students to craft their own simple patents and license term sheets.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 603
1 unit (13 hours)

Project Management and Corporate Leadership
Presentation of project management tools and techniques and how to build a foundational project plan. Explanation of corporate, personal and team leadership as well as principles applicable to larger organizations will be discussed.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 604
1 unit (13 hours)

Finances in Biomedical Technology
Coverage of the key regulations necessary for biopharmaceutical and medical device manufacturing, how to apply to the regulatory agencies and the consequences of non-compliance in regulatory affairs.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 605
1 unit (13 hours)

Regulatory Affairs
Coverage of the key regulations necessary for biopharmaceutical and medical device manufacturing, how to apply to the regulatory agencies and the consequences of non-compliance in regulatory affairs.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 606
1 unit (13 hours)

Clinical Trials
Review of clinical trials strategies and the regulations around them. An emphasis will be placed on regulatory obligations and current trends.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 607
1 unit (13 hours)

Communication, Marketing and Sales
Introduction to effective strategies for communication to diverse audiences of investors, corporations and clients in the biomedical technology sector, plus consideration of optimal marketing and sales approaches with appropriate channel selection.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 608
1 unit (13 hours)

Business Case Studies
Real-life presentations by corporate executives with an emphasis on strategic planning at the highest level, with examples of successes, failures and works in progress. Critical evaluation of publicly traded biotechnology corporations.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 609
1 unit (13 hours)

Business Integration
Integrating lessons learned in prior business modules and extrapolating to the corporate environment, plus business pitches.

Prerequisite(s): Admission to the Master of Biomedical Technology program or consent of the Program Director.

Medical Graduate Education 621
1 unit (13 hours)

Anti-tumour Drug Discovery and Current Cancer Therapies
Understanding the effective use of molecular pathology to identify biomarkers and potential targets for modulation. Explore the concepts of targeting stem cells, identification of small molecular weight inhibitors (drug discovery) and the formulation of clinical trials. Major emphasis will be placed on formulating an effective hypothesis and to design preclinical studies that will include cutting-edge ideas on molecular cancer therapeutics.

Prerequisite(s): Consent of the program.

Medical Graduate Education 622
1 unit (13 hours)

Proteomics and Metabolomics and Cancer Biomarker Discovery
Proteomics and metabolomics will be covered including the objectives of these disciplines, the technologies, methods and informatics used in biological mass spectrometry as applied to the 'omics. Examples will be drawn from cancer-related disciplines (research or clinical).

Prerequisite(s): Consent of the program.

Medical Graduate Education 623
1 unit (13 hours)

Tumour Immunology and Immunotherapy
Introductory topics in tumour immunobiology and immunotherapy will be covered. Fundamental and translational topics including, tumour immunogenicity, tumour immune surveillance and editing, immune escape, active immunotherapy, passive immunotherapy, virotherapy and viral vaccines, therapies targeting immunosuppressive mechanisms, and personalized immunotherapy.

Prerequisite(s): Consent of the program.

Medical Graduate Education 624
1 unit (13 hours)

Cell Cycle Regulation in Cancer and Aging
The links between cancer and aging, the experimental definition of the cell cycle, major events in G0, G1, S, G2, M, drivers and regulators of the cell cycle including oncogenes and tumour suppressors, cyclins, CDKs, CDIs and links to the cell cycle through tumour suppressors will be covered. An overview of biological and replicative aging including recent developments regarding the role of epigenetic modifications in cancer and aging.

Prerequisite(s): Consent of the program.

Medical Graduate Education 625
1 unit (13 hours)

Epigenetics and Chromatin Dynamics
Fundamentals of eukaryotic chromatin assembly, dynamic chromatin regulation and post-translational modifications that comprise epigenetics. DNA methylation, histone post-translational modifications, histone variants, regulatory siRNA, nucleosome remodelling and higher-order chromatin organization. Cancer and disease-associated epigenetic alterations will be discussed in detail.

Prerequisite(s): Consent of the program.

Medical Graduate Education 626
1 unit (13 hours)

DNA Damage Signalling and Repair
DNA repair pathways, highlighting the cellular responses to ionizing radiation will be covered, including: base excision repair, mismatch repair, nucleotide excision repair, and DNA single strand and double strand break repair. The relationship of replication stress and telomere maintenance to genomic instability in a cancer context will be covered.

Prerequisite(s): Consent of the program.

Medical Graduate Education 627
1 unit (13 hours)

Cancer Cell Biology - Fundamentals and Current Topics
An advanced discussion-based format featuring analysis of the current literature in cancer cell biology with an emphasis on developmental systems. Background in cancer cell biology and signal transduction is essential. Topics include stem cells, cell polarity and migration, endocytosis and mitochondrial biogenesis, and are selected based on the student's research project to enhance their learning experience.

Prerequisite(s): Consent of the program.

Medical Graduate Education 628
1 unit (13 hours)

Cancer Cell Invasion, Metastasis and Angiogenesis
Angiogenesis, cell invasion and metastasis will be discussed from molecular, cell biological and clinical perspectives. Methods of experimental modelling of metastatic behaviour and angiogenesis, as well as their respective advantages and limitations will be discussed. There will be lab demonstration of available in vitro and in vivo invasion/metastasis/angiogenesis models.

Prerequisite(s): Consent of the program.

Medical Graduate Education 629
1 unit (13 hours)

Signal Transduction Pathways and Cancer
Fundamental principles of receptor-mediated and intracellular signalling pathways that have implications in cancer biology. Topics focus on receptor tyrosine kinases, serine/threonine kinase receptors and G-protein-coupled receptors.

Prerequisite(s): Consent of the program.

Medical Graduate Education 630
1 unit (13 hours)

Ethics of Data Analysis and Clinically-Oriented Research
Issues of scientific ethics as it relates to cancer research. Students learn how clinical trials involving human subjects and tissues are designed to gain ethical approval, as well as issues surrounding genomic data analysis and use. The topics of unethical data manipulation, detecting falsified data, experimental replicates and typical cancer research assays will be covered.

Prerequisite(s): Consent of the program.

Medical Graduate Education 631
1 unit (13 hours)

Neural Development
Fundamental principles of central nervous system development. The course encompasses the first unit of Medical Science 619.01, which is a core course for all Neuroscience graduate students. It will cover basic principles of neural induction and neurogenesis, regionalization of the neural tube, neuronal migration, circuit formation (axons and dendrites), neurodevelopmental disorders, and model organisms.

Prerequisite(s): Consent of the program.

Antirequisite(s): Credit for Medical Graduate Education 631 and Medical Science 619.01 will not be allowed.

Medical Graduate Education 632
1 unit (13 hours)

Principles of Light Microscopy
Fundamentals of standard wide-field fluorescence microscopy as well as confocal and multiphoton techniques. Key concepts such as the optical light path, spatial resolution, and sampling will be emphasized. In addition, students will have the opportunity to assemble basic bright-field and fluorescence microscopes using optical “lego”.

Prerequisite(s): Consent of the program.

Medical Graduate Education 633
1 unit (13 hours)

Advanced Techniques in Optical Microscopy
Advanced techniques in optical microscopy covered though a combination of lectures and activities. Topics include total internal reflection (TIRF) microscopy, superresolution, light sheet techniques and other rapidly developing technologies. Also includes one or more selected topics in targeted illumination including fluorescence recovery after photo activation (FRAP).

Prerequisite(s): Medical Graduate Education 632 or consent of the program.

Medical Graduate Education 634
1 unit (13 hours)

Digital Imaging for Optical Microscopy
The concept of the digital image and its relevance to optical microscopy will be introduced. The workflow from image acquisition to image analysis and presentation of data for publication will be covered. Good practices and pitfalls will be emphasized at every step. Students will gain experience in image processing and analysis using the standard open source package FIJI.

Prerequisite(s): Medical Graduate Education 632 or consent of the program.

Medical Graduate Education 651
1 unit (13 hours)

Microbial Virulence Factors
Virulence factors used by microbial pathogens to cause disease. Topics include microbial adherence mechanisms, toxigenic infections, virulence factor secretion systems, microbial gene expression.

Prerequisite(s): Medical Science 611, Cellular, Molecular and Microbial Biology 431, or consent of the program.

Medical Graduate Education 652
1 unit (13 hours)

Microbial Interactions at Epithelial Surfaces
Strategies used by microbial pathogens to target mucosal surfaces, and their contribution to disease. Topics include microbial disruption of epithelial barrier function, interactions with the host microbiome, microbial adaptation to host defenses, and invasion and intracellular survival strategies.

Prerequisite(s): Medical Science 611, Cellular, Molecular and Microbial Biology 431, or consent of the program.

Medical Graduate Education 653
1 unit (13 hours)

Antimicrobials and Resistance
Mechanism of action of antimicrobials, and resistance genes. Topics will also include transmission of resistance and discovery of new antimicrobials.

Prerequisite(s): Medical Science 611, Cellular, Molecular and Microbial Biology 431, or consent of the program.

Medical Graduate Education 654
1 unit (13 hours)

Infection and Immunity
Interactions with microbial pathogens with the innate and adaptive immune systems. Topics include immune evasion, pathogen clearance, and vaccine development.

Prerequisite(s): Consent of the program.

Medical Graduate Education 655
1 unit (13 hours)

Autoimmunity and Immunodeficiency
Advanced course focusing on the cellular and molecular mechanisms of systemic and organ-specific autoimmunity, acquired immunodeficiencies including those in the context of organ transplantation, and immunomodulatory therapies.

Prerequisite(s): Consent of the program.

Medical Graduate Education 755
1 unit (13 hours)

Directed Studies
Lectures, seminars, term papers or training in theoretical and/or laboratory methods at the advanced level in the medical sciences.

Prerequisite(s): Consent of the program.

MAY BE REPEATED FOR CREDIT

Medical Graduate Education 799
1 unit (13 hours)

Topics in Medical Sciences
Prerequisite(s): Consent of the program.

MAY BE REPEATED FOR CREDIT

Medical Physics MDPH

Instruction offered by members of the Department of Physics and Astronomy in the Faculty of Science.

Note: For listings of related courses, see Astrophysics, Physics, and Space Physics.

Graduate Courses

Medical Physics 623 **3 units; H(3-0)**

Radiological Physics and Radiation Dosimetry
Photon and electron interactions, charged particle and radiation equilibrium, cavity theory, absolute and relative dosimetry, calibration protocols.

Prerequisite(s): Consent of the Department.

Medical Physics 625 **3 units; H(3-0)**

Radiation Oncology Physics
Clinical photon and electron beams, brachytherapy, treatment planning, radiation therapy devices, special techniques.

Prerequisite(s): Medical Physics 623 and consent of the Department.

Medical Physics 632 **1.5 units; Q(0-1.5)**

Clinical Rotation in Radiation Oncology Physics
Clinical observation of radiotherapy for cancer. Students observe the treatment process, including immobilization, CT simulation and radiotherapy treatment. Treatments observed include conventional radiotherapy, intensity modulated radiotherapy, total body irradiation, stereotactic radiosurgery, brachytherapy.

Prerequisite(s): Medical Physics 623 and consent of the Department.

NOT INCLUDED IN GPA

Medical Physics 633 **3 units; H(1-3)**

Radiation Oncology Physics Laboratory
Absorption dose determination, dose descriptors, photon beam modelling, quality control.

Prerequisite(s): Medical Physics 623 and consent of the Department.

Medical Physics 637 **3 units; H(3-0)**

Anatomy and Statistics for Medical Physicists
Anatomy, physiology, probability, statistical inference, hypothesis testing, regression models, clinical trials, survival analysis.

Prerequisite(s): Consent of the Department.

Medical Physics 638 **3 units; H(3-0)**

Imaging for Radiation Oncology Physics
An overview of the imaging modalities used for Radiation Oncology including: CT, MRI, planar X-ray, nuclear medicine and ultrasound. Course will cover basic physics, instrumentation and application.

Prerequisite(s): Consent of the Department.

Medical Physics 639 **3 units; H(3-0)**

Radiobiology and Radiation Safety for Medical Physicists
Cell kinetics, cell survival curves, radiation pathology, fractionation, radiation safety, shielding calculations.

Prerequisite(s): Consent of the Department.

Medical Physics 711 **3 units; H(0-8)**

Clinical Competency I
Consists of rotations through areas of clinical physics under the supervision of adjunct faculty. Objectives are set, in conjunction with the student, at the commencement of the three rotations comprising this course. Student performance is evaluated by the course mentors at the conclusion of each rotation and by a final oral examination.

Prerequisite(s): Consent of the Department.

Medical Physics 712 **3 units; H(0-8)**

Clinical Competency II
Consists of rotations through more complex areas of clinical physics under the supervision of adjunct faculty. Objectives are set, in conjunction with the student, at the commencement of the three rotations comprising this course. Student performance is evaluated by the course mentors at the conclusion of each rotation and by a final oral examination.

Prerequisite(s): Medical Physics 711 and consent of the Department.

Medical Physics 721 **3 units; H(0-8)**

Clinical Projects I
Includes completion of multiple clinical projects in the disciplines of external beam radiotherapy, stereotactic radiosurgery, brachytherapy, and treatment planning. These clinical projects aim to build the student's understanding of implementing advanced technologies in a radiotherapy clinic. Projects have clearly defined objectives established by mutual agreement between the student and project supervisor. The project culminates in written reports and oral presentations.

Prerequisite(s): Consent of the Department.

Medical Physics 722 **3 units; H(0-8)**

Clinical Projects II
Includes completion of multiple clinical projects in the disciplines of external beam radiotherapy, stereotactic radiosurgery, brachytherapy, and treatment planning. These clinical projects aim to build the student's understanding of implementing advanced technologies in a radiotherapy clinic. Projects have clearly defined objectives established by mutual agreement between the student and project supervisor. The project culminates in written reports and oral presentations.

Prerequisite(s): Medical Physics 721 and consent of the Department.

Medical Physics 731 **3 units; H(2T-0)**

Radiation Oncology Physics Tutorials
Requires the student to prepare written answers to pre-set questions published by the Canadian College of Physicists in Medicine as part of the certification process in Radiation Oncology Physics.

Prerequisite(s): Consent of the Department.

Medical Physics 741 **3 units; H(1-4)**

Treatment Planning
Designed to nurture knowledgeable and clinically competent treatment planning physicists. Develops background understanding of the mechanisms of dose calculation and radiation deliverability. As well, site specific treatment planning is a focus to ensure students are ready to practice as clinically competent medical physicists. The practical component allows the resident to train under the direct supervision of physicists and dosimetrists.

Prerequisite(s): Consent of the Department.

Medical Science MDSC

Instruction offered by members of the Cumming School of Medicine.

Graduate Courses

Medical Science 603 **3 units; H(3-1)**
(Biology 603)

Biology of Laboratory Animals
Based on the Canadian Council of Animal Care Syllabus "Basic Principles of Laboratory Animal Science for Research Scientists." In addition to the study of common, research, farm and exotic animals, topics covered include ethical considerations, regulation and legislation, animal models, animal facilities and husbandry, hazard control, surgery, anaesthesiology, euthanasia and post-mortem examinations. Practical sessions will provide experience in handling and restraint of specific laboratory animals, injections, blood collection, anaesthesiology and surgery.

Prerequisite(s): Consent of the Faculty.

Note: Enrolment in this course is restricted to graduate students who will do research utilizing animals.

Medical Science 604 **6 units; F(3-3)**

Integrative Human Physiology
Physiology is the study of how living organisms function and encompasses the integration of processes from molecules to the whole-organism. Designed to provide the student with fundamental principles and concepts about the normal function of the major human organ systems. At the end of this course, the student should be well equipped to apply their acquired knowledge to solve complex physiological problems related to integrative human physiology.

Prerequisite(s): Consent of the Faculty.

Medical Science 605 **3 units; H(3-0)**
(Computer Science 605)

Information Storage and Processing in Biological Systems
Examination of complex biological systems; concepts and fundamentals of biological solutions to information storage and processing: modelling and computer simulation of biological systems; information storage in biological molecules; genetic networks; hierarchical organization of biological information processing in signal transduction, development, evolution, and ecology; biological control systems.

Prerequisite(s): Consent of the Faculty.

Medical Science 609 **3 units; H(3-0)**

Gene Expression
Genetic control and cellular basis of development. Topics include an introduction to the major genetic model organisms, the regulation of gene expression and pattern formation by developmental signals, and the cellular basis of cell signalling, cell and tissue polarity, and morphogenesis.

609.02. Genes and Development

Prerequisite(s): Consent of the program. A strong background in undergraduate genetics and developmental biology is recommended.

Medical Science 611 **3 units; H(3-0)**
(formerly Medical Science 612)

Medical Microbiology
The basic principles of medical microbiology and the pathogenesis of infectious disease and of clinically important microbial pathogens including bacteria, viruses, parasites and fungi. Recent concepts will be described and students will be expected to present and critically discuss research advances of their choosing from the current research literature.

Prerequisite(s): Cellular, Molecular and Microbial Biology 343 or consent of the Faculty.

Medical Science 613 **3 units; H(3-0)**

Advanced Studies in Microbiology
Specialized topics including basic principles of infection; spread, prevention and control of infectious diseases; mechanisms of and approaches to

study bacterial pathogenesis; mechanism, methodology and modelling of gene expression.

613.01. Epidemiology of Infectious Diseases

613.05. Regulation of Gene Expression in Bacteria

Prerequisite(s): Medical Science 612 or Cellular, Molecular and Microbial Biology 421 or 521 or consent of the Faculty.

Medical Science 619 **3 units; H(4-2)**

Neurosciences

Introductory neuroscience courses covering aspects of cellular, molecular, and systems physiology, neuroanatomy, and neurodevelopment.

619.01. Cellular, Molecular and Developmental Neuroscience

619.02. Systems Neuroscience and Neuropathology

Prerequisite(s): Must be registered in the Neuroscience Graduate Program. Consent of instructor(s) is required for all other students.

Note: Not open to undergraduate students.

Medical Science 620 **3 units; H(3-0)**

Topics in Systems Physiology

Designed for students undertaking research in physiology or related disciplines with only limited prior exposure to the discipline. Introduces and discusses fundamental and current issues in physiology ranging from the basic physiological systems through to translational clinical topics. Encompasses the basic physiological mechanisms with emphasis on the role of the autonomic nervous system. Subject areas will include basic physiology of the cardiovascular, respiratory, gastrointestinal, renal, endocrine and reproductive systems.

Prerequisite(s): Admission to the Master of Pathologists' Assistant program or consent of the instructor.

Medical Science 621 **3 units; H(3-0)**

Principles of Drug Action

The action of chemicals and drugs on biological systems ranging from subcellular particles to the intact organism.

621.01. Basic Principles of Pharmacology

Prerequisite(s): Zoology 461, Medical Science 404 and Medical Science/Biology 501, or consent of the Faculty.

Medical Science 622 **3 units; H(3S-0)**

Neurobiology of Mental Illness

Students are exposed to up-to-date research regarding the neurobiological theories of various mental illnesses (such as depression, anxiety disorders, schizophrenia, etc.). The seminar format will involve discussion in both research and review articles. The focus of discussion will be on both preclinical research and clinical studies that shed insight into the neurobiology of mental illnesses or their treatments.

Prerequisite(s): Medical Science 619.02 and registration in a Cumming School of Medicine graduate program. Consent of instructor is required for all other students.

Note: Open to Psychology graduate students and Psychiatry residents with consent of instructor.

Medical Science 623 **3 units; H(3-1T)**

Respiratory Science and Critical Illness

Respiratory physiology; including topics such as cellular, morphology, mechanics, control of breathing, and respiratory muscles, necessary to an understanding of respiration and respiratory failure. As well, core physiology and molecular biology underlying critical illness.

623.01. Pulmonary Mechanics and Gas Exchange

623.02. Physiology of Respiration and Critical Illness

623.03. Respiratory Science: Basic

623.04. Respiratory Science: Applied

Prerequisite(s): Zoology 463 or 465 or consent of the Faculty.

Medical Science 624 **3 units; H(2-2)**
(formerly Medical Science 751.42)

Neuroanatomy

Detailed introduction to neuroanatomy using Homo sapiens as the primary experimental species but relying on other vertebrates for additional details. Detailed anatomic aspects of each major brain region, along with major connections and functions related to those regions will be presented. Laboratories will examine gross specimens, virtual microscopic images, and other anatomic images.

Prerequisite(s): Medical Science 619.02 or consent of instructor.

Medical Science 629 **3 units; H(3-0)**

Cardiovascular Dynamics

Includes topics such as basic physiologic mechanisms including excitation-contraction coupling, mechanics, energetics, and cardiovascular control; major diseases entities as a means of illustrating pathologic alterations in normal physiologic mechanisms; or a systematic in-depth examination of the chemicals that affect the cardiovascular system.

629.01. Cardiovascular Physiology

629.02. Cardiovascular Pathophysiology

629.03. Cardiovascular Pharmacology

Prerequisite(s): Consent of the Faculty.

Medical Science 631 **3 units; H(3-0)**

Muscle Physiology

Contractile processes, excitation-contraction coupling, the control of contraction and energetics in smooth, cardiac and skeletal muscle. Molecular studies of the contractile process and of the process of excitation contraction coupling.

Prerequisite(s): Consent of the Faculty.

Medical Science 633 **3 units; H(3-0)**

The Kidney

Advanced courses detailing the functional organization of the kidney at all levels, from cell to intact organism. Topics encompass basic physiological principles and their relevance to experimental medicine and therapeutics, as well as the study of disease processes, which impact kidney function.

633.01. Renal Physiology

633.02. Renal Pathophysiology

633.03 History of Renal Physiology

Prerequisite(s): Medical Science 604 or consent of the Faculty.

Medical Science 635 **3 units; H(3-0)**

Psychosocial Oncology

A seminar-based course focusing on the possible causes of psychosocial problems in cancer patients and families (medical, psychological and social) and also on how patients and families are helped through the difficult transitions resulting from a cancer diagnosis, treatment, recurrent disease, and end of life care. The course is open to health professionals and researchers, and to advanced undergraduate students in relevant disciplines.

Prerequisite(s): Consent of the Faculty.

Antirequisite(s): Credit for Medical Science 635 and 645.14 will not be allowed.

Note: This course is open to health professionals and researchers, and to advanced undergraduate students in relevant disciplines.

Medical Science 636 **3 units; H(3-1T)**

Advanced Topics in Physiology

Provides a general understanding in physiological systems and will present advanced topics in specified physiological system(s) for further depth of understanding. The course will review and build on basic physiological principles through a series of lectures and discussion groups and will examine a specified area of physiology in-depth by introducing students to research methodology and pathological processes in the system.

Prerequisite(s): Medical Science 404 or Zoology 463 or consent of the instructor.

Antirequisite(s): Credit for Medical Science 636 and 569 will not be allowed.

Medical Science 637 **3 units; H(3-0)**

Gastrointestinal Physiology

Physiology of the gastrointestinal (GI) tract at all levels from the cell to the intact system. Medical Science 637.01 has three components 1) An introductory series of lectures covering the basic physiological principles of the regulation of the GI tract and the individual organs that comprise it or are associated with it. 2) Extended directed tutorials conducted online through D2L. Topics will be selected to reflect the needs and interests of the enrolled students. 3) A written term paper on a subject of the students' own choice and pre-approved by the course co-ordinator that will also be presented orally to the class.

637.01. Organization and Function of the GI Tract

Prerequisite(s): Consent of the Faculty.

Medical Science 638 **3 units; H(4-0)**

Mucosal Pathophysiology

Focuses on the physiology and pathophysiology of the gastrointestinal tract, lung and other mucosal tissues. A particular emphasis will be placed on inflammatory processes in these tissues, and how they contribute to symptom generation and tissue dysfunction. Involves independent research on the part of the students, small group sessions, written assignments and class presentations.

Prerequisite(s): Consent of the Faculty.

Medical Science 639 **3 units; H(3-0)**

Immunology

Introductory and advanced courses in immunology that cover humoral and cellular immunity and the inflammatory response at the cellular, molecular, and whole organism level. Basic mechanisms that lead to immunity or to inflammatory responses. The contribution of immunological and inflammatory processes in the immunopathogenesis of disease.

639.02. Cellular and Molecular Immunology

639.04. Inflammation

Prerequisite(s): Consent of the Faculty.

Medical Science 640 **3 units; H(3-1T)**

Introduction to Immunology

Introductory immunology for graduate students who have no background in immunology in their undergraduate studies. It provides a comprehensive overview of the immune responses:

antibody-antigen interaction, antibody structure, genetics and synthesis, cellular immunology, MHC, phagocytosis, and tolerance. Using this basic understanding of fundamental immune processes the involvement of the immune response in auto-immunity, hypersensitivity, tissue rejection, tumor immunology, vaccine production, viral, bacterial, fungal and parasitic infections will be discussed. Additionally, methods for the study of immunology will be covered.

Prerequisite(s): Consent of the Faculty.

Antirequisite(s): Credit for Medical Science 640 and Cellular, Molecular and Microbial Biology 527 will not be allowed.

Note: This course will share lectures with Cellular, Molecular and Microbial Biology 527 with an additional separate tutorial.

Medical Science 641 **3 units; H(3-0)**

Genetics

Advanced courses that provide in-depth coverage of the research discipline of genetics, including the areas of cytogenetics, genomics, metabolic genetics, mouse genetics, population genetics, and human and medical genetics.

641.01. Advanced Genetics I

641.02. Advanced Human Cytogenetics

641.03. Advanced Genetics II

641.04. Genomics

Prerequisite(s): Consent of the instructor.

Medical Science 663 **3 units; H(3-0)**
(Kinesiology 663)/(Mechanical Engineering 663)

Advanced Muscle Mechanics and Physiology

A look at problems associated within muscle mechanics and contractility. Also the use of muscle mechanics as a scientific discipline to critically learn and evaluate the scientific process. Basic anatomy and physiology of muscle contraction including the cross-bridge theory, and the force-length, force-velocity and force-time relationships of actively and passively contracting muscles will also be covered.

Prerequisite(s): Consent of the Faculty.

Medical Science 670 **6 units; F(0-6)**

Practicum in Biomedical Technology

A full course carried out in an academic or industrial setting for a period of at least twelve weeks. Students have an opportunity to apply the principles and methods of investigation learned during the Master of Biomedical Technology program and carry out related research. Practicum projects can be focused on any of the following aspects of the commercialization process: patent filing, research and development, business development, manufacturing to clinical trials, marketing and sales.

Prerequisite(s): Must be registered in the Biomedical Technology Graduate Program.

Note: Completion of all other course requirements in Master of Biomedical Technology program is normally required prior to registration for this course. Exceptions must be approved by the Graduate Director.

NOT INCLUDED IN GPA

Medical Science 671 **3 units; H(0-6)**

Techniques in Medical Science

Introduction to the theory of operation of electronic devices commonly used in biophysical studies including principles of amplifiers and filters, micro- and patch electrode techniques and computer-laboratory interfacing.

Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Medical Science 673 **3 units; H(3S-0)**

Careers in Biotechnology

A series of talks and workshops designed to provide students with practical knowledge of the biotechnology industry. In collaboration with the University of Calgary Career Services, the course covers personal and professional development planning, resume writing, networking, negotiation and interviewing skills and job search strategies specifically for the biotechnology field. This course runs during the fall and winter block weeks with additional retreat days throughout the year.

Prerequisite(s): Must be registered in the Biomedical Technology Graduate Program. Consent of instructor(s) is required for all other students.

Note: Admission to the Master of Biomedical Technology program is normally required for enrolment in this course.

NOT INCLUDED IN GPA

Medical Science 674 **6 units; F(3-0)**

Integrated Systems Course

The principles of molecular and cell biology, pathology, physiology, pharmacology, microbiology and immunology as applied to new diagnostics, vaccines or therapeutics. Lectures in the two courses are in parallel and fully integrated. Both courses are required components of the MBT program. The goal of the course, with an emphasis on cellular and molecular mechanisms in health and disease, is to provide students with the skills to interface with individuals in these disciplines in the biotechnology industry. Complemented by special lectures that provide industry perspectives in these disciplines.

674.01. Physiological and Pharmacological Aspects of Therapeutics Development

674.02. Molecular Cell Biology of Diagnostic and Vaccine Development

Prerequisite(s): Must be registered in the Biomedical Technology Graduate Program. Consent of the instructor(s) is required for all other students.

Medical Science 675 **3 units; H(2-3T)**

Bioinformatics Resources for the Biologist

This introductory graduate-level course will familiarize biologists with algorithms and search engines used to analyze nucleic acid and protein sequences and structures.

Prerequisite(s): Consent of the Faculty.

Medical Science 676 **3 units; H(2.5-1)**

Scripting and Database Querying for Molecular Biologists

Intended for biologists who wish to improve their bioinformatics analysis capabilities by learning just a small amount of query and programming syntax. The focus is on practicality rather than programming theory. The course explores how to use existing tools (on the command-line and on the web) to gather and process large datasets all at once, rather than doing many individual analyses manually.

Note: No prior programming experience is required.

Medical Science 677 **3 units; H(1-6)**

Directed Study in Biomedical Technology

Lectures, seminars, term papers or training in theoretical and/or laboratory methods at the advanced level in biomedical technology or medical sciences.

Prerequisite(s): Consent of both the faculty member who will supervise and the MBT faculty member who will co-supervise the chosen study and must be registered in the Master of Biomedical Technology program.

MAY BE REPEATED FOR CREDIT

Medical Science 678 **3 units; H(1-3T-6)**

Project in Biomedical Technology

Students will conduct both business and laboratory-based projects throughout the year. The business-based aspect will include running a business, doing market research for companies or working with their business mentor. The laboratory-based aspect will include new diagnostics development and validation. This course will cover basic principles of project management as well as biotech lab theory and practical aspects covered via tutorials, journal club and laboratory sessions. There will be a combination of monthly meetings, lectures, lab tutorials, commercial technology reviews, tours, demos, and practical labs.

Prerequisite(s): Must be registered in the Biomedical Technology Graduate Program. Consent of the instructor(s) is required for all other students.

Medical Science 679 **3 units; H(2-2)**

Fundamentals of Bioinformatics

Foundational techniques and current research in bioinformatics are explored. Focus on biological concepts and relevant algorithms. Topics covered will include large-scale programmatic data access via data-marts and genome browsers, visualization, statistical techniques, and analysis of sequence and ‘omics datasets.

Prerequisite(s): Registration in the Bioinformatics specialization of the Biochemistry and Molecular Biology graduate program or consent of instructor.

Note: This course assumes some computational background including programming or scripting ability.

Medical Science 685 **3 units; H(3-3)**
(Mechanical Engineering 685)

Biomechanics of Human Movement

Introduction to the measuring methods (accelerometry, goniometry, film and film analysis, video systems) of biomechanical analysis of human movement (force and force distribution). Description of the mechanical properties of bone, tendon, ligaments, cartilage, muscles, and soft tissues. The relation between structure and function of biomaterials. Introduction in descriptive analysis of human movement.

Prerequisite(s): Consent of the Faculty.

Antirequisite(s): Credit for more than one of Medical Science 685, Mechanical Engineering 685 and Kinesiology 685 is not allowed.

Medical Science 689 **3 units; H(3-0)**

Medical Imaging

Introduction to the theory and practical applications of medical imaging. Specific courses focus on an overview of modern diagnostic imaging techniques (689.01), as well as advanced study of specific techniques including magnetic resonance

imaging (689.02) and medical image processing (689.03), and molecular imaging (689.04).

689.01. Medical Imaging Techniques

689.02. Advanced Magnetic Resonance Imaging

689.03. Advanced Medical Image Processing

689.04. Advanced Molecular Imaging

689.10. Medical Imaging Theory

689.11. Medical Imaging Applications

689.99. Medical Imaging Project

Prerequisite(s): Admission to a graduate program with specialization in Medical Imaging or consent of the instructor.

Medical Science 701 (Veterinary Medicine 701) **3 units; H(3-0)**

Advanced Topics in Reproductive Health

A series of topics, ranging from basic sciences to clinical topics (including ethical issues) to increase awareness and comprehension regarding current issues in reproductive health.

Prerequisite(s): Consent of course co-ordinator and student's supervisor, if applicable.

Note: Interest in reproductive health/reproductive biology is essential.

Medical Science 703 **3 units; H(2-6)**

Human Anatomy: Concepts, Exploration and Teaching

Introductory course for graduate students with an interest in mammalian morphology to human cadaver dissection, human anatomy concepts and teaching strategies within the medical professional curriculum. Weekly lectures and discussions supplement a cadaver dissection-based course intended for students interested in pursuing an academic career in a medically related field.

Prerequisite(s): Should have some previous experience with dissection. Consent of the instructors.

Medical Science 706 **3 units; H(3-0)**

Theory and Practice of Family Therapy

Overview of different family therapy approaches focusing on systemic assessment and systemic intervention through therapeutic interviewing. The development of student knowledge and skills in family therapy utilizing social constructionist, narrative, systemic, collaborative, and pro-feminist ideas while fostering the professional identity of the therapist.

706.01 Theory and Practice of Family Therapy I: Systemic Approaches

706.02 Theory and Practice of Family Therapy II: Postmodern Approaches

Prerequisite(s): Must be registered in the Cumming School of Medicine graduate programs. All others will require consent of the instructor.

Medical Science 707 **3 units; H(2S-12)**

Family Therapy Practicum

The development of conceptual and experiential expertise in working therapeutically with families.

707.01. Family Therapy I

707.02. Family Therapy II

Prerequisite(s): Consent of the Faculty.

NOT INCLUDED IN GPA

Medical Science 708 **3 units; H(3-0)**

Theory and Practice of Interprofessional Psychosocial Oncology

Provides graduate students with a multidisciplinary introduction to the field of psychosocial oncology. Emphasis will be placed on understanding and interpreting the experience of cancer informed by theory, evidence and illness narratives. Case-based learning in small interprofessional groups will allow students to explore a variety of key learning themes relevant to psychosocial oncology including distress assessment, depression, anxiety, adjustment and coping, sexuality, loss and grief. Attention to diversity will be integrated throughout the course.

Prerequisite(s): Consent of the instructor.

Note: Must have an undergraduate degree in a relevant domain (including, but not limited to medicine, psychology, nursing, social work, spiritual care/theology). This is an online course.

Medical Science 710 **3 units; H(3-0)**

Business and Careers in Biotechnology

An overview of the biotechnology sector from several perspectives: product development, regulatory, intellectual property, market analysis and finance. This course will include series of lectures and discussions to provide both the necessary background about the biotechnology industry and an understanding of careers in the biotechnology industry.

Prerequisite(s): Must be a registered graduate student in a thesis-based Master's or Doctoral program.

Medical Science 713 **3 units; H(0-3T)**

Topics in Mountain Medicine and High Altitude Physiology

A tutorial-based course focused on high altitude medicine and physiology. The aim of the course is to introduce the students to the physiological adaptations of, and pathophysiology associated with, the hypoxia of altitude. Students will be introduced to several diseases associated with the hypoxia of high altitude (i.e., Acute Mountain Sickness; High Altitude Pulmonary Edema, High Altitude Cerebral Edema), and the pathophysiology underlying these diseases.

Prerequisite(s): Consent of the instructor.

Medical Science 721 **3 units; H(3-0)**

Biochemistry and Molecular Biology

Discussions and presentations in a small group format will highlight historical and recent developments in analysis of eukaryotic genomes and control of gene expression, chromosome structure, translation, protein structure, proteomics, regulatory networks and related technologies and their applications to the study of human diseases. Additional learning objectives relate to the critical assessment of published literature as well as the development of research proposal writing and presentation skills.

Prerequisite(s): Must be registered in the Biochemistry and Molecular Biology Graduate Program. Consent of the instructor is required for all other students.

Medical Science 722 **3 units; H(4-0)**

The Blood Vessel

Modular course offering advanced knowledge at the cellular, molecular, and whole organism levels including the hormonal regulation of the vascular system, the interaction between endothelium and smooth muscle in the blood vessel, the molecular mechanisms underlying smooth muscle contraction and relaxation, differentiation and dedifferentiation, and the pathogenesis of vascular diseases including hypertension and atherosclerosis. Drug treatments for vascular diseases and their molecular mechanisms will also be covered.

722.01. Vascular Biology

722.02. Vascular Pharmacology

Prerequisite(s): Open to graduate students registered in the Cumming School of Medicine graduate programs. All other students require consent of instructor.

Antirequisite(s): Credit for Medical Science 722.01 and 722.02 will not be allowed.

Medical Science 740 **6 units; F(3T-0)**

Smooth Muscle Structure Function

An inquiry-based approach used to provide students with a broad background for the study of smooth muscle and to introduce students to current trends in the field. Students will also be introduced to the spectrum of research on smooth muscle ongoing at the University of Calgary. The subjects to be included range from the molecular biology and biochemistry of individual proteins to the function and regulation of integrated smooth muscle systems. A number of methodological approaches that are being used for the study of smooth muscle will also be discussed.

Prerequisite(s): Consent of the instructor.

Medical Science 744 **6 units; F(3-0)**

Human Pathology

The principles of basic pathology, including cellular responses to injury, inflammation, tissue reaction, hemodynamic, basic genetics, and neoplasia are taught through a series of interactive lectures and seminars which are applied to examine the human system and the diseases that affect it.

Prerequisite(s): Must be registered in the Pathologists' Assistant Master's graduate program or the Pathologists' Assistant specialization of the Medical Science graduate program. Consent of instructor is required for all other students.

Medical Science 745 **3 units; H(3-0)**

Human Histology

Normal histology of the human body and how it relates to the pathologic mechanisms of function and disease will be discussed and presented in small group format.

Prerequisite(s): Must be registered in the Pathologists' Assistant Master's graduate program or the Pathologists' Assistant specialization of the Medical Science graduate program. Consent of instructor is required for all other students.

Medical Science 746 **3 units; H(3-0)**

Integrated Pathologists' Assistant Skills

A series of discussions and workshops to solidify the knowledge gained throughout the Pathologists' Assistant Master's program that will provide practical knowledge of the Pathologists' Assistant profession, in particular focusing on laboratory management skills, quality control and quality assurance, and the legal and accreditation requirements for medical laboratories.

Prerequisite(s): Must be registered in the Pathologists' Assistant Master's graduate program. Consent of instructor is required for all other students.

Medical Science 747 **3 units; H(0-3)**

Pediatric Pathology Practicum

Practical training in the technical skills of grossing a surgical specimen from the pediatric population in a safe and appropriate manner, as well as grossing placentas and performing fetal autopsies.

Skill development will include quality management, ancillary techniques, and medical photography.

Prerequisite(s): Must be registered in the Pathologists' Assistant Master's graduate program or the Pathologists' Assistant specialization of the Medical Science graduate program. Consent of instructor is required for all other students.

Medical Science 748 3 units; H(0-3)

Surgical Pathology Practicum
The primary goal is the technical skills of grossing a surgical specimen in a safe and appropriate manner. Secondary goals include skill development in quality management, ancillary techniques, frozen section cutting, and medical photography.

748.01. Surgical Pathology Practicum I

748.02. Surgical Pathology Practicum II

Prerequisite(s): Must be registered in the Pathologists' Assistant Master's graduate program or the Pathologists' Assistant specialization of the Medical Science graduate program. Consent of instructor is required for all other students.

Note: Students are required to take both Medical Science 748.01 and Medical Science 748.02.

Medical Science 749 3 units; H(0-3)

Autopsy Pathology Practicum
Hands on rotation that will train students how to perform autopsies under the supervision of a pathologist. Knowledge from anatomy, physiology, histology, and human pathology will be incorporated in the training.

749.01. Autopsy Pathology Practicum I

749.02. Autopsy Pathology Practicum II

Prerequisite(s): Must be registered in the Pathologists' Assistant Master's graduate program or the Pathologists' Assistant specialization of the Medical Science graduate program. Consent of instructor is required for all other students.

Note: Students are required to take both Medical Science 749.01 and Medical Science 749.02.

Medical Science 750 3 units; H(0-4)

Pathologists' Assistant Research Project
Guided work with practical research, encouraging independent thought and collaboration with pathologists and clinical colleagues. Requires completion of written reports and oral presentation on research performed.

750.01. Pathologists' Assistant Research Project I

750.02. Pathologists' Assistant Research Project II

Prerequisite(s): Must be registered in the Pathologists' Assistant Master's graduate program. Consent of instructor is required for all other students.

Note: Students are required to take both Medical Science 750.01 and Medical Science 750.02. After consultation with a Departmental faculty member who will supervise the chosen project, approval must be obtained from the Program Director before a student can register.

Medical Science 751 3 units; H(3-0)

Topics in Medical Science
751.07. The Physiological Development of the Fetus and Newborn

751.09. Ion Channel Diseases

751.31. Joint Injury and Disease Biomechanical Focus

751.43. Orientation and Clinical Rotations for Pathologists' Assistants

Prerequisite(s): Consent of the Faculty.

Note: Enrolment in Medical Science 751.43 is restricted to students registered in the Pathologists' Assistant Specialization in the Medical Science (Master's) graduate program.

Medical Science 755 3 units; H(1-6)

Directed Study
Lectures, seminars, term papers or training in theoretical and/or laboratory methods at the advanced level in the medical sciences.

Prerequisite(s): Consent of the Faculty.

Note: Submission of application is required to set up directed study topic. Forms available from the Graduate Science Education Office in the Cumming School of Medicine.

MAY BE REPEATED FOR CREDIT

Music MUSI

Instruction offered by members of Music in the School of Creative and Performing Arts in the Faculty of Arts.

Graduate Courses

Music 611 3 units; H(3-1)
(formerly Music Theory and Composition 673)

Selected Topics in Theory and Composition
Various topics (master's level).

Music 613 3 units; H(3S-0)
(formerly Music Theory and Composition 671)

Seminar in Theory and Composition
Advanced creative and analytic approaches to the study of selected repertoire with an emphasis upon contemporary music.

MAY BE REPEATED FOR CREDIT

Music 615 3 units; H(3-0)
(formerly Music Theory and Composition 675)

Pedagogy of Music Theory
Refining ideas about music theory and its teaching, while developing and strengthening teaching skills.

Note: Required course for all PhD (Composition) students.

Music 621 3 units; H(2-3)
(formerly Music Performance 691)

Advanced Performance Practicum I
Applied instruction in instrument or voice.

Note: A supplementary fee will be assessed to cover additional costs associated with this course.

Music 623 3 units; H(2-3)
(formerly Music Performance 693)

Advanced Performance Practicum II
Continuation of Music 621.

Prerequisite(s): Music 621 or Music Performance 691.

Note: A supplementary fee will be assessed to cover additional costs associated with this course.

Music 625 3 units; H(3-0)
(formerly Music Performance 671)

Topics in Music Performance
Various topics such as applied music literature, applied pedagogy, accompanying, phonetics and others.

MAY BE REPEATED FOR CREDIT

Music 629 3 units; H(0-3)
(formerly Music Performance 657)

Studies at the Banff Centre
Advanced music studies.

Note: Although the Banff Centre does not provide credit course instruction, students with advanced experience in music at the Banff Centre may apply for graduate-level credit from the University of Calgary.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Music 631 3 units; H(3-0)
(formerly Music History and Literature 651)

Research Techniques and Bibliography of Music
Exploring the basic reference materials and techniques for musical research at the graduate level.

Note: Required course for all MMus and MA (Musicology) students.

Music 633 3 units; H(3-0)
(formerly Music History and Literature 671)

Selected Topics in Musicology
Various topics such as history of music theory, analysis, notation, or performance practice may be offered. Consult the timetable for current topic.

MAY BE REPEATED FOR CREDIT

Music 641 3 units; H(2-2)
(formerly Music Theory and Composition 695)

Composition
MAY BE REPEATED FOR CREDIT

Music 645 3 units; H(2S-2)
(formerly Music Theory and Composition 691)

Composition Seminar
Prerequisite(s): Consent of the Division Chair, Music.

Music 651 3 units; H(3-0)
(formerly Music Theory and Composition 685)

Selected Topics in Electroacoustic Music
Advanced topics in computer music selected from such subjects as: analysis, theory and aesthetics of electroacoustic repertoire, computer programming and software design, interactivity, performance practice and interpretation, sound morphology, sound spatialization, sound synthesis, soundscape studies, tele-media.

MAY BE REPEATED FOR CREDIT

Music 653 3 units; H(3-0)
(formerly Music Theory and Composition 681)

Projects in Computer Music
Individual and collaborative creative and research projects in computer music.

MAY BE REPEATED FOR CREDIT

Music 661 3 units; H(3-0)
(formerly Music History and Literature 655, Music Theory and Composition 655, Music Performance 655)

Independent Study
Individual study in a selected area of music.

MAY BE REPEATED FOR CREDIT

Music 711 3 units; H(3-0)
(formerly Music Theory and Composition 775)

Advanced Topics in Theory and Composition
Various topics (doctoral level).

MAY BE REPEATED FOR CREDIT

Music 733 **3 units; H(3-0)**
(formerly Music History and Literature 771)

Selected Topics in Musicology
Various topics in the field of Musicology (doctoral level).

MAY BE REPEATED FOR CREDIT

Music 741 **3 units; H(3-0)**
(formerly Music Theory and Composition 795)

Composition
Individual study in musical composition (doctoral level).

MAY BE REPEATED FOR CREDIT

Music 751 **3 units; H(3-0)**
(formerly Music Theory and Composition 785)

Advanced Topics in Electroacoustic Music
Advanced topics in computer music selected from such subjects as: interactivity, tele-media, sound morphology, sound spatialization, analysis, theory and aesthetics, performance practice and interpretation, computer programming and software design, sound synthesis, soundscape studies.

MAY BE REPEATED FOR CREDIT

Music 753 **3 units; H(3-0)**
(formerly Music Theory and Composition 781)

Advanced Projects in Computer Music
Individual and collaborative creative and research projects in computer music.

MAY BE REPEATED FOR CREDIT

Music 761 **3 units; H(3-0)**
(formerly Music Theory and Composition 755)

Independent Study
Individual study in a selected area of music (doctoral level).

MAY BE REPEATED FOR CREDIT

Music Education MUED

Instruction offered by members of Music in the School of Creative and Performing Arts in the Faculty of Arts.

Graduate Courses

Music Education 655 **3 units; H(3-0)**

Independent Study
Individual study in a selected music education area.

Prerequisite(s): Consent of the Division Chair, Music.

MAY BE REPEATED FOR CREDIT

Music Education 671 **3 units; H(3-0)**

Selected Topics in School Music
Selected topics with emphasis upon practical application relevant to the field of music education. Various topics are regularly offered under this title, such as early childhood, Kodaly pedagogy, administration of school music programs and techniques of school music supervision.

Prerequisite(s): Consent of the Division Chair, Music.

MAY BE REPEATED FOR CREDIT

Music Education 695 **3 units; H(2-4)**

Practicum in School Music I
Practical application of teaching techniques studied in graduate-level school music courses. Will include various topics such as early childhood, Kodaly, choral and instrumental.

Music Education 697 **3 units; H(2-4)**

Practicum in School Music II
Continuation of Music Education 695.

Music Education 755 **3 units; H(3-0)**

Independent Study
Individual directed study in an area of Music Education (doctoral level).

Prerequisite(s): Consent of the Division Chair, Music.

MAY BE REPEATED FOR CREDIT

Music Education 771 **3 units; H(3-0)**

Selected Topics in Music Education
Selected topics with emphasis upon practical application relevant to the field of Music Education. Possible topics may include early childhood musical development, Kodaly pedagogy, folk music studies, choral and instrumental pedagogy and the role of new technologies within the discipline.

Prerequisite(s): Consent of the Division Chair, Music.

MAY BE REPEATED FOR CREDIT

Music Performance MUPF

Instruction offered by members of Music in the School of Creative and Performing Arts in the Faculty of Arts.

Students are cautioned that notwithstanding the given prerequisite, registration in any of the performing ensembles is subject to the approval of the ensemble director.

Further information on ensembles is available at: music.ucalgary.ca.

Graduate Courses

Music Performance 632 **6 units; F(2-3)**

Advanced Choral Conducting
Prerequisite(s): Consent of the Division Chair, Music.

Music Performance 634 **6 units; F(2-3)**

Advanced Instrumental Conducting
Prerequisite(s): Consent of the Division Chair, Music.

Music Performance 641 **3 units; H(0-4)**

Advanced Chamber Ensemble I
Intensive coaching in chamber ensembles.

Prerequisite(s): Consent of the Division Chair, Music.

Music Performance 643 **3 units; H(0-4)**

Advanced Chamber Ensemble II
Continuation of Music Performance 641.

Prerequisite(s): Music Performance 641 or consent of the Division Chair, Music.

Music Performance 645 **3 units; H(0-6)**

Voice Lab
Performance projects involving vocal music (opera, art song, music theatre, baroque, new music), and an exploration of interarts and interdisciplinary connections through performance creation.

Prerequisite(s): Consent of the Division Chair, Music.

Nursing NURS

Instruction offered by members of the Faculty of Nursing.

Note: Where applicable, Clinical Practice courses must be taken concurrently with the theoretical components.

Graduate Courses

Nursing 601 **3 units; H(3S-0)**

Seminar on Special Topics Related to Health Care and Nursing
Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Nursing 603 **3 units; H(156 hours)**

Independent Supervised Clinical Practicum
Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Nursing 605 **3 units; H(3S-0)**

Philosophical Knowledge and Advanced Nursing Practice
Exploration of the philosophical knowledge of advanced nursing practice. A process of critical analysis, reflection and inquiry into the various philosophical approaches, ways of knowing, theories concepts and paradigms leading to a philosophically informed analysis of the knowledge practices activated during the conduct of nursing work.

Prerequisite(s): Consent of the Faculty.

Nursing 607 **3 units; H(39 hours)**

Independent Guided Study
Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Nursing 609 **3 units; H(3-1)**

Applied Statistics for Nursing Research
The understanding of the conceptual basis, use, and pitfalls of common bio statistical methods used in the analyses of data, as well as, being able to analyze data using computer software. This course minimizes mathematical theory and concentrates on the 'when to use', 'why to use', and 'what the results mean' bio statistical issues.

Prerequisite(s): Consent of the Faculty.

Nursing 611 **3 units; H(3-0)**

Theoretical Knowledge and Advanced Nursing Practice
Introduction to substantive theory related to advanced nursing practice. As students identify their population focus they will examine frameworks for advanced nursing practice that inform their care for individuals, families and communities of practice.

Prerequisite(s): Consent of the Faculty.

Nursing 617 **3 units; H(3-0)**

Philosophy and Practice in Palliative Care
Examination of the philosophy of palliative/hospice care, taught by faculty from many disciplines. An important focus includes the students' self-exploration of their own beliefs, values, and attitudes about life, illness, death, and dying, and how this self-exploration shapes interactions with those we care for.

Prerequisite(s): Consent of the Faculty.

Nursing 621 **3 units; H(3S-0)**

Quantitative Designs and Analysis
Critical analysis of nursing research. Emphasis on the study of research designs appropriate to clinical nursing problems, measurement, reliability and validity issues, and critique criteria.

Prerequisite(s): Consent of the Faculty.

Nursing 623 **3 units; H(3-0)**
(formerly Nursing 601.23)

Hermeneutic Phenomenology
Inquiry into the philosophical and historical influences that have shaped hermeneutic phenomenology as an approach to nursing and health care research. Exploration of interpretive practices essential to the conduct of hermeneutic research.

Prerequisite(s): Consent of the Faculty.

Nursing 627 **1.5 units; Q(18 hours)**

Academic Scholarly Writing
An intensive two-day writing workshop with additional pre-course reading and writing. Students will prepare for the course by reading texts and writing scholarly accounts that may be based in their nursing practice.

Prerequisite(s): Consent of the Faculty.

Nursing 629 **1.5 units; Q(18 hours)**

Evidence-Informed Nursing
Building on foundations of critical inquiry by emphasizing the evaluation and interpretation of qualitative and quantitative research, students develop an enhanced ability to use systematic reviews and research-based innovations in making evidence-based decisions for client care, nursing knowledge and organizational or system improvement.

Prerequisite(s): Consent of the Faculty.

Nursing 633 **3 units; H(3S-8)**

Leadership in Advanced Nursing Practice and Practicum I
A critical examination of theories and principles of leadership and leadership development as it relates to individual leadership practices, leading multidisciplinary teams, and leadership within the broader health system. Students will explore and discuss the influence of leaders and leadership on the healthcare workplace, on client/population outcomes, and the health care system. In the practicum project students will utilize evidence to assess their leadership skills and competencies, and how they relate to the development and evaluation of their practicum project.

Prerequisite(s): Nursing 605 and 611.

Nursing 634 **6 units; F(2S-8)**

Advanced Nursing Practice: Practicums II and III
The purpose of clinical practicums II and III is to follow through with the project that was proposed in Nursing 633 including: implementing the study, analyzing and interpreting the findings, writing and submitting the paper for publication and/or presenting the paper at a conference.

Prerequisite(s): Nursing 633.

Nursing 642
6 units; F(52S-180 within 8-week block)

Nurse Practitioner Practicum I and Role Integration
Building on the foundational knowledge of advanced pathophysiology, advanced health assessment and pharmacology, this course provides an opportunity for students to begin to acquire advanced knowledge and skills related to clinical diagnosis, decision-making and management of commonly presented acute and chronic health problems. Additionally this course will address issues related to nurse practitioner role integration.

Prerequisite(s): Nursing 661, 663 and 665 or consent of the Faculty, registration in Post-Master's NP Diploma program or the integrated MN/NP program.

NOT INCLUDED IN GPA

Nursing 644
6 units; F(52S-180 within 8-week block)

Nurse Practitioner Practicum II
Diagnostic and management skills related to care of patients. Further development of skills in clinical history taking, physical assessment, and diagnostic testing.

Prerequisite(s): Nursing 642.

NOT INCLUDED IN GPA

Nursing 646
6 units; F(52S-180 within 8-week block)

Nurse Practitioner Practicum III
Learning opportunities and practice experience with emphasis on clinical diagnosis, diagnostic imaging, laboratory tests, differential diagnosis, and patient management.

Prerequisite(s): Nursing 644.

NOT INCLUDED IN GPA

Nursing 650
6 units; F(16S-292 within 8-week block)

Nurse Practitioner Practicum IV
Consolidation of components of NP role in specialty focus.

Prerequisite(s): Nursing 646.

Note:

NOT INCLUDED IN GPA

Nursing 661 **3 units; H(4S-0)**

Advanced Pathophysiology and Therapeutics
Study of pathophysiological phenomena and therapeutics at an advanced level. Classes will be a combination of didactic presentations, seminars and case studies. Students are invited to explore morbidity and mortality in the Canadian population in general and in their area of focus in particular.

Prerequisite(s): Consent of the Faculty.

Nursing 663 **3 units; H(3S-0)**

Pharmacotherapeutics in Advanced Nursing Practice
Principles of drug action, pharmacokinetics and pharmacotherapeutics in the context of advanced nursing practice. Opportunity to investigate pharmacotherapies specific to student's individual client populations.

Prerequisite(s): Consent of the Faculty.

Nursing 665 **3 units; H(3S-3)**

Advanced Health Assessment
Builds upon fundamental health assessment skills to provide a solid foundation for advanced assessment. Focuses on history taking physical examination, diagnostic reasoning and clinical judgment, as well as selected diagnostic skills necessary for advanced practice.

Prerequisite(s): Consent of the Faculty.

Nursing 683 **3 units; H(3S-0)**

Qualitative Designs and Analysis
Exploration of research methods based primarily on inductive reasoning. Methods, issues and techniques of sampling, data collection, analysis, and interpretation will be explored. Experience will be provided in data collection, management, and analysis.

Prerequisite(s): Consent of the Faculty.

Nursing 701 **3 units; H(3-0)**

Doctoral Special Topics
Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Nursing 705 **3 units; H(3-0)**

Philosophy of Science in Nursing
Exploration of major philosophical positions and their contributions to the generation and evaluation of knowledge. Examination of the development and evolution of nursing knowledge.

Prerequisite(s): Consent of the Faculty.

Nursing 707 **3 units; H(39 hours)**

Directed Study
Prerequisite(s): Consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Nursing 711 **3 units; H(2S-0)**

Doctoral Scholarship in Nursing
Focus on development of a nurse scientist. Seminar discussions will address launching a viable and fundable program of research, grantsmanship, managing multi-disciplinary research teams, and establishing a record of publication and dissemination.

Prerequisite(s): Consent of the Faculty.

NOT INCLUDED IN GPA

Nursing 721 **3 units; H(3-0)**

Advanced Quantitative Research Methods
Opportunities for developing nurse scientists and other health professional doctoral students to increase understanding of, and ability to utilize, quantitative research methods for scientific inquiry. Focuses on identifying issues/dilemmas arising during the research process and methods to address these challenges.

Prerequisite(s): Nursing 621.

Nursing 723 **3 units; H(3-0)**
(formerly Nursing 701.23)

Hermeneutic Phenomenology
Inquiry into the philosophical and historical influences that have shaped hermeneutic phenomenology as an approach to nursing and health care research. Exploration of interpretive practices essential to the conduct of hermeneutic research.

Nursing 733 **3 units; H(2S-0)**

Doctoral Thesis Seminar
Opportunity for students to discuss development of their thesis proposal with a focus on the question, design, ethical considerations, and funding.

Prerequisite(s): Nursing 705 and one graduate-level advanced research course.

NOT INCLUDED IN GPA

Nursing 769 **3 units; H(3-0)**

Contemporary Issues in Health Care
Theoretical examination of concepts and research for increasing the availability and accessibility of health care. Appraisal of the relationships among leadership, policy and practice issues from a multidisciplinary perspective.

Prerequisite(s): Consent of the Faculty.

Nursing 783 **3 units; H(3-0)**

Advanced Qualitative Research Methods
Exploration of the philosophical foundations and practice of qualitative research methods in health care inquiry. Emphasis on interpretive assumptions and practices relevant to the conduct of qualitative research.

Prerequisite(s): Nursing 683.

Operations Management OPMA

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Operations Management 601 **3 units; H(3-0)**

Operations Management
Management of the production and/or service delivery system of the organization in concert with marketing, human resources, finance, and information systems. Management decision making on a continuum from day-to-day operating decisions such as quality control to long-term strategic decisions such as capacity planning. Topics covered in the course may include operations strategy, project management and inventory and supply chain management.

Operations Management 715 **3 units; H(3-0)**

Management Science Using Spreadsheets
The modelling and analysis of quantitative problems from a variety of fields within business, with emphasis on insight for decision making. Use of optimization, simulation, decision analysis, and other techniques in spreadsheets. Spreadsheet engineering as an approach to reducing spreadsheet errors. Case studies are used to develop skill in dealing with incomplete and ambiguous information.

Prerequisite(s): Management Studies 613.

Operations Management 719 **3 units; H(3-0)**

Project Procurement and Logistics
Project procurement and logistics management in engineering, construction management and manufacturing, both nationally and internationally. Topics include fundamentals of procurement management, preparation of request for proposals, the selection of bidders, the evaluation of bids, supplier selection, contract management, control of inventory, handling of material flow and management of warehousing, logistics strategy and global issues.

Prerequisite(s): Business and Environment 691.

Operations Management 731 **3 units; H(3-0)**

Decision-Making for Outcome Optimization
Evaluates the use of decision tools for analysis and synthesis to optimize decision-making in different types of businesses. Tools explored include mathematical programming, computer simulation, decision analysis, forecasting and queuing theory. Theoretical treatment is considered, as well as practical model application to support managerial decision-making.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Operations Management 743 **3 units; H(3-0)**

Simulation of Operational Systems
Examines simulation as a means for imitating the behaviors of real-world situations in the computer environment. The emphasis is on hands-on experience in transforming a real situation into a simulation model and obtaining reliable results. Focus on discrete-event simulation, with the introduction of other techniques, such as advanced Monte Carlo simulation.

Prerequisite(s): Operations Management 601 and Management Studies 613.

Operations Management 745 **3 units; H(3-0)**

Operations Planning and Supply Chain Management
Examines supply chain management in an environment where multiple companies are involved in the sourcing, production, distribution and sales of materials and products; and proper planning and managing of the supply chain. Presents cases of real-world situations calling for appropriate state-of-the-art models and solution methods for the design, planning, control and improvement of supply chain operations. The main concepts and terminology in the domain of supply chain management are explored and then applied to a given situation.

Prerequisite(s): Operations Management 601 and Management Studies 613.

Operations Management 797 **3 units; H(3S-0)**

Advanced Seminar in Operations Management
Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Operations Management 799 **3 units; H(3S-0)**

Doctoral Seminars in Operations Management
799.01. Strategic Research Issues

799.02. Tactical Research Issues

799.03. Operational Research Issues

Organizational Behaviour and Human Resources OBHR

Instruction offered by members of the Haskayne School of Business.

Organizational Behaviour and Human Resources 601 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 601)

Organizational Behaviour
Evidence-based approach to leadership and organizational behavior. Begins with self-assessment and then uses experiential learning to develop leadership techniques, including: motivation, team processes, negotiation, and decision-making.

Organizational Behaviour and Human Resources 631 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 631)

Managing Human Resources from a Strategic Perspective
Integrated coverage of human resource management theory, practice and research as it applies to the strategic management of organizations.

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 691 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 691)

Project Team Building and Interpersonal Skills
Leadership style and behaviour; interpersonal effectiveness and self-awareness; project teams; group dynamics; organizational change; application to the project environment.

Prerequisite(s): Admission to the MEng Program (Project Management specialization). Not open to students in the MBA Program.

Organizational Behaviour and Human Resources 721 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 721)

Advanced Leadership
Examines leadership theories relevant to advanced leadership (e.g., ethical leadership, humble leadership, charismatic leadership). Delves into concepts that leaders must consider when making decisions and implementing strategy (e.g., power, influence, change-management).

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 723 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 723)

Organizational Change and Development
Diagnosing organizational situations where the need for change exists and facilitating such changes. Utilization of behavioural science knowledge for organizational problem-solving.

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 725 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 725)

Organizational Analysis and Design
Application of knowledge of organizational theory and behaviour to organizational analysis and design. Emphasis will be placed on the acquisition of the required analysis and design skills based on an understanding of how organizations are structured, how they function and their relationships with their environment.

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 727 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 727)

Competitive Advantage Through People
Analysis of the interdependencies and theoretical foundations of staffing and development programs, design and administration of reward compensation systems and performance management programs from the orientation of professional human resources management.

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 729 **3 units; H(3-0)**
(formerly Human Resources and Organizational Dynamics 729)

Workplace Issues
Examination of the employment relationship, with a focus on controversial and significant topics in the workplace. Coverage may include: unjust dismissal; drug and alcohol testing; computer and Internet policies; privacy and surveillance; impact of unions; disability and accommodation; and workplace violence. Modular format with modules customized to meet student interests.

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 731 3 units; H(3-0)
(formerly Human Resources and Organizational Dynamics 731)

Lifework Planning and Career Assessment
Persons demonstrate competency in personal and career development by their ability to take personal responsibility for the quality of their lives. Students will clarify their competencies and values and plan for dealing with the challenges faced by mature adults.

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 733 3 units; H(3-0)

Leadership for Change
Focuses on understanding and developing the skills required to lead and sustain the process of change in oneself and others and being able to mobilize and harness the energy of multiple stakeholders in a constantly changing environment, moving the collective in a positive direction.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Organizational Behaviour and Human Resources 741 3 units; H(3-0)
(formerly Human Resources and Organizational Dynamics 741)

Managerial Decision Making
Examines how decisions are made in organizations and how these decisions can be made more effectively, particularly at the top management and Board levels. Decision making in current business contexts are explored by way of simulations, case analyses, discussions, debates and written assignments.

Organizational Behaviour and Human Resources 745 3 units; H(3-0)
(formerly Human Resources and Organizational Dynamics 745)

Cross-Cultural Leadership and Human Resources Management
Leadership of human resources in a cross-cultural and international context; the nature of cultural differences; influence on organizational processes and practices such as communication, leadership, decision-making, team dynamics, staffing, performance management and organizational design, and implications for those holding international managerial roles.

Organizational Behaviour and Human Resources 789 3 units; H(3S-0)
(formerly Human Resources and Organizational Dynamics 789)

Seminar in the Management of Human Resources
Intensive study and discussion of current literature, research and issues with respect to selected topics in the management of human resources.

Prerequisite(s): Organizational Behaviour and Human Resources 601 or consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Organizational Behaviour and Human Resources 793 3 units; H(3-0)
(formerly Human Resources and Organizational Dynamics 793)

Business Negotiations
The major concepts and theories of negotiation; the dynamics of interpersonal and intergroup conflict; analysis of negotiation strategies and individuals styles. Application to a broad range of business negotiations. Use of simulations and written assignments.

Prerequisite(s): Organizational Behaviour and Human Resources 601.

Organizational Behaviour and Human Resources 797 3 units; H(3S-0)
(formerly Human Resources and Organizational Dynamics 797)

Advanced Seminar in Organizational Behaviour and Human Resources
Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Organizational Behaviour and Human Resources 799 3 units; H(3S-0)
(formerly Human Resources and Organizational Dynamics 799)

Doctoral Seminars in Organizational Behaviour and Human Resources
799.01 Organizational Behaviour

799.02 Organization Theory

799.03 Industrial Relations

799.05 Interorganizational Relationships: Creating and Managing Strategic Alliances

Petroleum Engineering ENPE

Instruction offered by members of the Department of Chemical and Petroleum Engineering in the Schulich School of Engineering.

Petroleum Engineering 621 3 units; H(3-1)

Applied Reservoir Engineering
Basic reservoir engineering principles including fluid flow in porous media, rock and fluid properties; estimation of recovery under different operating conditions.

Note: This course does not count towards the degree requirements of MSc and PhD students.

Petroleum Engineering 622 3 units; H(3-1)

Subsurface Production Operations
Analysis of fluid flow from the formation to the surface including inflow performance, wellbore hydraulics, multiphase flows and well stimulation techniques.

Note: This course does not count towards the degree requirements of MSc and PhD students.

Petroleum Engineering 623 3 units; H(3-1)

Reservoir Analysis and Description
Data analysis and integration for reservoir modelling and simulation.

Note: This course does not count towards the degree requirements of MSc and PhD students.

Petroleum Engineering 624 3 units; H(3-1)

Enhanced Oil Recovery
Introduction to water and polymer flooding, miscible displacements and surfactant flooding with focus on case studies.

Note: This course does not count towards the degree requirements of MSc and PhD students.

Petroleum Engineering 625 3 units; H(3-0)

Natural Gas Engineering
Basic principles of natural gas production and processing including properties of natural gases, vapour-liquid equilibrium and separation techniques.

Note: This course does not count towards the degree requirements of MSc and PhD students.

Petroleum Engineering 626 3 units; H(3-0)

Economic Analysis of Petroleum Systems
Basic principles of analyzing the profitability and risk of petroleum projects including project selection, investment ranking, budgeting and portfolio development.

Antirequisite(s): Credit for Petroleum Engineering 626 and Chemical Engineering 687 will not be allowed.

Petroleum Engineering 627 3 units; H(3-0)

Drilling Engineering
Overview of modern drilling technologies and techniques including drilling hydraulics, directional drilling, drilling fluid properties and selection, well control and completion methods.

Antirequisite(s): Credit for Petroleum Engineering 627 and either Chemical Engineering 689 or Chemical Engineering 619.91 will not be allowed.

Philosophy PHIL

Instruction offered by members of the Department of Philosophy in the Faculty of Arts.

Graduate Courses

Philosophy 601 3 units; H(3-0)

Seminar in Selected Problems
MAY BE REPEATED FOR CREDIT

Philosophy 603 3 units; H(3-0)

Graduate Proseminar

Philosophy 609 3 units; H(3-0)

Topics in the History of Philosophy
MAY BE REPEATED FOR CREDIT

Philosophy 623 3 units; H(3-0)
(formerly Philosophy 621)

Topics in Metaphysics
MAY BE REPEATED FOR CREDIT

Philosophy 627 3 units; H(3-0)

Topics in the Philosophy of Religion
MAY BE REPEATED FOR CREDIT

Philosophy 649 3 units; H(3-0)

Topics in Ethics
MAY BE REPEATED FOR CREDIT

Philosophy 653 3 units; H(3-0)

Topics in Social and Political Philosophy
MAY BE REPEATED FOR CREDIT

Philosophy 661 3 units; H(3-0)
(formerly Philosophy 663)

Topics in Epistemology
MAY BE REPEATED FOR CREDIT

Philosophy 667 3 units; H(3-0)

Topics in Philosophy of Science
MAY BE REPEATED FOR CREDIT

Philosophy 671 **3 units; H(3-0)**

Topics in Philosophical Logic and the Philosophy of Language
MAY BE REPEATED FOR CREDIT

Philosophy 677 **3 units; H(3-0)**

Metalogic
Introduction to the metatheory of logical systems. Completeness, compactness, Loewenheim-Skolem, and undecidability theorems for first-order logic. Preview of non-standard models, second-order logic, and Godel's first incompleteness theorem.

NOT INCLUDED IN GPA

Philosophy 679 **3 units; H(3-0)**

Topics in Logic
MAY BE REPEATED FOR CREDIT

Philosophy 683 **3 units; H(3-0)**
(formerly Philosophy 681)

Topics in the Philosophy of Mind
MAY BE REPEATED FOR CREDIT

Philosophy 691 **3 units; H(3-0)**

Topics in Philosophical Analysis
MAY BE REPEATED FOR CREDIT

Philosophy 695 **3 units; H(3-0)**

Graduate Directed Reading
MAY BE REPEATED FOR CREDIT

Physics PHYS

Instruction offered by members of the Department of Physics and Astronomy in the Faculty of Science.

Note: For listings of related courses, see Astrophysics, Medical Physics and Space Physics.

Graduate Courses

Physics 603 **3 units; H(3-0)**

Experimental Methods of Physics
Instrumentation for physical experiments. General philosophy of experimentation; signal processes; signal processing methods; instrument design and control; data acquisition and storage; specific detection methods.

Physics 605 **3 units; H(3-0)**

Advanced Data Analysis
Methods of extraction of significant information from experimental data degraded by noise. Parametric and non-parametric statistical methods; curve fitting; spectral analysis; filtering, sampling, convolution and deconvolution techniques.

Physics 609 **3 units; H(3-0)**

Advanced Classical Mechanics
Variational principles, Lagrange's equations, Noether's theorem. Hamilton's equations and canonical transformations. Hamilton-Jacobi theory, action-angle variables. Perturbation theory.

Physics 611 **3 units; H(3-0)**

Statistical Physics
Classical and quantum ensemble theory applied to interacting systems: real gases, spin lattices, phase transitions. Kinetic theory: Boltzmann equation, transport processes, irreversible processes and fluctuations.

Physics 613 **3 units; H(3-0)**

Electrodynamics
Interaction between charged particles and the electromagnetic field in relativistic formulation. Scattering and energy losses of charged particles. Radiation by charged particles.

Physics 615 **3 units; H(3-0)**

Non-Relativistic Quantum Mechanics
Mathematical formalism of quantum mechanics. Topics may include addition of angular momenta, Clebsch-Gordan coefficients, Wigner-Eckart theorem; charged particles in electric and magnetic fields; quantum operators; approximation methods; scattering; quantum nonlocality, Einstein-Podolsky-Rosen paradox, Bell's theorem.

Physics 617 **3 units; H(3-0)**

Relativistic Quantum Mechanics
Klein-Gordon and Dirac equations; Dirac spinor and the adjoint spinor; charge (C), parity (P) and (T) transformations and CPT symmetry; relativistic corrections to atomic spectra.

Physics 619 **3 units; H(3-0)**

Statistical Physics II
Topics Theories of equilibrium and non-equilibrium critical phenomena and methods to study fluctuating systems selected from the following list of topics: Percolation, scaling theory, phase transitions, Landau-Ginzburg theory, lattice models, Monte Carlo methods, renormalization group, self-organized criticality, theory of random graphs; Brownian motion, random walks and diffusion, Fokker-Planck-Equation, Markov processes, stochastic differential equations, first passage times.

Prerequisite(s): Physics 611.

Physics 621 **3 units; H(3-0)**

Non-linear Dynamics and Pattern Formation
Topics: Introduction to pattern formation and self-organization in nature: Reaction-diffusion systems, hydrodynamical systems, bistable media, excitable and oscillatory media, stability analysis, bifurcations, pattern selection, amplitude equations and normal forms, fronts, traveling waves, topological defects, spiral waves, spatiotemporal chaos, defect-mediated turbulence, spatiotemporal point processes.

Physics 629 **3 units; H(3-0)**

Gravitation
An introduction to Einstein's theory of gravitation. Applications to the solar system, black holes, and cosmology.

Physics 663 **3 units; H(2-1)**
(Geology 663)

Applications of Stable Isotopes
Application of stable isotope techniques with special focus on Hydrogeology, Geology and Environmental Sciences. The use of isotopes to understand the water, carbon, nitrogen and sulphur cycles is demonstrated. Topics include hydrology, paleoclimates, geothermometry, fossil fuels exploration and recovery, pollutant tracing, food webs, forensic investigations, among others.

Prerequisite(s): Consent of the Department.

Physics 671 **3 units; H(3-0)**

Atomic and Molecular Spectroscopy
Atomic structure and spectra. Rotational, vibrational and electronic spectra of diatomic molecules, including microwave, infrared, Raman and visible/ultraviolet spectroscopic techniques. Hund's coupling cases. Polyatomic molecular spectroscopy. Examples from astronomy and upper atmosphere/space physics.

Physics 673 **3 units; H(3-0)**

Quantum and Non-linear Optics
Theory of dispersion. Fast and slow light. Basics of nonlinear optics. Nonlinear optical crystals, phase matching. Coherence theory. Preparation, manipulation and measurement of quantum optical states and single-photon qubits. Elements of atomic physics, optical Bloch equation, rotating-wave approximation. Two-and three-level systems. Cavity quantum electrodynamics.

Physics 675 **3 units; H(3-0)**

Special Topics in Laser and Optical Sciences
Lectures by Physics and Astronomy, Chemistry, Engineering, and/or Medicine staff on current research topics in laser science and modern optical techniques.

MAY BE REPEATED FOR CREDIT

Physics 677 **3 units; H(3-0)**

Implementations of Quantum Information
Proposals and realizations of quantum information tasks including quantum computation, quantum communication, and quantum cryptography in optical, atomic, molecular, and solid state systems.

Prerequisite(s): Consent of the Department.

Physics 691 **1.5 units; Q(2S-0)**

Scientific Communication Skills
Required, multi-component, program of courses for all graduate students in the Department of Physics and Astronomy designed to assist students in improving their scientific oral and written communication skills. Each student must complete a minimum of three terms of Physics 691 during each graduate course, although the normal load is four terms, and additional terms may be required of students on an as-need basis. The components of Physics 691 are:

691.11. Effective Scientific Speaking for MSc Students

691.12. Graduate Seminar for MSc Students I

691.13. Effective Scientific Writing for MSc Students

691.14. Graduate Seminar for MSc Students II

691.16. Graduate Seminar for MSc Students III

691.18. Graduate Seminar for MSc Students IV

691.21. Effective Scientific Speaking for PhD Students

691.22. Graduate Seminar for PhD Students I

691.23. Effective Scientific Writing for PhD Students

691.24. Graduate Seminar for PhD Students II

691.26. Graduate Seminar for PhD Students III

691.28. Graduate Seminar for PhD Students IV

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Physics 697 **3 units; H(3-0) or H(0-6)**

Topics in Contemporary Physics
Topics will be from the research areas of staff members.

MAY BE REPEATED FOR CREDIT

Physics 699 **3 units; H(0-9)**

Project in Physics
Each student will select a project in consultation with a staff member. The project may be experi-

mental or theoretical in nature. A written report and an oral presentation are required.

Physics 701 **3 units; H(0-9)**

Independent Study
Each student will select a topic of study in consultation with a staff member. The topic will be in the research area of the staff member. This course may not be used to meet the regular course requirements in the MSc and PhD programs.

MAY BE REPEATED FOR CREDIT

Plant Biology PLBI

Instruction offered by members of the Department of Biological Sciences in the Faculty of Science.

Graduate Course

Enrolment in any graduate course requires consent of the Department. Only when appropriate to a student's program may graduate credit be received for courses numbered 500-599. 600-level courses are available with permission to undergraduate students in the final year of their programs.

Plant Biology 633 **3 units; H(3-0)**

Current Topics in Plant Biology
Topics include: plant genomics, biotechnology, biochemistry, cell biology, development and evolutionary biology. Emphasis is on technical advances and their application to plant biology research.

MAY BE REPEATED FOR CREDIT

Political Science POLI

Instruction offered by members of the Department of Political Science in the Faculty of Arts.

Graduate Courses

Courses numbered 600-799 are offered either as special reading courses or as seminars, as required. Students should consult the Department regarding enrolment in these courses.

Political Science 605 **3 units; H(3S-0)**

Advanced Introduction to Sexual Ethics
An advanced introduction to theorizing human sexuality using works of historical and contemporary political philosophy. Topics may include: the nature of love and friendship, the good of marriage, limits of sexuality, and the place of justice, equality, and shame.

Antirequisite(s): Credit for Political Science 605 and 505 will not be allowed.

Political Science 606 **3 units; H(3-0)**

Social and Global Justice
An examination of contemporary theories and debates in social and global justice. Topics may include: the redistribution-recognition dilemma, multiculturalism, intersectionality, identity/post-identity politics, globalization, transnationalization, and post-Westphalian approaches to governance and democracy.

Political Science 615 **3 units; H(3S-0)**

Advanced History of Political Thought
An intensive study of selected major political thinkers within the history of political thought.

Political Science 617 **3 units; H(3-0)**

Advanced Political Theory
Discussion of contemporary topics in political thought. Emphasis on analysis of problems rather than history of ideas.

Political Science 619 **3 units; H(3-0)**

War and Interpretation
An examination of the philosophical justifications offered to defend the use of military force, based particularly on the analysis of texts in the history of Western political philosophy.

Political Science 621 **3 units; H(3-0)**

Canadian Political Institutions
Examination of the structure and operation of the central institutions of the Canadian state, including the constitution, federalism, parliamentary government, and political parties.

Political Science 623 **3 units; H(3-0)**

Canadian Political Process
Examination of Canadian political behaviour within its institutional context, including political parties, interest groups, voting and socialization. Computer use is optional.

Political Science 624 **3 units; H(3S-0)**

Advanced Seminar on Indigenous-State Relations in Canada
Structure and operation of colonialism and settler-colonialism in Canada, and Indigenous resistance to those structures of oppression. Attention will be paid to the reconciliation debates, Indigenous gender oppression, and the politics of decolonization in Canada.

Political Science 631 **3 units; H(3-0)**

Parties, Elections and Representation
An examination of political parties and elections in both established and emerging democracies as a means of understanding the nature of political representation in modern representative democracies.

Political Science 633 **3 units; H(3S-0)**

U.S. Security Policy
An examination of U.S. security policy, with an emphasis both on how U.S. security policy is made and on the main contemporary security issues the U.S. faces today.

Political Science 641 **3 units; H(3-0)**

Selected Topics in Public Law
Examination of the political, philosophical, and institutional dimensions of selected public law issues, with particular reference to judicial and quasi-judicial tribunals as policy-making institutions. Consult the Department for information on choice of topics.

Political Science 643 **3 units; H(3-0)**

Law and Armed Conflict
An examination of key texts and topics concerning the evolution, conceptualization, codification, and practical application of the laws of armed conflict. Topics may include the historical and philosophical development of the customary and codified laws of armed conflict, military law and military training and education, and the use of law to punish and deter war crimes.

Political Science 651 **3 units; H(3-0)**

Policy Studies
Critical review of major themes, issues, and approaches in the study and evaluation of public policy.

Political Science 653 **3 units; H(3-0)**

Gender and Public Policy
Explores the gendered impact of a range of public policies and also explores the influence of gender norms and ideas on the formulation of public policy. Topics covered include gender-based policy analysis, gender and the welfare state, family and child-care policies, policies to address gender inequalities in the labour market and workplace, and reproductive rights policies.

Political Science 665 **3 units; H(3S-0)**

Advanced Seminar on Indigenous Politics in the Global South
Advanced examination of the competing theoretical explanations for the sudden and unexpected rise of Indigenous peoples as key political actors in countries of the Global South. In-depth case studies may include Indigenous rights struggles in Africa, Asia, and Latin America.

Political Science 671 **3 units; H(3-0)**

Advanced Comparative Politics: Political Development
Analysis of comparative methods and paradigms of political development.

Political Science 673 **3 units; H(3-0)**

Advanced Comparative Politics: Institutions and Systems
Comparative analysis of political institutions and systems.

Political Science 675 **3 units; H(3-0)**

Selected Topics in Advanced Comparative Politics
Selected regions and topics in Comparative Politics.

MAY BE REPEATED FOR CREDIT

Political Science 681 **3 units; H(3-0)**

Advanced Analysis of International Relations
Selected issues and approaches in the analysis of world politics.

Political Science 683 **3 units; H(3-0)**

Advanced Studies in Foreign Policy
Selected themes in the formation and implementation of foreign policies.

Political Science 684 **3 units; H(3-0)**

Human Rights and Humanitarianism
An advanced introduction to the principal contemporary debates in the field of human rights and humanitarian politics.

Antirequisite(s): Credit for Political Science 684 and 571 will not be allowed.

Political Science 685 **3 units; H(3-0)**

Strategic Studies
Advanced seminar in major topics in strategic studies, such as arms control, deterrence, and other military doctrines.

Political Science 686 **3 units; H(3S-0)**

Advanced Seminar in Global Political Economy
Covering in-depth major debates in global political economy, provides an advanced exploration of

the causes and effects of globalization, including the determinants of foreign economic policy-making (such as trade, money, migration, global production, finance, and foreign aid) as well as the subsequent impact of these policies.

Political Science 687 **3 units; H(3S-0)**

Advanced Studies in Canadian Arctic Security
The Canadian Arctic is an emerging area of concern due to changes scarcely imaginable even a few years ago. Examines the nature of some of these changes—e.g., climate change and the northern seas' dramatically changing ice conditions, growing recognition of the regions' resource wealth, and evolving international relations in the circumpolar region—and what they mean for Canadian Arctic security.

Antirequisite(s): Credit for Political Science 687 and 523 will not be allowed.

Political Science 689 **3 units; H(3-0)**

Unconventional Warfare
Analysis of warfare conducted by, or against, sub-state groups. This may include in-depth studies of guerrilla warfare, asymmetric conflict, or terrorism.

Political Science 691 **3 units; H(3-1)**

Quantitative Analysis in Political Science
Examination of empirical research methods and techniques of quantitative analysis in the study of political phenomena. Computer use is required.

Political Science 693 **3 units; H(3-0)**

Advanced Quantitative Analysis in Political Science
Examination of advanced empirical research methods and techniques of multivariate quantitative analysis in the study of political phenomena.

Prerequisite(s): Political Science 691.

Political Science 699 **3 units; H(3-0)**

Qualitative Analysis in Political Science
An introduction to qualitative research methods in Political Science. Topics may include qualitative methodology, elite interviewing, focus groups, content analysis, case studies and qualitative data analysis.

Prerequisite(s): Political Science 691.

Political Science 715 **3 units; H(3-0)**

Special Topics in Political Theory
MAY BE REPEATED FOR CREDIT

Political Science 721 **3 units; H(3-0)**

Special Topics in Canadian Politics
MAY BE REPEATED FOR CREDIT

Political Science 723 **3 units; H(3-0)**

Special Topics in Political Science
MAY BE REPEATED FOR CREDIT

Political Science 725 **3 units; H(3-0)**

Special Topics in Public Administration
MAY BE REPEATED FOR CREDIT

Political Science 741 **3 units; H(3-0)**

Special Topics in Public Law
MAY BE REPEATED FOR CREDIT

Political Science 755 **3 units; H(3-0)**

Special Topics in Public Policy
MAY BE REPEATED FOR CREDIT

Political Science 781 **3 units; H(3-0)**

Special Topics in International Relations
MAY BE REPEATED FOR CREDIT

Political Science 791 **3 units; H(3-0)**

Scope and Methods in Political Science
Advanced seminar covering various approaches, topics, methods and theories employed in the discipline of political science.

MAY BE REPEATED FOR CREDIT

Psychology PSYC

Instruction offered by members of the Department of Psychology in the Faculty of Arts.

Graduate Courses

Psychology 601 **3 units; H(3-0)**

History and Systems of Psychology
History of psychological concepts in Western culture, major theoretical systems of twentieth century psychology, foundational assumptions of theories in contemporary psychology.

Prerequisite(s): Consent of the Department.

Psychology 607 **3 units; H(3-0)**

Advanced Research Design and Methodology in Psychology
Survey of advanced topics in the conduct of psychological research including issues in philosophy of science; origins of research ideas; validity and reliability; measurement; experimental, quasi-experimental, and non–experimental designs; survey research; specialized methods such as computer simulation, psychophysiological methods, event-sampling, online data collection, and cognitive procedures; and ethics.

Prerequisite(s): Consent of the Department.

Psychology 611 **3 units; H(3-3)**

Advanced Qualitative Inquiry in Psychology
Qualitative research designs and historical research in psychology. Advanced study of selected qualitative approaches in psychology to include research design, methods, and analysis. Specific topics covered include foundations of qualitative research, evaluation and practical techniques including computerized analysis.

Prerequisite(s): Consent of the Department.

Psychology 613 **3 units; H(3-3)**

Signal and Systems Analysis in Behavioural Research
Application of signal and systems analysis to behavioural neuroscience and psychophysics.

Prerequisite(s): Consent of the Department.

Psychology 615 **3 units; H(3-3)**

Analysis of Variance
Applications of the general linear model to research design and analysis. Topics include analysis of variance, regression, and analysis of covariance.

Prerequisite(s): Consent of the Department.

Psychology 617 **3 units; H(3-3)**

Multivariate Data Analysis
Multivariate techniques and design issues, including canonical correlation, discriminant analysis, multivariate analysis of variance, multivariate regression, principal components analysis and factor analysis.

Prerequisite(s): Consent of the Department.

Psychology 619 **3 units; H(3-3)**

Special Topics in the Design of Psychological Research
Prerequisite(s): Consent of the Department.
MAY BE REPEATED FOR CREDIT

Psychology 620 **3 units; H(3-0)**

Advanced Topics in Brain and Cognitive Sciences
An advanced survey of some of the fundamental issues and recent developments in the Brain and/or Cognitive Sciences. Topics will vary.

Prerequisite(s): Consent of the Department.
MAY BE REPEATED FOR CREDIT

Psychology 625 **3 units; H(3S-0)**

Clinical Neuropsychology
Examination of normal brain development and neuroanatomy, brain-behaviour relationships, and brain disorders across the lifespan. Epidemiology, etiology and pathogenesis, phenotypic expression, and assessment and treatment of disorders will be considered.

Prerequisite(s): Consent of the Department.

Psychology 630 **3 units; H(3-0)**

Advanced Topics in Social and Theoretical Psychology
An advanced survey of some of the fundamental issues and recent developments in Social and/or Theoretical Psychology. Topics will vary.

Prerequisite(s): Consent of the Department.
MAY BE REPEATED FOR CREDIT

Psychology 639 **3 units; H(3-0)**

Advanced Industrial and Organizational Psychology
Application of psychological principles, research and methods relating to human interactions and performance in work settings.

Prerequisite(s): Consent of the Department.

Psychology 641 **3 units; H(3-0)**

Advanced Topics in Health Psychology
Introduces students to current research issues in health psychology. Focuses primarily on issues related to the study of chronic illnesses and evaluates the role of psychological/behavioural factors in: the etiology of disease, disease prevention, adaptation to illness, and disease progression.

MAY BE REPEATED FOR CREDIT

Psychology 650 **6 units; F(1S-0)**

Research Seminar in Clinical Psychology
An introduction to research and design issues in clinical psychology.

Prerequisite(s): Admission to the Clinical Psychology graduate program.
MAY BE REPEATED FOR CREDIT

Psychology 651 **3 units; H(3-0)**

Psychopathology
Current theory, issues, and research regarding the epidemiology, etiology, diagnosis, and prognosis of psychopathology. Implications for assessment and treatment.

Psychology 659 **3 units; H(3-0)**

Ethics and Professional Issues in Clinical Psychology
Ethical and legal standards for clinical psychologists. An introduction to professional issues in contemporary clinical practice.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

Psychology 660 **6 units; F(0-14)**

Summer Practicum in Clinical Psychology
Supervised training experience in an approved clinical setting. Provides exposure to basic issues and techniques in the practice of psychological assessment.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Psychology 671 **3 units; H(3-3)**

Psychological Assessment of Adults
An overview of theoretical, professional, and ethical issues in the psychological assessment of adult clinical populations. Instruction in the administration and interpretation of assessment procedures for adults including interviews, behavioural assessments, and selected intellectual and personality tests. Supervised practical experience in the application of adult assessments in a relevant clinical setting.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

Psychology 673 **3 units; H(3-3)**

Psychopathology and Psychological Assessment of Children
An overview of theoretical, professional and ethical issues in the psychopathology and psychological assessment of child clinical populations. Instruction in the administration and interpretation of child and family assessment procedures including interviews, behavioural assessments, and selected psychological tests. Supervised practical experience in the application of child and family assessments in a relevant clinical setting.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

Psychology 681 **3 units; H(3-3)**

Adult Psychotherapy
Theory, research, and practice in adult psychotherapy and behaviour change. Supervised exposure to the practice of adult psychotherapy in a relevant clinical setting.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

Psychology 683 **3 units; H(3-3)**

Child Psychotherapy
Theory, research, and practice in child and family psychotherapy and behaviour change. Supervised exposure to the practice of child and family psychotherapy in a relevant clinical setting.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

Psychology 700 **3 units; H(3S-0)**

Integrative Seminar in Psychology
Selected interdisciplinary topics in Psychology. Topics will vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 702 **3 units; H(0-3)**

Research in Brain and Cognitive Sciences
Completion of a research project in Brain and/or Cognitive Sciences conducted under the supervision of a faculty member. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 703 **3 units; H(0-3)**

Research in Social and Theoretical Psychology
Completion of a research project in the areas of Social and/or Theoretical Psychology conducted under the supervision of a faculty member. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 709 **3 units; H(0-3)**

Research in Industrial/Organizational Psychology
Completion of a research project in Industrial/Organizational Psychology conducted under the supervision of a faculty member. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 710 **6 units; F(3S-0)**

Integrative Seminar in Psychology
Selected interdisciplinary topics in Psychology. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 712 **6 units; F(0-3)**

Research in Brain and Cognitive Sciences
Completion of a research project in Brain and/or Cognitive Sciences conducted under the supervision of a faculty member. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 713 **6 units; F(0-3)**

Research in Social and Theoretical Psychology
Completion of a research project in the areas of Social and/or Theoretical Psychology conducted under the supervision of a faculty member. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 720 **3 units; H(3S-0)**

Seminar in Brain and Cognitive Sciences
Selected topics in Brain and/or Cognitive Sciences. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 730 **3 units; H(3S-0)**

Seminar in Social and Theoretical Psychology
Selected topics in Social and/or Theoretical Psychology. Topics may vary.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Psychology 739 **3 units; H(3S-0)**

Seminar in Industrial/Organizational Psychology
Application of psychological principles and methods to business, industry and other organizational settings.

Prerequisite(s): Psychology 639.

MAY BE REPEATED FOR CREDIT

Psychology 750 **1.5 units; Q(3S-0)**

Advanced Seminar in Clinical Psychology
A doctoral-level seminar in advanced topics in the practice of clinical psychology.

750.01. Psychopharmacology

750.02. Neuropsychology

750.05. Diversity Issues in Clinical Psychology

750.06. Clinical Geropsychology

750.09. Addictions

750.10. Health Psychology

750.11. Eating Disorders

750.12. Consultation/Supervision

Prerequisite(s): Admission to the Clinical Psychology graduate program.

NOT INCLUDED IN GPA

Psychology 751 **3 units; H(3-0)**

Special Topics in Adult Psychopathology
A specialized topic course in the area of adult psychopathology. Course offerings will vary from year to year and may include such topics as: schizophrenia, substance abuse, suicide, mental health delivery systems, or computer applications in clinical psychology.

MAY BE REPEATED FOR CREDIT

Psychology 760 **6 units; F(1-7)**

Specialty Practicum in Clinical Psychology I
Supervised training experience in an approved clinical setting. Provides in-depth exposure to specific clinical populations and to the application of various psychological assessment and intervention strategies and techniques.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

NOT INCLUDED IN GPA

Psychology 762 **6 units; F(1-7)**

Specialty Practicum in Clinical Psychology II
Supervised training experience in an approved clinical setting. Provides advanced in-depth exposure to specific clinical populations and to the application of various psychological assessment and intervention strategies and techniques.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Psychology 765 **3 units; H(1-7)**

Practicum in Clinical Psychology
Supervised training experience in an approved clinical setting. Provides exposure to specific clinical populations and to the application of various psychological assessment and intervention strategies and techniques.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Psychology 798

Pre-Doctoral Internship in Clinical Psychology
A full calendar year, full-time (or two-years, half-time) supervised training experience in an approved clinical setting. Intensive exposure to various professional issues, the opportunity to work with a diverse range of clinical populations and problems, and advanced training in the use of specific psychological assessment and intervention strategies.

Prerequisite(s): Admission to the Clinical Psychology graduate program.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Public Policy PPOL

Instruction offered by members of the School of Public Policy and individual faculties.

Public Policy 601 **3 units; H(3-0)**

Foundations I
This preparatory course covers the foundations necessary to understand and apply economic analysis and it covers selected topics relevant to the core courses listed below.

NOT INCLUDED IN GPA

Public Policy 603 **3 units; H(3-0)**

Foundations II
This preparatory course covers the foundations of basic empirical analysis, including quantitative and qualitative research methods.

NOT INCLUDED IN GPA

Public Policy 605 **3 units; H(3-0)**

Markets and Public Policy
The role of markets in the allocation of resources and the determination of income. Sources of market failure, and the appropriate public policy response to those failures, are examined. Students learn how private firms make decisions, and how they respond to policy initiatives.

Public Policy 607 **3 units; H(3-0)**

Politics and Collective Choice
How public policy issues emerge and how they are developed, refined, and influenced by the political process. The roles and influences of NGOs, interest groups, the media, political parties, and social protest on the development of new public policies are examined from the perspective of several disciplines. The importance of agenda setting, management and planning, policy reform and the organizational resistance to change is examined. Models of rational actors and bureaucratic behaviour are explored.

Public Policy 609 **3 units; H(3-0)**

Decision Analysis
The focus is on the foundations, applications and use of quantitative methods commonly used in decision making in the public and private sectors. Included are methods such as impact analysis, cost-benefit analysis, surveys, game theory and risk management tools.

Public Policy 611 **3 units; H(3-0)**

Independent Study
Supervised individual study in a selected public policy area.

MAY BE REPEATED FOR CREDIT

Public Policy 613 **3 units; H(3-0)**

Effective Writing and Research Skills
Development of skills for writing high quality documents in a professional setting. Defining, designing and executing applied, policy-oriented research.

Public Policy 615 **3 units; H(3-0)**

Public Finances
An overview of government finances and the restrictions on policy choices resulting from the need for governments to satisfy a budget constraint. Tax policy, the appropriate design of expenditure policies, policies with respect to deficits and debt, and issues of intergovernmental relations will be examined.

Public Policy 617 **3 units; H(3-0)**

Regulation and the Law
The role of international and national legal institutions in determining public policy choices. Legal research and interpretation skills are developed through specific public policy issues such as the design of market regulation in telecommunications, energy and various utility markets.

Public Policy 619 **3 units; H(3-0)**

Governance, Institutions and Public Policy
An examination of the rules and informal relationships among those determining public policy outcomes. Alternative institutional relationships and the evolution of those relationships are studied. The ever-changing dynamic of multi-level governance and court versus legislative public policy making are explored.

Public Policy 621 **3 units; H(3-0)**

Communicating Policy
Examines all aspects of communication in the context of policy, including the impact of new modes of communication on the development and dissemination of public policy. The new role of blogs, online communities, and web-based media at marshalling and influencing public opinion and the changing role of print media are discussed and evaluated. Implications for copyright policies, media concentration, privacy, and advertising are among the issues examined.

Public Policy 623 **3 units; H(9-0)**

Capstone Project
Students learn methods by which research contributes to the design and development of policy outcomes. Students are required to apply the skills they have learned to the completion of a capstone project which investigates a well-defined issue of public policy. The final product of the capstone project is expected to be a substantive, well-researched, focused and highly professional document. Work on the capstone project will be guided by a School of Public Policy faculty member and may include input provided by an expert from the private sector or public sector.

NOT INCLUDED IN GPA

Real Estate Studies REAL

Instruction offered by members of the Haskayne School of Business.

Real Estate Studies 717 **3 units; H(3-0)**

Real Estate Investment and Analysis
Structure and operations of the Canadian mortgage and asset-backed securities markets. Topics include instruments, techniques, and institutions of real estate finance, sources of funds, mortgage risk analysis, and fundamentals of residential and commercial real estate contracting. Examination of the risks and rewards when investing in and financing both commercial and residential real estate deals. Concepts include investment, financing, site analysis, appraisals, lending, and management of real estate portfolios and corporate real estate.

Prerequisite(s): Admission to the Master of Business Administration program and Finance 601.

Antirequisite(s): Credit for Real Estate Studies 717 and either Management Studies 789.03 or 789.05 will not be allowed.

Real Estate Studies 727 **3 units; H(3-0)**

Land Development and Planning
Introduction to urban planning. Topics will include planning legislation, municipal processes and timelines, the risks and costs associated with planning approvals, stakeholder engagement, developing political acumen, and new trends in managing growth and achieving sustainability goals.

Prerequisite(s): Admission to the Master of Business Administration program.

Antirequisite(s): Credit for Real Estate Studies 727 and Management Studies 789.09 will not be allowed

Real Estate Studies 737 **3 units; H(3-0)**

Real Estate Legal and Operating Environment
Foundation of legal, regulatory and stakeholder issues affecting real estate. Topics will include real estate transactions, real estate brokerage, real property ownership interests, illegal discrimination in residential and commercial transactions, and other legal transactions involving real estate, such as sales and leases. Governance models, legislation, policies and by-laws in relation to the business of real estate and land development.

Prerequisite(s): Admission to the Master of Business Administration program.

Real Estate Studies 747 **3 units; H(3-0)**

Real Estate Marketing
Coverage includes real estate marketing programs based on theoretical principles, an understanding of changing real estate markets, marketing methods, research approaches and marketing program development.

Prerequisite(s): Marketing 601 and admission to the Master of Business Administration program.

Real Estate Studies 757 **3 units; H(3-0)**

Fundamentals of Real Estate Development and Urbanization
Topics include the process of developing land and gaining approvals from regulatory bodies in the real estate industry, learning how to go from bare land to built form. Exploration of the context of city building, including topics such as the conflict between use value and exchange value of land, political economy of space, globalization trends, sustainability, gentrification and social movements.

Prerequisite(s): Admission to the Master of Business Administration program.

Real Estate Studies 767 **3 units; H(3-0)**

Advanced Real Estate Development
Opportunity to use classroom learning in an applied setting through a re-development plan for designated site(s), complete with supporting

market and financial analyses. The course may include site visits.

Prerequisite(s): Real Estate Studies 717, Real Estate Studies 727 and admission to the Master of Business Administration program.

Antirequisite(s): Credit for Real Estate Studies 767 and either Management Studies 789.12 or Environmental Design 683.69 will not be allowed.

Religious Studies RELS

Instruction offered by members of the Department of Classics and Religion in the Faculty of Arts.

Graduate Courses

Religious Studies 601 **3 units; H(3-0)**

Studies in Western Religions
MAY BE REPEATED FOR CREDIT

Religious Studies 603 **3 units; H(3-0)**

Studies in Eastern Religions
MAY BE REPEATED FOR CREDIT

Religious Studies 605 **3 units; H(3-0)**

Studies in the Nature of Religion
MAY BE REPEATED FOR CREDIT

Religious Studies 607 **3 units; H(0-3T)**

Supervised Master's Thesis Inquiry

Religious Studies 609 **3 units; H(3-0)**

Selected Topics on Critical Discourses in the Study of Religion
Selected topics on critical discourses in the study of religion.

MAY BE REPEATED FOR CREDIT

Religious Studies 681 **3 units; H(3-0)**

Specialized Studies in Western Religions
MAY BE REPEATED FOR CREDIT

Religious Studies 683 **3 units; H(3-0)**

Specialized Studies in Eastern Religions
MAY BE REPEATED FOR CREDIT

Religious Studies 685 **3 units; H(3-0)**

Specialized Studies in the Nature of Religion
MAY BE REPEATED FOR CREDIT

Religious Studies 701 **3 units; H(3-0)**

Studies in Western Religions
MAY BE REPEATED FOR CREDIT

Religious Studies 703 **3 units; H(3-0)**

Studies in Eastern Religions
MAY BE REPEATED FOR CREDIT

Religious Studies 705 **3 units; H(3-0)**

Studies in the Nature of Religion
MAY BE REPEATED FOR CREDIT

Religious Studies 707 **3 units; H(3-0)**

PhD Departmental Colloquium
MAY BE REPEATED FOR CREDIT
NOT INCLUDED IN GPA

Religious Studies 709 **3 units; H(3-0)**

Advanced Topics on Critical Discourses in the Study of Religion
Advanced topics on critical discourses in the study of religion.

MAY BE REPEATED FOR CREDIT

Risk Management and Insurance RMIN

Instruction offered by members of the Haskayne School of Business.

Graduate Course

Risk Management and Insurance 763 **3 units; H(3-0)**
(formerly Finance 763)

Managing Risks and Disasters
Risk management strategies with emphasis on the management of operational and hazard risks. Topics include risk identification and assessment; organizational responsibility for risk management; risk mitigation; risk financing; crisis management, and business continuity planning.

Prerequisite(s): Consent of the Haskayne School of Business.

School of Creative and Performing Arts SCPA

Instruction offered by members of Drama in the School of Creative and Performing Arts in the Faculty of Arts.

Graduate Courses

School of Creative and Performing Arts 601 **3 units; H(2-2)**

Topics in Inter-Arts Collaborations
Experiential or lecture-based work that crosses the disciplinary boundaries of Dance, Drama and Music.

Prerequisite(s): Consent of the School.

MAY BE REPEATED FOR CREDIT

School of Creative and Performing Arts 603 **6 units; F(0-7)**

Travel Study
An international perspective on performance and culture that crosses the disciplinary boundaries of Dance, Drama and Music.

Prerequisite(s): Consent of the School.

MAY BE REPEATED FOR CREDIT

Science SCIE

Instruction offered by members of the Faculty of Science.

Science 601 **3 units; H(3-0)**

Theory and Practice of University Teaching and Learning in STEM
Current educational theory and practice relating to university teaching and learning in STEM will be explored and critically evaluated. Students will critically evaluate their teaching beliefs and broaden their knowledge and skills through a combination of discussion, microteaching opportunities and a capstone project involving the design of a teaching unit.

Prerequisite(s): Admission to a MSc or PhD program in the Faculty of Science and consent of the instructor.

NOT INCLUDED IN GPA

Science 603 **3 units; H(0-3)**

STEM Teaching Development
Design and delivery of a unit of a course within the student's area of specialization and under the guidance of a faculty member. Course and curriculum design elements are emphasized through the production of a detailed lesson plan, strategy for assessment and evaluation of the success of the teaching unit. The importance of reflective practice and mentorship to the teaching function is stressed through reflective essays and group discussions. Experiences will be shared through a symposium poster presentation.

Prerequisite(s): Science 601.

NOT INCLUDED IN GPA

Social Work SOWK

Instruction offered by members of the Faculty of Social Work.

Graduate Courses

Note: Not all options are offered every academic year. The number of options will vary across the programs and program locations.

Social Work 600 **3 units; H(3S-0)**

Advanced Social Work Theory, Policy and Practice I
Examines the role and relationship of social work to the broad field of social welfare, including its development and current practice in historical, economic, political, social and cultural contexts. Theoretical and ethical foundations of social work practice are examined and assessed as a means to facilitating change.

Prerequisite(s): Admission to the MSW program or the Post-Baccalaureate Certificate in Advanced Social Work Practice.

Social Work 602 **3 units; H(3S-0)**

Advanced Practice, Research and Evaluation in Social Work I
Application of social work theories to practice, assess personal values and ethical dilemmas to develop their own professional practice model. Development of understanding of social work research through examining various approaches (qualitative and quantitative), paradigms, and methods.

Prerequisite(s): Admission to the MSW program or the Post-Baccalaureate Certificate in Advanced Social Work Practice.

Social Work 604 **3 units; H(3S-0)**

Advanced Social Work Theory, Policy and Practice II
Examines concepts of social justice, culture, identity, oppression and "differentness." Explores the influences of public policy on the lives, relationships, and well-being of individuals, families, groups and communities. Development of understanding of the policy-making process and the role of social workers in shaping policy.

Prerequisite(s): Admission to the MSW program or the Post-Baccalaureate Certificate in Advanced Social Work Practice.

Social Work 606 **3 units; H(3S-0)**

Advanced Practice, Research and Evaluation in Social Work II

Integration of concepts of social justice, social action, and anti-oppressive practice into all levels of a professional practice model. Engagement in social action towards to development and implementation of more equitable social policies and practices. Development and dissemination of knowledge and the evaluation of practice through conducting social work research.

Prerequisite(s): Admission to the MSW program or the Post-Baccalaureate Certificate in Advanced Social Work Practice.

Social Work 610 **3 units; H(3S-0)**

Advanced Topics in Clinical Social Work I

Examines multiple social work theories, models, and approaches to clinical practice. Clinical social work practice is situated within in historical, economic, political, social and cultural contexts. Critical perspectives, contemporary issues and research debates are discussed.

Prerequisite(s): Admission to the MSW with specialization in Clinical Social Work Practice or the Post-Baccalaureate Certificate in Clinical Social Work Practice.

Social Work 612 **3 units; H(3S-0)**

Advanced Topics in Clinical Practice and Research I

Application of evidence-based and anti-oppression modalities and best practices towards supporting and helping individuals, groups, families and communities.

Prerequisite(s): Admission to the MSW with specialization in Clinical Social Work Practice or the Post-Baccalaureate Certificate in Clinical Social Work Practice.

Social Work 614 **3 units; H(3S-0)**

Advanced Topics in Clinical Social Work II

Examines issues in clinical practice with diverse populations, including Indigenous, Francophone and newcomer populations. Specific treatment modalities and techniques are examined in depth.

Prerequisite(s): Admission to the MSW with specialization in Clinical Social Work Practice or the Post-Baccalaureate Certificate in Clinical Social Work Practice.

Social Work 616 **3 units; H(3S-0)**

Advanced Topics in Clinical Practice and Research II

Considers complicating factors in applying best, promising and ethical practices and techniques in clinical practice with diverse populations. Students will advocate for the needs of diverse and specific populations, including Indigenous Canadians and other minorities. Students will develop and use self-care practice.

Prerequisite(s): Admission to the MSW with specialization in Clinical Social Work Practice or the Post-Baccalaureate Certificate in Clinical Social Work Practice.

Social Work 620 **3 units; H(3S-0)**

Advanced Topics in International and Community Development I

Examines the role of social work and social workers in international and community development work at home and abroad. Theoretical foundations are examined alongside global influences in relation to historical, economic, political, social and cultural contexts. Critical perspectives, contemporary issues and research debates in social development, internationalization and globalization are discussed.

Prerequisite(s): Admission to the MSW with specialization in International and Community Development or the Post-Baccalaureate Certificate in International and Community Development.

Social Work 621 **3 units; H(3S-0)**

History and Foundation of the Profession

An examination of the relationship between knowledge, values, ethics and power and how they shape interventions in social work.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 622 **3 units; H(3S-0)**

Advanced Topics in Practice and Research in International and Community Development I

Application of theories and concepts of international social work and community development to practice, with a focus on promoting change and challenging structured inequalities. Development of skills, strategies and tools for engaging in international social work and community development in international and North American settings.

Prerequisite(s): Admission to the MSW with specialization in International and Community Development or the Post-Baccalaureate Certificate in International and Community Development.

Social Work 624 **3 units; H(3S-0)**

Advanced Topics in International and Community Development II

Examination of various approaches, strategies, and perspectives for taking action as a social worker in international and community development settings, and growing a professional toolkit of resources and techniques to engage in this work.

Prerequisite(s): Admission to the MSW with specialization in International and Community Development or the Post-Baccalaureate Certificate in International and Community Development.

Social Work 625 **3 units; H(3S-0)**

Practice with Individuals, Families and Groups

A basic understanding of social work practice theory with respect to work with individuals, families and groups.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 626 **3 units; H(3S-0)**

Advanced Topics in Practice and Research in International and Community Development II

Designing, creating and evaluating international and community development projects that integrate theory, research, and best practices. Development of greater self-awareness of the role, values, and skills of a social worker engaging in international and community development work.

Prerequisite(s): Admission to the MSW with specialization in International and Community Development or the Post-Baccalaureate Certificate in International and Community Development.

Social Work 627 **3 units; H(3S-0)**

Practice with Organizations and Communities

A basic understanding of social work practice theory with respect to work with organizations and communities.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 629 **3 units; H(3S-0)**

Professional Communication and Interviewing

Offers experiential learning aimed at developing basic professional competencies and practice skills along with critical self-reflection.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 632 **3 units; H(3S-0)**

Social Policy and Social Justice

An exploration of the social, political and economic forces, social movements and social structures that are transforming the Canadian welfare state and the practice of social work.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 633 **3 units; H(426 hours-2T)**

Foundational Field Practicum

Direct and indirect social work practice opportunities with professional supervision.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

NOT INCLUDED IN GPA

Social Work 637 **3 units; H(3S-0)**

Human Behaviour in the Environment

Human development and diversity within a social work context.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 640 **3 units; H(3S-0)**

Advanced Topics in Leadership in the Human Services I

Examines multiple theories, models and approaches of leadership in the human services. The historical, political, economic, social, and cultural influences impacting human service organizations are examined. Critical perspectives, contemporary issues, and research debates are discussed.

Prerequisite(s): Admission to the MSW with specialization in Leadership in the Human Services or the Post-Baccalaureate Certificate in Leadership in the Human Services.

Social Work 641 **3 units; H(3S-0)**

Models of Practice

Provides the conceptual and theoretical foundation for students to acquire the skills to practice in Social Work.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 642 **3 units; H(3S-0)**

Advanced Topics in Practice and Research in Leadership in the Human Services I

Integration of leadership theories, models, and approaches in organizational and community practice. Application evidence-based tools and strategies in assessment, evaluation, intervention, innovation, evaluation, change, and collaboration to develop a professional model of leadership.

Prerequisite(s): Admission to the MSW with specialization in Leadership in the Human Services or the Post-Baccalaureate Certificate in Leadership in the Human Services.

Social Work 644 **3 units; H(3S-0)**

Advanced Topics in Leadership in the Human Services II

Examines issues of diversity, culture, power and oppression in organizational and community practice. The changing roles of leadership in complex

systems and changing contexts will be examined. Explores the influences of policy on the human service organization and the practice of leadership in this setting.

Prerequisite(s): Admission to the MSW with specialization in Leadership in the Human Services or the Post-Baccalaureate Certificate in Leadership in the Human Services.

Social Work 645 3 units; H(3S-0)

Issues in Social Work Research
An overview of social work research topics and issues.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 646 3 units; H(3S-0)

Advanced Practice and Research in Leadership in the Human Services II
Enhancement of skills in facilitation, building trust, managing conflict, and fostering relationships in working with individuals, groups and communities. Integration of practice-based research to inform best practices, policy development and social change.

Prerequisite(s): Admission to the MSW with specialization in Leadership in the Human Services or the Post-Baccalaureate Certificate in Leadership in the Human Services.

Social Work 651 3 units; H(3S-0)

Policy as Context for Clinical Work
Policies and their impacts on the delivery of clinical work will be examined.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 653 3 units; H(3S-0)

Comparative Approaches to Change
Various clinical change applications will be examined and critiqued.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 655 3 units; H(3S-0)

Thesis Research
An introduction to preparing a thesis proposal.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 657 3 units; H(3S-0)

Clinical Social Work Applications
Specific issues involved in the effective application of clinical approaches will be studied.

Prerequisite(s): Social Work 653 and admission to the MSW program, or consent of the Faculty.

Social Work 659 3 units; H(3S-0)

Evidence and Clinical Practice
Research as utilized in the clinical arena will be the focus of this course.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 660 3 units; H (262.5 hours)

Advanced Practicum and Seminar I
Direct and indirect Social Work practice opportunities with professional supervision in student's area of specialization or interest.

Prerequisite(s): Admission to the MSW program of consent of the Faculty.

Corequisite(s): Social Work 662.

NOT INCLUDED IN GPA

Social Work 662 3 units; H (262.5 hours)

Advanced Practicum and Seminar II
Direct and indirect Social Work practice opportunities with professional supervision in student's area of specialization or interest.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Corequisite(s): Prerequisite or corequisite: Social Work 660.

NOT INCLUDED IN GPA

Social Work 664 3 units; H(3S-0)

Field and Research Integration Seminar I
Focuses on understanding and integrating the role of research and evidence in professional practice. Seeks to develop student's capacity to engage in research and evaluation, and then integrate these models into their own practices.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 665 3 units; H(3S-0)

Influencing Policy Development
Focuses on leadership in policy practice and in particular policy advocacy at all levels of policy (i.e., organizational, community, and provincial or national levels).

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 667 3 units; H(3S-0)

Leadership Theories in Action
Directed toward helping prepare leaders for "best practice" across the range of sectors and roles in which human service leaders work.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 668 3 units; H(3S-0)

Field and Research Integration Seminar II
Seeks to integrate program content across student's area of specialization, and is focused on preparation and presentation of a capstone exit requirement.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 669 3 units; H(3S-0)

Leading Organizations and Communities
A practical course that will emphasize networked and collaborative approaches to leadership in a global context.

Prerequisite(s): Social Work 667 and admission to the MSW program, or consent of the Faculty.

Social Work 671 3 units; H(3S-0)

Social Policy
Explores social welfare policy in Canada and in a globalizing world, the current roles of social welfare policy, and the roles they should have.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 673 3 units; H(3S-0)

International Social Development
Examines issues in international social development. There will be an emphasis on analysis of the social forces and conditions giving rise to different models of social development, and on what each of these alternative models tends to produce in terms of social welfare policies and programs.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 675 3 units; H(3S-0)

Advanced International Social Work Modules
This set of modules will give students tools for social change.

Prerequisite(s): Social Work 673 and admission to the MSW program, or consent of the Faculty.

Social Work 677 3 units; H(3S-0)

Social Work Research for International and Community Methods
International and Community Development Research is designed to provide methodological knowledge and skills specifically oriented to community-based practice abroad or in Canada.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 679 3 units; H(3S-0)

Special Topics Seminar I
Selected topics related to area of specialization or interest.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Social Work 682 0.75 units; E(3S-0)

Special Seminar II
Selected topics related to an area of specialization or interest.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Social Work 693 3 units; H(3S-0)

Research as a Foundation for Leadership
This course will provide students with a working understanding for the study and nature of the theoretical and practical issues underlying the application of the research process to professional and leadership practice.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 695 3 units; H(3S-0)

Becoming an Evidence-Based Leader
Extends students' abilities to identify, assess, and utilize research knowledge as a problem-solving tool in social work.

Prerequisite(s): Social Work 693 and admission to the MSW program, or consent of the Faculty.

Social Work 696 6 units; F(525 hours within two consecutive terms)

Advanced Practicum
Direct and indirect Social Work practice opportunities with professional supervision in student's area of specialization or interest.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

NOT INCLUDED IN GPA

Social Work 697 3 units; H(3S-0)

Diversity, Oppression and Social Justice
Critical examination of the issues of diversity and the power relations that form common links among the experiences of oppression and marginalization in Canadian society.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

Social Work 699 **3 units; H(3S-0)**

Special Topics Seminar II
Advanced selected topics related to area of specialization or interest.

Prerequisite(s): Admission to the MSW program or consent of the Faculty.

MAY BE REPEATED FOR CREDIT

Social Work 721 **3 units; H(2S-0)**

Integrative Research Colloquia
A concluding course offered as final component of student's course work. Allows doctoral students and the instructor to engage in a series of research colloquia, thereby facilitating critical analysis, feedback and synthesis of materials covered and skills learned in other course work. This process will help students to develop conceptual and methodological skills.

Prerequisite(s): Admission to the Social Work PhD program.

Note: Social Work 721 can only be taken once all other required courses have been completed.

Social Work 741 **3 units; H(2S-0)**

Research Foundations: Epistemology and Professional Knowledge-Building
An exploration of major philosophical issues that have shaped social work's diverse approaches to knowledge building and research methods. The relevance of this exploration to the student's area of interest is emphasized.

Prerequisite(s): Admission to the Social Work PhD program or consent of the Faculty.

Social Work 743 **3 units; H(2S-0)**

Theory, History and Philosophy: Values, Ethics and Professional Beliefs
An exploration of the philosophical and ideological issues that have been historically important to the profession with respect to its conception of its ethics, mandate and practices. The relevance of this exploration to the student's area of interest in emphasized.

Prerequisite(s): Admission to the Social Work PhD program or consent of the Faculty.

Social Work 745 **3 units; H(2S-0)**

Research Methods I: Quantitative
Quantitative methodological and design options in social work research.

Prerequisite(s): Admission to the Social Work PhD program or consent of the Faculty.

Social Work 747 **3 units; H(2S-0)**

Research Methods II: Qualitative
Qualitative methodological and design options in social work research.

Prerequisite(s): Admission to the Social Work PhD program or consent of the Faculty.

Social Work 749 **3 units; H(2S-0)**

Quantitative Data Analysis
Statistical analysis of quantitative data.

Prerequisite(s): Admission to the Social Work PhD program or consent of the Faculty.

Social Work 799 **3 units; H(3S-0)**

Special Topics Seminar
Advanced selected topics related to the PhD focus area.

Prerequisite(s): Admission to the Social Work PhD program.

MAY BE REPEATED FOR CREDIT

Sociology SOCI

Instruction offered by members of the Department of Sociology in the Faculty of Arts.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Sociology 601 **3 units; H(3S-0)**

Seminar in Special Topics in Sociology
Arranged for various topics of Sociology on the basis of special interest and need.

Prerequisite(s): Consult Department for assignment to Faculty member.

MAY BE REPEATED FOR CREDIT

Sociology 602 **6 units; F(3/2S-0)**

Master's Seminar in Professional Sociology
NOT INCLUDED IN GPA

Sociology 603 **3 units; H(3S-0)**

Seminar in Sociology of Health and Illness
Prerequisite(s): Consent of the Department.

Sociology 611 **3 units; H(3S-3)**

Social Statistics: The General Linear Model
Multiple regression with applications to sociological research, with topics such as regression diagnostics, categorical predictors, non-linear relationships, logistic regression, and testing of mediation and moderation.

Prerequisite(s): Consent of the Department. (Sociology 311 and 315 normally required.)

Sociology 613 **3 units; H(3S-0)**

Seminar in Quantitative Research Methods
Advanced study in the theory and practice of quantitative research methods. Topics may include the logic of causality, mixed methods designs, sampling, measurement, survey construction and implementation.

Prerequisite(s): Sociology 313.

Sociology 615 **3 units; H(3S-0)**

Seminar in Qualitative Research Methods
Advanced study in the theory and practice of qualitative research methods. Topics may include participant observation, in-depth interviews, narrative analysis, conversation and discourse analysis, autoethnography, archival research, and feminist research methods.

Prerequisite(s): Sociology 313. Sociology 413 is recommended.

Sociology 625 **3 units; H(3S-0)**

Seminar on Deviant Behaviour
Prerequisite(s): Sociology 325.

Sociology 631 **3 units; H(3S-0)**

Seminar in Sociological Theory
Prerequisite(s): Sociology 331 and 333.

Sociology 653 **3 units; H(3S-0)**

Seminar on Urban Sociology
Prerequisite(s): Sociology 353.

Sociology 667 **3 units; H(3S-0)**

Seminar on Ethnic Relations
Prerequisite(s): Sociology 375.

Sociology 671 **3 units; H(3S-0)**

Seminar on Families, Relationships, and Personal Life
Prerequisite(s): Sociology 471.

Sociology 677 **3 units; H(3S-0)**

Seminar in Sociology of Gender Relations
Prerequisite(s): Consent of the Department.

Sociology 699 **1.5 units; Q(0-3)**

Special Topics in Sociology
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Sociology 701 **3 units; H(3S-0)**

Doctoral Seminar in Sociology
Seminar on selected topics. Consult Department for details.

Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Sociology 702 **6 units; F(3/2S-0)**

Doctoral Seminar in Professional Sociology
Prerequisite(s): Consent of the Department.

NOT INCLUDED IN GPA

Sociology 705 **1.5 units; Q(3S-0)**

Selected Topics in Advanced Methodological Issues
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Sociology 711 **1.5 units; Q(3S-3)**

Selected Topics in Advanced Quantitative Methods
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Sociology 715 **1.5 units; Q(3S-0)**

Selected Topics in Advanced Qualitative Methods
Prerequisite(s): Consent of the Department.

MAY BE REPEATED FOR CREDIT

Sociology 731 **3 units; H(3S-0)**

Doctoral Seminar in Sociological Theory
Prerequisite(s): Consent of the Department.

Software Engineering SENG

Instruction offered by members of the Department of Computer Science in the Faculty of Science and the Department of Electrical and Computer Engineering in the Schulich School of Engineering.

Graduate Courses

Software Engineering 605 **1.5 units; Q(3-1)**

Industrial Topics in Software Engineering
A study of practical approaches of industrial relevance to students specializing in Software Engineering.

Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.

MAY BE REPEATED FOR CREDIT

Software Engineering 607 3 units; H(3-1)

Special Topics in Software Engineering
A study of problems of particular interest to students specializing in Software Engineering.

Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.

MAY BE REPEATED FOR CREDIT

Software Engineering 609 1.5 units; Q(3-1)

Special Topics in Software Engineering
A study of problems of particular interest to students specializing in Software Engineering.

Note: Consult Department (Computer Science or Electrical and Computer Engineering) for details regarding offerings in the upcoming academic year.

MAY BE REPEATED FOR CREDIT

Software Engineering 611 1.5 units; Q(3-1)

Requirements Engineering I
The elicitation, modelling, expression, and validation of requirements.

Software Engineering 615 3 units; H(3-1)

Agile Software Engineering
Investigation and application of agile software development practices.

Antirequisite(s): Credit for Software Engineering 615 and Computer Science 601.93 will not be allowed.

Note: Students are expected to have some background in software development as preparation for this course.

Software Engineering 622 3 units; H(3-1)

Software Release Planning
Product release planning covers systematic methods, tools and techniques for defining the functionality of a sequence of product releases in incremental development. The planning and replanning is established as a systematics process trying to optimize resources available towards the functionality most requested by customers and stakeholders.

Antirequisite(s): Credit for Software Engineering 622 and 607.25 will not be allowed.

Software Engineering 627 3 units; H(3-1)

Software Engineering Decision Support
Provides methodological foundations of software engineering decision-making and how to apply them to make better decisions about processes, products, and resources as well as for selection of tools and techniques.

Antirequisite(s): Credit for Software Engineering 627 and 625 will not be allowed.

Software Engineering 629 1.5 units; Q(3-0)
(formerly Software Engineering 609.17)

Software Engineering Standards and Models
Formal description of algorithms for current software engineering standards and models. Trends and future development in software engineering standardization.

Software Engineering 637 3 units; H(3-0)

Dependability and Reliability of Software Systems
Principles of software dependability techniques, and techniques to improve and predict software reliability.

Antirequisite(s): Credit for Software Engineering 637 and 521 will not be allowed.

Note: Engineering 319, Software Engineering 511, and Software Engineering 437 or 421, or their equivalents, are recommended as preparation for this course.

Software Engineering 639 3 units; H(3-0)
(formerly Software Engineering 607.22)

Advanced Software Testing
Advanced techniques, tools and concepts in software testing including: Agile testing, acceptance testing, GUI testing, test coverage analysis, automated testing, and new developments in testing research.

Note: Software Engineering 437 or equivalent is recommended as preparation for this course.

Software Engineering 641 3 units; H(3-0)
(formerly Computer Science 601.33)

Software Evolution and Reuse
Phenomena and approaches involved in the evolution and reuse of large-scale software, including design for modifiability and tool support. Strengths and weaknesses of industrially-current techniques as well as recent research results.

Antirequisite(s): Credit for Software Engineering 641 and 541 will not be allowed.

Note: Software Engineering 301 or equivalents are recommended as preparation for this course.

Software Engineering 652 6 units; F(3S-0)

Full-Course Project
A project in either software development or software best practice and experience.

Antirequisite(s): Credit for Software Engineering 652 and either 651 or Electrical Engineering 698 will not be allowed.

Note: This course is only available to MEng students with a specialization in Software Engineering. Students should register for this course in the semester when they will complete it.

Software Engineering 696 3 units; H(3-0)
(formerly Software Engineering 697)

Agent-Based Software Engineering
Principles and practices of engineering agent-based software systems.

Antirequisite(s): Credit for Software Engineering 696 and Computer Science 609 will not be allowed for programs offered by the Department of Computer Science.

Software Engineering for Engineers ENSF

Instruction offered by members of the Department of Electrical and Computer Engineering in the Schulich School of Engineering.

Graduate Courses

Registration in all courses requires the approval of the Department of Electrical and Computer Engineering.

Software Engineering for Engineers 603
3 units; H(3-0)

Modelling and Measurement of Software Performance
Performance-oriented review of computer systems; methodologies to evaluate software performance; fundamental performance laws; performance prediction using queuing network models; discrete event simulation of computer system performance, simulation input and output analysis; performance testing, monitoring and benchmarking; workload characterization; software performance engineering.

Antirequisite(s): Credit for Software Engineering 603 and 619.02 will not be allowed.

Software Engineering for Engineers 604
3 units; H(3-0)

Theoretical Foundations of Software Engineering
Explores formal principles of software engineering based on the common recognition that software engineering is not constrained by any physical laws as we know. The transdisciplinary foundations of software engineering are presented from the facets of information, computing, mathematics, cognitive, and management sciences, software engineering philosophies; engineering, mathematical, computational, management science, cognitive informatics, computational intelligence foundations and approaches of software engineering. As a result, a coherent framework of software engineering theories is learnt.

Antirequisite(s): Credit for Software Engineering for Engineers 604 and Software Engineering 609.19 will not be allowed.

Software Engineering for Engineers 606
3 units; H(3-0)

Software Engineering Fundamentals
Methodological foundation of software development principles from requirements analysis to software design and architecture.

Prerequisite(s): Software Engineering for Engineers 409 or consent of the Department.

Antirequisite(s): Credit for Software Engineering for Engineers 606 and Software Engineering for Engineers 619.16 will not be allowed.

Software Engineering for Engineers 619
3 units; H(3-1) or H(3-0)

Special Topics
A study of problems of particular interest to students specializing in Software Engineering.

MAY BE REPEATED FOR CREDIT

Space Physics SPPH

Instruction offered by members of the Department of Physics and Astronomy in the Faculty of Science.

Note: For listings of related courses, see Astrophysics, Medical Physics and Physics.

Graduate Course

Space Physics 671 3 units; H(3-0)

Physics of the Magnetosphere
Physics of the interaction between the earth's magnetic field and the fields and plasmas of the surrounding interplanetary environment. Topics include magnetic field models and co-ordinate

systems, reconnection, current flow in the magnetosphere, substorms, and particle acceleration.

Prerequisite(s): Note: It is expected that a student's background will include Physics 509 and 555 or equivalent.

Spanish SPAN

Instruction offered by members of the School of Languages, Linguistics, Literatures and Cultures in the Faculty of Arts.

Graduate Courses

Note: The Department will give graduate credit for 500-level courses in cases it deems exceptional. This option is subject to the approval of the Department. Graduate students taking a 500-level course for graduate credit will be asked to complete additional requirements.

Spanish 601 **3 units; H(3-0)**

Literary and Cultural Theory
MAY BE REPEATED FOR CREDIT

Spanish 613 **3 units; H(3-0)**

Critical Analysis of Medieval Texts
MAY BE REPEATED FOR CREDIT

Spanish 615 **3 units; H(3-0)**

Golden Age Literature
MAY BE REPEATED FOR CREDIT

Spanish 617 **3 units; H(3-0)**

Theatre and Performance in the 19th or 20th Centuries
MAY BE REPEATED FOR CREDIT

Spanish 619 **3 units; H(3-0)**

Post-Franco Literature, Art and Film
MAY BE REPEATED FOR CREDIT

Spanish 621 **3 units; H(3-0)**

Art, Film and Literature in the Spanish Avant-Garde
MAY BE REPEATED FOR CREDIT

Spanish 623 **3 units; H(3-0)**

Spanish American Literature and Culture to 1900
MAY BE REPEATED FOR CREDIT

Spanish 625 **3 units; H(3-0)**

20th Century Spanish American Literature
MAY BE REPEATED FOR CREDIT

Spanish 627 **3 units; H(3-0)**

Avant-Garde Movements in Spanish America
MAY BE REPEATED FOR CREDIT

Spanish 631 **3 units; H(3-0)**

Popular Culture
MAY BE REPEATED FOR CREDIT

Spanish 633 **3 units; H(3-0)**

Writings in Exile
MAY BE REPEATED FOR CREDIT

Spanish 635 **3 units; H(3-0)**

Literature and the Visual Arts in Hispanic Culture
MAY BE REPEATED FOR CREDIT

Spanish 637 **3 units; H(3-0)**

Identities and Post-Colonial Voices
MAY BE REPEATED FOR CREDIT

Spanish 639 **3 units; H(3-0)**

Hispanic Female Voices
MAY BE REPEATED FOR CREDIT

Spanish 641 **3 units; H(3-0)**

Hispanic Cinema
MAY BE REPEATED FOR CREDIT

Spanish 643 **3 units; H(3-0)**

Special Topics in Hispanic Culture, Language or Literature
MAY BE REPEATED FOR CREDIT

Statistics STAT

Instruction offered by members of the Department of Mathematics and Statistics in the Faculty of Science.

Graduate Courses

Statistics 600 **1.5 units; Q(3S-0)**
(formerly Statistics 621)

Research Seminar
A professional skills course, focusing on the development of technical proficiencies that are essential for students to succeed in their future careers as practicing statistician in academia, government, or industry. The emphasis is on delivering professional presentations and using modern statistical research tools. A high level of active student participation is required.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

MAY BE REPEATED FOR CREDIT

NOT INCLUDED IN GPA

Statistics 601 **3 units; H(3-0)**

Topics in Probability and Statistics
The content of this course is decided from year to year in accordance with graduate student interest and instructor availability. Topics include but are not restricted to: Advanced Design of Experiments, Weak and Strong Approximation Theory, Asymptotic Statistical Methods, the Bootstrap and its Applications, Generalized Additive Models, Order Statistics and their Applications, Robust Statistics, Statistics for Spatial Data, Statistical Process Control, Time Series Models.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

MAY BE REPEATED FOR CREDIT

Statistics 603 **3 units; H(3-1)**
(formerly Statistics 601.14)

Applied Statistics for Nursing Research
Descriptive statistics; probability theory; statistical estimation/inference; power analysis; regression analysis; anova; logistic regression analysis; non-parametric tests; factor analysis; discriminant analysis; Cox's Proportional Hazard Model.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Statistics 619 **3 units; H(3-0)**

Bayesian Statistics
Fundamentals of Bayesian inference, single and multiparameter models, hierarchical models, regression models, generalized linear models, advanced computational methods, Markov chain Monte Carlo.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Statistics 619 and 519 will not be allowed.

Statistics 625 **3 units; H(3-0)**

Multivariate Analysis
Normal distribution. Statistical inference: confidence regions, hypothesis tests, analysis of variance, simultaneous confidence intervals. Principal components. Factor Analysis. Discrimination and classification. Canonical correlation analysis.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Statistics 625 and 525 will not be allowed.

Statistics 631 **3 units; H(3-0)**

Computational Statistics
Unconstrained optimization methods, simulation and random number generation, Bayesian inference and Monte Carlo methods, Markov chain Monte Carlo, non-parametric inference, classical inference and other topics. An emphasis will be placed on computational implementation of algorithms.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Statistics 633 **3 units; H(3-0)**

Survival Models
Advanced topics in survival models such as the product limit estimator, the cox proportional hazards model, time-dependent covariates, types of censorship.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Statistics 633 and 533 will not be allowed.

Statistics 635 **3 units; H(3-0)**

Generalized Linear Models
Exponential family of distributions, binary data models, loglinear models, overdispersion, quasi-likelihood methods, generalized additive models, longitudinal data and generalized estimating equations, model adequacy checks.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Statistics 637 **3 units; H(3-0)**

Non-linear Regression
Topics include but are not restricted to selections from: linear approximations; model specification; various iterative techniques; assessing fit; multiresponse parameter estimation; models defined by systems of differential equations; graphical summaries of inference regions; curvature measures.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Statistics 641 **3 units; H(3-0)**

Statistical Learning
Introduction and Linear Regression; Classification; Regularization; Model Assessment and Selection; Support Vector Machines; Unsupervised Learning; Tree-Based Methods; Other Topics (e.g., Neural Networks, Graphical Models, High-Dimensional Data).

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Antirequisite(s): Credit for Statistics 641 and 543 will not be allowed.

Statistics 701 **3 units; H(3-0)**

Theory of Probability I
Probability spaces, integration, expected value, laws of large numbers, weak convergence, characteristic functions, central limit theorems, limit theorems in Rd, conditional expectation, introduction to martingales.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Statistics 703 **3 units; H(3-0)**

Theory of Probability II
Stopping times, renewal theory, martingales, almost sure convergence, Radon-Nikodym derivatives, Doob's inequality, square integrable martingales, uniform integrability, Markov chains, stationary measure, Birkhoff's Ergodic Theorem, Brownian motion, stopping times, hitting times, Donsker's Theorem, Brownian bridge, laws of the iterated logarithm.

Prerequisite(s): Statistics 701 and admission to a graduate program in Mathematics and Statistics or consent of the Department.

Statistics 721 **3 units; H(3-0)**

Statistical Inference
Statistical models, likelihoods, maximum likelihood estimators, likelihood ratio, Wald and score tests, confidence intervals, bounds and regions, Bayesian estimation and testing, basic large sample theory, estimating equations, jackknife, bootstrap and permutation.

Prerequisite(s): Admission to a graduate program in Mathematics and Statistics or consent of the Department.

Statistics 723 **3 units; H(3-0)**

Theory of Hypothesis Testing
Likelihood ratio (LR), union-intersection, most powerful, unbiased and invariant tests, Neyman-Pearson Lemma, Karlin-Rubin Theorem, confidence interval (CI), pivotal quantities, shortest length and shortest expected length CI, uniformly most accurate CI, confidence region, simultaneous CI, large-sample tests (Wald's, score, LR tests), Bayesian hypothesis testing, analysis of variance and linear models.

Prerequisite(s): Statistics 721 and admission to a graduate program in Mathematics and Statistics or consent of the Department.

Strategic Studies STST

Instruction offered by members of the Faculty of Arts.

Graduate Courses

Only where appropriate to a student's program may graduate credit be received for courses numbered 500-599.

Strategic Studies 601 **3 units; H(4 months)**

MSS First Term Co-operative Education
Strategic Studies first term co-operative education work placement.

Prerequisite(s): Admission to the co-operative education option of the MSS program.

NOT INCLUDED IN GPA

Strategic Studies 602 **3 units; H(4 months)**

MSS Second Term Co-operative Education
Strategic Studies second term co-operative education work placement.

Prerequisite(s): Admission to the co-operative education option of the MSS program.

Strategic Studies 603 **3 units; H(3-0)**

Questions and Methods
A Block Week introduction to research design and methods in Military and Strategic Studies. Introduces the field, its history, major methodological debates and challenges of interdisciplinary research.

Prerequisite(s): Admission to Military and Strategic Studies graduate program.

NOT INCLUDED IN GPA

Strategic Studies 609 **3 units; H(3-0)**

The Canadian Military in the Second World War
An examination of the political parameters imposed by the Canadian government, the quality of Canadian leadership, and the "fit" between British forms of military organization and the fighting quality of Canadian soldiers, sailors and airmen.

Strategic Studies 611 **3 units; H(3-0)**

Canadian Military Studies
Canadian military studies, excepting the two world wars. Topics will include the evolution of Canadian defence policy, past or present, the development and evolution of the Canadian Forces or any of its main elements (army, navy or air force), Canadian military operability with the military forces of Allied nations, and the relationship between Canadian foreign policy and the use of the Canadian military.

Strategic Studies 613 **3 units; H(3S-0)**

The Canadian Military in the First World War
The development and operational achievements of the Canadian Expeditionary Force, wartime civil-military relations and conscription politics.

Note: Credit for Strategic Studies 613 and History 520 will not be allowed

Strategic Studies 649 **3 units; H(3S-0)**

Special Topics in Military and Strategic Studies
MAY BE REPEATED FOR CREDIT

Strategic Studies 651 **3 units; H(3-0)**

Reading Seminar
Prerequisite(s): Consent of the Graduate Coordinator.

MAY BE REPEATED FOR CREDIT

Strategic Studies 653 **3 units; H(3-0)**

Research Seminar
Prerequisite(s): Consent of the Graduate Coordinator.

MAY BE REPEATED FOR CREDIT

Strategic Studies 655 **3 units; H(3-0)**
(History 655)

Classics of Strategy
Strategic thought from Sun Tzu to Clausewitz, Mahan to Corbett. Analyzes the writings of classic strategic thinkers and then, by way of case studies, examines their theories as they pertain to military and political planners from the Peloponnesian War to the present.

Strategic Studies 657 **3 units; H(3-0)**

Intelligence; Information Operations; and "Command, Control, Communications and Computers"
An assessment of the history of intelligence, information operations, and command systems for military and diplomatic institutions as well as contemporary theory and practice related to these issues.

Strategic Studies 659 **3 units; H(3-0)**

Sea Power
The meaning of sea power and an assessment of how modern states use it. An analysis of the writings of major naval strategic thinkers and case-study examination of the application of those theories from Nelson to the present.

Strategic Studies 662 **3 units; H(3S-0)**

Advanced Studies in Canadian Arctic Security
The Canadian Arctic is an emerging area of concern due to changes scarcely imaginable even a few years ago. Examines the nature of some of these changes – e.g. climate change and the northern seas' dramatically changing ice conditions, growing recognition of the region's resource wealth, and evolving international relations in the circumpolar region – and what they mean for Canadian Arctic Security.

Strategic Studies 663 **3 units; H(3S-0)**

War – Causes and Aftermaths
An examination of the complexity and experience of conflict and war as well as the broader institutions that govern post-conflict recovery and transition in the twentieth and twenty-first centuries. Special attention will be paid to the methodological complexities of studying violence.

Strategic Studies 751 **3 units; H(3-0)**

Reading Seminar
Prerequisite(s): Consent of the Graduate Coordinator.

MAY BE REPEATED FOR CREDIT

Strategic Studies 753 **3 units; H(3-0)**

Research Seminar
Prerequisite(s): Consent of the Graduate Coordinator.

MAY BE REPEATED FOR CREDIT

Strategy and Global Management SGMA

Instruction offered by members of the Haskayne School of Business.

Graduate Courses

Strategy and Global Management 601 **3 units; H(3-0)**
(formerly Strategy and Global Management 701)

Strategic Management I
The role of the CEO and other senior executives in formulating and implementing corporate strategies,

and provides an overview of key strategic issues and topics. Covers such areas as industry analysis, executive leadership, corporate strategy, corporate diversification, strategic change, global strategy, mergers and acquisitions, and strategic implications of new technologies.

Antirequisite(s): Credit for Strategy and Global Management 601 and 701 will not be allowed.

Strategy and Global Management 707
3 units; H(3-0)

Advanced Strategic Management Tools
Re-examination of the main tools used in strategy analysis with a unique triple focus on: 1) inclusion only of tools that are actionable and lead to outcomes with clear management implications; 2) critical assessment of the 'limits' associated with applying each tool (boundary conditions; weaknesses; danger of wrong interpretation of results; unexpected negative spill-over effects; etc.); and 3) discussion of the most recent insights from the scholarly and practitioner oriented literatures, emphasizing dynamics.

Prerequisite(s): Admission to the Doctor of Business Administration program.

Strategy and Global Management 725
3 units; H(3-0)

e-Strategy
The impact of Internet technology on strategic management of large corporations. How the technology influences industry structure and how it drives companies' competitive strategies and their organizational structures and systems. Explores the implications for strategic leadership in organizations.

Corequisite(s): Business Technology Management 725.

Strategy and Global Management 751
3 units; H(3-0)

Strategic Management in the Global Energy Industry
Characteristics of the energy industry. Major strategic issues facing top management teams in corporations involved in oil and gas and power businesses and relevant strategic tools for addressing them. Industry structure, energy value chain, key players and their strategies, industry dynamics and trends, supply and demand, expansion, M&As, roles of governments, OPEC and international politics, Kyoto Protocol, major technological drivers, organization and top management leadership.

Corequisite(s): Strategy and Global Management 601.

Strategy and Global Management 775
3 units; H(3-0)

International Business Environment
The environment which influences international business activities including economic, legal, political and socio-cultural factors. Foreign direct investment in Canada will also be considered.

Strategy and Global Management 789
3 units; H(3S-0)

Seminar in Strategy and Global Management
Study and discussion of current research literature and contemporary issues on topics related to Strategy and Global Management in the private and/or the public sectors.

MAY BE REPEATED FOR CREDIT

Strategy and Global Management 795
3 units; H(3-0)

Strategic Management II
Application of strategic concepts and frameworks of analysis. Decisions and the processes to mobilize resources for the attainment of objectives. Measurement of performance through industry and competitive analysis.

Prerequisite(s): Strategy and Global Management 601 or consent of the Haskayne School of Business.

Strategy and Global Management 796
3 units; H(3-0)

Qualitative Research in Strategy and Organizations
Processes of collecting, analyzing, and reporting qualitative data, as well as inducing theory from them. Application to the area of Strategy and Organizations is emphasized. Focus on various approaches to qualitative research and on developing competence in conducting it.

Prerequisite(s): Consent of the Haskayne School of Business.

Strategy and Global Management 797
3 units; H(3S-0)

Advanced Seminar in Strategy and Global Management
Prerequisite(s): Consent of the Haskayne School of Business.

MAY BE REPEATED FOR CREDIT

Strategy and Global Management 799
3 units; H(3S-0)

Doctoral Seminars in Strategy and Global Management
799.01. Survey of the Field

799.02. Corporate and Competitive Strategy

799.03. Current Topics in Strategic Management

799.04. Business Environment

799.05. Interorganizational Relationships: Creating and Managing Strategic Alliances

Sustainable Energy Development SEDV

Instruction offered by members of the Faculties of Environmental Design, Law, Schulich School of Engineering and the Haskayne School of Business.

Graduate Courses

Sustainable Energy Development 601
3 units; H(3-0)

Energy Systems I: Non-Renewable Energy
Interactions between non-renewable energy resources and the environment; exploration, production and exploitation of energy resources, including conventional and unconventional oil and gas, coal, and nuclear; technical, economic and environmental and policy aspects of production transportation and use of non-renewable energy.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 603
3 units; H(3-0)

Energy Systems II: Renewable Energy
Renewable energy sources, such as: wind, hydro, solar photovoltaic, solar heat collection, geothermal, biomass, cogeneration; system level physical modelling; steady-state turbine operation; introductory thermodynamics; economic tools, such as levelized cost of energy analysis.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 605
3 units; H(3-0)

Indigenous Peoples and Sustainability in Energy Development
In-depth analysis of indigenous peoples and ecological sustainability in relation to energy development. Systems ecology, ecological economics, cultural anthropology, indigenous rights and ethics provide theoretical foundations for sustainable development in global context of indigenous peoples with primary focus on Canadian indigenous peoples. Historical and legal-political context addresses treaties, policy and land-use including duty to consult and accommodate with emphasis on reconciliation.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 607
3 units; H(3-0)

Water Pollution and its Impact on the Energy Sector
Water pollution, water chemistry, water and wastewater quality and quantities, conventional, non-conventional and emerging contaminants, water and wastewater treatment methods, water usage and reuse options, municipal and industrial water treatment, water energy nexus, water requirements and pollution as related to the energy sector.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 609
3 units; H(3-0)

Air Pollution and its Impact on the Energy Sector
Population growth and energy options; meteorological parameters, physical and chemical properties of the atmosphere; nature of pollutants present: anagenetic-made sources; stationary and mobile; generation, methods of control and effects of photochemical smog; global warming; particulates, acid rain gases, carbon monoxide, hydrocarbons and their emission control; pollution monitoring and instrumentation; environmental regulations; tail gas clean-up; health impacts; industrial site selection; pollutant dispersion.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 611
3 units; H(3-0)

Land Pollution and Waste Management in the Energy Sector
Waste management principles and effective practices in the development of energy projects. Causes and consequences of land pollution associated with energy production and management practices and technologies for prevention, mitigation and control of pollution.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 613
3 units; H(3-0)

Energy Systems III: Planning and Energy Economics
Financial principles and evaluation techniques and their application to energy investment planning; assessment methods applied to real-world examples; assessment of foundations in environmental energy economics and policies.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 615
3 units; H(3-0)

Environmental Impact Assessment in the Energy Sector
Principles and professional practice of environmental impact assessment, with application to energy development projects.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 617
3 units; H(3-0)

Human Resource and Management in the Energy Sector
Major concepts and theories of management and organizational dynamics as they impact on the energy sector; Interpersonal effectiveness and self-awareness, motivation, group dynamics, project teams, supportive communication, stress, leadership, power, influence and conflict, organizational culture, processes of change.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 619
3 units; H(3-0)

Environmental Law in the Energy Sector
General legal concepts, administrative law, aspects and sources of environmental law, environmental decision making, international agreements and treaties, and law reform.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 621
3 units; H(3-0)

Environmental Management Tools in the Energy Sector
Environmental management systems and issues are discussed as they relate to organizational and environmental impacts. Topics include: environmental management for both compliance and innovation; management processes including audits, development of indicators and reporting, green product development, risk management.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 623
3 units; H(3-0)

Strategic Environmental Planning for Energy Organizations
The strategy of sustainable development concepts and principles and their application to energy policies and development opportunities for businesses, including stakeholder engagement.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Sustainable Energy Development 631
3 units; H(3-0)

Life Cycle Assessment in the Energy Sector
The concept of life cycle assessment (LCA) as it applies to energy production and consumption from an environmental and sustainability perspective; Use of LCA to support informed decision-making for improved environmental performance of energy projects and for avoiding problem-shifting and sub-optimization.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

Antirequisite(s): Credit for Sustainable Energy Development 631 and Sustainable Energy Development 699.03 will not be allowed.

Sustainable Energy Development 640
1.5 units; Q(1.5-0)

Capstone Project I: Research Design
Identification of potential capstone project research questions that are anchored in energy, environment and one other aspect of the student's choice; development of research designs and skills to determine the feasibility of investigating potential research questions, narrowing options, and advancing the best option into a short proposal.

Prerequisite(s): Admission to the Sustainable Energy Development Program.

Antirequisite(s): Credit for Sustainable Energy Development 640 and Sustainable Energy Development 625 will not be allowed.

NOT INCLUDED IN GPA

Sustainable Energy Development 641
0.75 units; E(0.75-0)

Capstone Project II: Proposal Development
Writing a comprehensive proposal designed to answer a research question. Seeking approval from a supervisor with expertise on the chosen topic, with guidance from the course instructor. Verbally presenting the research question and convincing the audience of its importance. Continuing investigation of the research question with progress reports submitted to both the supervisor and the course instructor.

Prerequisite(s): Admission to the Sustainable Energy Development Program and Sustainable Energy Development 640.

Antirequisite(s): Credit for Sustainable Energy Development 641 and Sustainable Energy Development 625 will not be allowed.

NOT INCLUDED IN GPA

Sustainable Energy Development 642
0.75 units; E(0.75-0)

Capstone Project III: Research Exploration and Examination
Exploring the research question through an in-depth literature review, data collection, and analyses of the aspects of energy, environment, and one other aspect. Completion and submission of a professionally prepared final report that explains the investigation and findings. Presentation of findings.

Prerequisite(s): Admission to the Sustainable Energy Development Program and Sustainable Energy Development 641.

Antirequisite(s): Credit for Sustainable Energy Development 642 and Sustainable Energy Development 625 will not be allowed.

NOT INCLUDED IN GPA

Sustainable Energy Development 699
3 units; H(3-0)

Topics in Energy and the Environment
Study of selected topics related to energy and the environment and related subjects. Specific course(s) will reflect changing needs and faculty interests.

Prerequisite(s): Admission to the Sustainable Energy Development Program or consent of the Program.

MAY BE REPEATED FOR CREDIT

University UNIV

Instruction offered by the University and individual Faculties depending on the topic(s) being covered.

Graduate Courses

University 601 **3 units; H(3-0)**

Ethics of Research with Human Subjects
A multidisciplinary course addressing issues in research with human subjects. Topics include theoretical approaches to understanding ethics, respect for persons, benefit and harm, confidentiality and publication, and selection of research subjects. Taught by a multidisciplinary team with very broad experience on research ethics boards.

Prerequisite(s): Consent of the Course Co-ordinator.

University 611 **3 units; H(3-0)**

Special Topics in Sustainability
611.01. Introduction to Sustainable Development

611.02. Theoretical Basis for Interdisciplinary Intervention and Design

MAY BE REPEATED FOR CREDIT

University 613 **3 units; H(0-8)**

Introduction to Interdisciplinary Design Practice

University 615 **3 units; H(0-8)**

Advanced Interdisciplinary Design Practice
Prerequisite(s): University UNIV 611.01.

Veterinary Medicine VETM

Graduate Courses

The following courses are delivered through the Veterinary Medical Sciences Graduate Program. Enrolment in these courses is not open to DVM students. Please consult the Graduate Studies calendar for additional details and requirements for students in other graduate programs.

Veterinary Medicine 601 **3 units; H(3-0)**

Professional Skills in Health Science Research
Includes a series of workshops focusing on skills essential for success in health science research. Topics include: Research Integrity; Ethics; Grants and Grant Writing; Verbal and Written Communication of Research Findings; Career Development; and Career Options in the Health Sciences.

Prerequisite(s): Consent of the Faculty.

NOT INCLUDED IN GPA

Veterinary Medicine 603 (Biology 603) **3 units; H(3-1)**

Biology of Laboratory Animals
Based on the Canadian Council on Animal Care Syllabus "Basic Principles of Laboratory Animal Science for Research Scientists." In addition to

the study of common, research, farm and exotic animals, topics to be covered include ethical considerations, regulation and legislation, animal models, animal facilities and husbandry, hazard control, surgery, anaesthesiology, euthanasia and post-mortem examinations. Practical sessions will provide experience in handling and restraint of specific laboratory animals, injections, blood collection, anaesthesiology and surgery.

Note: Enrolment in this course is restricted in the first instance to graduate students who will do research utilizing animals.

Veterinary Medicine 605 3 units; H(3-1T)
(Community Health Sciences 605)

Introduction to Biostatistical Methods
Analysis and design of research related to biological sciences. Emphasis is placed upon formulating good research questions, evaluating the appropriateness of different statistical methods for analyzing results, and performing and interpreting such statistical analyses. Statistical analyses will be carried out using modern statistical software.

Prerequisite(s): Consent of the Faculty.

Veterinary Medicine 610 3 units; H(3-2T)
(Community Health Sciences 610)

Biostatistics I: Essentials of Biostatistics
Introduces the fundamental concepts of summarizing data and statistical inference, including graphical displays, hypothesis testing, p-values, and confidence intervals. Specific topics include comparisons of means and proportions, non-parametric tests, correlation and regression, confounding, sample size determination, and power calculations. Additional topics include a brief introduction to analysis of variance and covariance, logistic regression, and analysis of time-to-event data. Students gain hands-on experience analysing data using STATA statistical software. Although this course uses STATA exclusively, much of the technical knowledge and some of the computing techniques are applicable to any statistical package.

Prerequisite(s): Admission to the Veterinary Medical Sciences graduate program.

Veterinary Medicine 611 3 units; H(3-2T)
(Community Health Sciences 611)

Biostatistics II: Models for Health Outcomes
Extends the fundamental concepts to modelling health outcomes using modern regression analysis techniques. Logistic and linear regressions, and their extensions, are covered in detail. The rationale, formulation, and statistical assumptions underlying each regression technique are discussed. Methods for selecting and assessing models are included. Additional topics include a brief introduction to models used in the analysis of repeated measures, longitudinal studies, and time-to-event data.

Prerequisite(s): Veterinary Medical Sciences 610.

Veterinary Medicine 640 3 units; H(3-2T)
(Community Health Sciences 640)

Fundamentals of Epidemiology
Principles and methods of descriptive and analytic epidemiology. Emphasizes the underlying concepts and approaches of epidemiological research and critical appraisal of epidemiologic studies including: observational study designs and their vulnerabilities to bias, measures of frequency and association, basic methods for addressing sampling variability, confounding, and effect modification. Concepts related to causal judgment in epidemiology are also introduced.

Prerequisite(s): Admission to the Veterinary Medical Sciences graduate program or consent of the Faculty.

Corequisite(s): Veterinary Medicine 610

Note: Not available to Open Studies students

Veterinary Medicine 690 3 units; H(3-0)

Directed Study
Lectures, seminars, term papers and/or other training directed to one or only a few students in theoretical and/or laboratory methods at the advanced level in veterinary medical sciences. These courses are offered when no other suitable alternatives are available.

Prerequisite(s): Consent of the Faculty.

Note: An approval form may be obtained from the Office of Research and Graduate Education, and must be signed by the VMS Graduate Program Director before a student can register.

MAY BE REPEATED FOR CREDIT

Veterinary Medicine 701 3 units; H(3-0)

Advanced Topics in Reproductive Health
A series of topics, ranging from basic sciences to clinical topics (including ethical issues) to increase awareness and comprehension regarding current issues in reproductive health.

Prerequisite(s): Research interest in reproductive health/reproductive biology. Consent of course coordinator and student's supervisor, if applicable.

Veterinary Medicine 702 3 units; H(3-0)

Advanced Topics in Stem Cell Biology and Regenerative Medicine
Provides a comprehensive overview of stem cell biology in the context of embryonic development and adult tissue maintenance. Students will gain an appreciation for embryonic versus adult stem cells and how these pluripotent or multipotent cells may be utilized in regenerative medicine (i.e. treatment of congenital defects, diseases or injury).

Prerequisite(s): Students not enrolled in the VMS graduate program will require consent of the instructor.

Veterinary Medicine 721 3 units; H(3-0)

Wildlife Parasitology: Principles and Techniques
Students will learn about the ecology of parasites in wildlife populations with emphasis on impacts of parasitism, invasive species, and conservation issues. This is taught through a series of seminars, critical evaluation and discussion of the literature, and independent and group projects. Laboratory sessions include on parasitology techniques for surveillance and research.

Prerequisite(s): Consent of the instructor.

Note: This course may not be offered every year. Please contact vmgrad@ucalgary.ca for information.

Veterinary Medicine 740 3 units; H(3-2T)
(Community Health Sciences 740)

Advanced Epidemiology
An expansion on the understanding of causality and threats to validity in epidemiologic research. The focus will be on the assessment and control of bias, including selection, information and confounding. The concept of effect modification (interaction) will be appraised. Stratified analysis will be considered as a tool for the assessment and control of confounding and effect modification and will be applied to a variety of study designs including case-control, and cohort studies.

Prerequisite(s): Veterinary Medical Sciences 640 or consent of the Faculty.

Zoology ZOOL

Instruction offered by members of the Department of Biological Sciences in the Faculty of Science.

Graduate Course

Zoology 697 3 units; H(3-1T)

Advanced Topics in Comparative Endocrinology
The principles of endocrinology will be provided through the lecture component of Zoology 597, and this will be augmented with additional reading, term papers and seminars in comparative endocrinology.

Prerequisite(s): Zoology 463.

Antirequisite(s): Credit for Zoology 697 and 597 will not be allowed.

Student and Campus Services

Student and Enrolment Services

Enhancing the Student Experience

Student and Enrolment Services (SES) is committed to fostering a community that values student engagement, challenges students to explore their potential and supports each student's success through the provision of best practice services and programs that enhance the student experience in support of the Eyes High strategy of the University of Calgary.

Contact Information:

Vice-Provost (Student Experience): Susan Barker

Telephone: 403.220.6580

Email: vpse@ucalgary.ca

Location: MacKimmie Block 137

Registrar: Angelique Saweczko

Telephone: 403.220.3833

Email: registrar@ucalgary.ca

Location: MacKimmie Block 124

Senior Director, Student Services: Jennifer Quin, BA, MSc

Telephone: 403.210-6300

Location: MacEwan Student Centre, 293

Director, SU Wellness Centre: Debbie Bruckner

Telephone: 403.210.8904

Location: MacEwan Student Centre, 370

Website: ucalgary.ca/ses/

Career Services

Programs and services at Career Services include one-to-one career development and education, career workshops, access to full-time, summer, part-time and co-op or internship positions.

Telephone: 403.220.8020

Fax: 403.282.8342

Recruiting: recruit@ucalgary.ca

Student inquiries: csstdnt@ucalgary.ca

Location: MacEwan Student Centre 188

Website: ucalgary.ca/careers

Enrolment Services

Enrolment Services assists students in carrying out a variety of administrative functions at the University of Calgary. Enrolment Services provides services over the phone, online (via MyUofC online Student Centre) and in-person in the following areas: prospective student inquiry, admissions, student awards, course registration support, financial aid and student fees.

Contact Information:

Telephone: 1.403.210.7625*

Fax: 1.403.289.1253

Location: MacKimmie Block 117

Website: ucalgary.ca/registrar

Hours of Operation: Monday to Friday - 09:00-16:00, and Thursday - 10:00 - 16:00**

**Limited information and service can be provided on the phone due to the Freedom of Information and Protection of Privacy Act legislation.*

***Enrolment Services may stop generating tickets prior to 4:00 depending on service demands.*

Enrolment Services may experience temporary closures throughout the year for staff training and professional development. For current updates on closures and wait times please visit: ucalgary.ca/currentstudents/.

Faith and Spirituality Centre

The Faith and Spirituality Centre (FSC) is a religious positive space that is open to engaging all viewpoints, regardless of belief, tradition, or spiritual outlook and including those that are questioning or seeking.

Telephone: 403.220.5451

Email: artuliss@ucalgary.ca

Location: MacEwan Student Centre 373

Website: ucalgary.ca/fsc

International Recruitment and Admissions

Prospective Graduate students: graduate@ucalgary.ca

Location: Earth Sciences, Room 1010

Website: grad.ucalgary.ca

International Student Services

Ricky Ramdhaney, Manager International Student Services

International Student Services (ISS) provides support services and customized advising for all international students adjusting to studying at the University of Calgary and to life in Canada. Our leadership initiatives develop, design and deliver unique peer-driven programs that connect international and Canadian students.

Telephone: 403.220.5581

Fax: 403.289.4409

Email: international.advice@ucalgary.ca

Location: MacEwan Student Centre 275

Website: ucalgary.ca/iss/

Leadership and Student Engagement

Leadership and Student Engagement (LSE) is dedicated to providing all University of Calgary students with the opportunity to develop their leadership identities. We provide a well-rounded university experience from first-year through to graduation.

Telephone: 403.210.5824

Fax: 403.210.9877

Location: MacEwan Student Centre 293

Website: ucalgary.ca/leadership

Native Centre

The University of Calgary welcomes, respects, and supports the rich diversity of Aboriginal learners, their communities, cultural traditions, and aspirations in post-secondary education. The Native Centre provides academic, personal, and cultural support to prospective and current First Nations, Métis, and Inuit students. Through student engagement and cultural events, the Native Centre also strives to create a welcome, inclusive, and inter-cultural educational environment for the whole campus community.

Telephone: 403.220.6034

Fax: 403.220.6019

Location Room 390z MacEwan Student Centre

Website: ucalgary.ca/nativecentre

Scholars Academy Program

Co-ordinator: Jessica Cohen, PhD

The Scholars Academy provides talented students with the privilege of developmental

opportunities that enhance their eligibility for prestigious scholarships and graduate/professional programs. Admission to the Scholars Academy requires students to be at the top of their class academically (minimum 3.60 CGPA). Students are also chosen based on a demonstrated ability to make the most of offered opportunities and their commitment/involvement in the community.

Telephone: 403.220.2625

Email: sap@ucalgary.ca

Website: ucalgary.ca/sap

Student Accessibility Services

Manager: Johanne Tottle, PhD

The Student Accessibility Services works collaboratively and innovatively with the campus community to create an accessible, equitable and supportive learning and living environment that enhances each student's academic and personal development.

Telephone: 403.220.8237

Fax: 403.210.1063

TTY: 403.220.2823

Email: access@ucalgary.ca

Location: MacEwan Student Centre 452

Website: ucalgary.ca/access

Student Ombuds Office

The Student Ombuds Office offers a safe place for undergraduate and graduate students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.

For an appointment with the Student Ombuds, please send your request via email, call, or book an appointment online.

Telephone: 403.220.6420

Email: ombuds@ucalgary.ca

Website: http://ucalgary.ca/ombuds/

Student Success Centre

Director: Roxanne Ross, BA, MA

The Student Success Centre provides services and programs to undergraduate, graduate, international or open studies students. Our advisors, learning support staff, and writing support staff are here to assist you in enhancing your skills and achieving your academic goals.

Telephone: 403.220.5881

Fax: 403.220.0190

Location: Taylor Family Digital Library, 3rd Floor

Website: ucalgary.ca/ssc

SU Wellness Centre

Senior Director, Student Wellness, Access and Support: Debbie Bruckner

The SU Wellness Centre feels we all have a role to play in creating a healthy campus community, which is about working collaboratively to create a campus environment where students, faculty and staff feel empowered to support each other and participate actively in maintaining their own health and well-being. With a student-centred approach, we offer comprehensive, holistic and accessible programs and services to foster all dimensions of wellness.

Mental Health Services

Programs and services at the Wellness Centre include individual counselling and relationship support; online self-help; educational success strategies and career decisions. Whether you are a successful student looking to brush up on your skills, are concerned about a friend, or in crisis, the Wellness Centre can help you identify ways to improve your well-being and achieve your goals.

Telephone: 403.210.9355, Option #2

Fax: 403.284.0069

Location: MacEwan Student Centre 370

Website: https://ucalgary.ca/wellnesscentre/services/mental-health-services

Peer Support and Health Promotion

Building resiliency and capacity by offering innovative events and programs to promote wellness in mind, body and spirit through peer support, training and workshops.

Telephone: 403.220.7011

Email: communityhub@ucalgary.ca

Location: Campus Community Hub Yamnuska Hall YA S005

Website: https://www.ucalgary.ca/wellnesscentre/hub

Health Services

Promoting and monitoring physical wellness for students and their dependents through access to medical, chiropractic, massage and nutrition services. In addition, our Student Medical Response Team is a 100% student volunteer run and organized team with the goal of providing qualified, and skilled pre-hospital emergency medical care to eligible University of Calgary community events.

Telephone: 403.210.9355, Option #3

Fax: 403.282.5218

Location: MacEwan Student Centre 370

Website: https://www.ucalgary.ca/wellnesscentre/services/health

Student Support and Outreach

Support and outreach to students to address immediate and ongoing mental health needs. A multi-disciplinary team provides mental health information, referrals, help in developing personal coping strategies and response for reported students-at-risk.

Telephone: 403.220.9355, #2 for Counselling

Fax: 403.282.5218

Location: MacEwan Student Centre 373

Website: ucalgary.ca/wellnesscentre/services/studentsupport

Women's Resource Centre

Co-ordinator: Nanako Furuyama

The Women's Resource Centre provides a safe and supportive place to advance gender equality and build community where all experiences are valued, and everyone is offered the resources necessary to make informed choices.

Telephone: 403.220.8551

Fax: 403.210.7970

Email: women@ucalgary.ca

Location: MacEwan Student Centre 482

Website: ucalgary.ca/women/

Hours: Monday to Friday, 8:30 a.m. – 4:30 p.m.

Active Living

As a University of Calgary student, you are automatically an 'all-access' member of one of Calgary's largest and most complete recreation facility. Students can also purchase family memberships at special student rates. Community members, alumni and staff are also welcome to become members.

Our facilities include a Fitness Centre, Racquet Centre, Aquatic Centre, Gymnastics Centre, and Outdoor Centre. Active Living offers a wide variety of programs from health and wellness, to recreation programs and certifications.

Look for Active Living and Outdoor Centre Program Guides in display racks located around campus.

Telephone: 403.220.7749 or 403.220.5029

Location: Kinesiology Complex

Website: ucalgary.ca/activeliving

Bookstore

The University of Calgary Bookstore is where you'll find textbooks and other course materials, Dinos gear and merchandise, books for leisure reading, gift items, school supplies and a full-service Starbucks to help you refuel any time of day.

Telephone: 403.220.5937

Email: bkstore@ucalgary.ca

Location: First floor, MacEwan Student Centre, 424 Collegiate Blvd. N.W.

Website: calgarybookstore.ca

Hours of operation: Monday to Friday, 9:00 a.m. to 6:00 p.m., Saturday: 10:00 a.m. to 5:00 p.m.

All Bookstore proceeds stay on campus; supporting student programming, academic, and research initiatives.

Campus Security

Campus Security is dedicated to maintaining the campus as a safe and pleasant place to live, work and study. Officers are on duty 24 hours a day, year round, to respond to your security and emergency needs. Campus Security, in partnership with the Students' Union, provides a Safewalk service to any location on campus including the LRT, parking lots, bus zones and campus housing. Campus Security can be contacted from any of the "Help" phones located around campus.

Telephone: 403.220.5333

Fax: 403.282.2765

Location: MacEwan Student Centre, Room 260

Website: ucalgary.ca/security

Conference and Event Management

Centrally managing over 42,000 square feet of bookable classroom, boardroom, conference, and event space, 141 lecture theatres and more than 200 hectares of beautiful, park-like outdoor space, the Conference and Event Management (CEM) team is sure to find a creative solution for your event. Whether you need to arrange a multi-day conference, a business luncheon or a social event, our CEM staff will take care of all essential details.

Telephone: 403.220.3111

Email: mse@ucalgary.ca

Location: 169 University Gate N.W.

Website: ucalgary.ca/cem/

Office hours: Monday to Friday: 8:30 a.m. to 4:30 p.m.

All Conference and Event Management proceeds stay on campus; supporting student programming, academic, and research initiatives.

Dinos Athletics (The Interuniversity Athletic Program)

Dinos Athletics is a full member of the Canada West Universities Athletic Association. Canada West is one of the most competitive conferences in Canadian Interuniversity Sport (CIS). The Dinos compete in Canada West conference league sports including basketball, field hockey, football, ice hockey, rugby, soccer, and volleyball and in Canada West tournament sports including cross-country, swimming, track and field, and wrestling. All undergraduate and graduate students are admitted free of charge to all regular season games upon presentation of proper I.D.

Telephone: 403.220.6803

Email: goDinos@ucalgary.ca

Location: Kinesiology Complex A 147

Website: goDinos.com

Environment, Health and Safety

The University of Calgary is committed to providing a safe and healthy environment for students in which to learn. The EH&S Department provides leadership in the implementation of the University's Occupational Health and Safety and Environmental Management Systems, including WHMIS (Workplace Hazardous Materials Information System), radiation safety, and biohazardous materials. The EH&S website provides information on legislation; policies and procedures; safety courses and online registration; as well as other health and safety related information and guidance.

Telephone: 403.220.6345

Website: ucalgary.ca/safety

Food Services

University of Calgary Food Services oversees the food services operator, select retail outlets and catering on campus. The Dining Centre and 19 other food retailers across campus provides the campus community a variety of healthy choices.

Meal plans are managed by Food Services, in co-ordination with the Unicard office. Meal plans are available to anyone who has a Unicard. The cards are also loadable on an ad-hoc basis and can serve as a simple way to purchase food on campus (ucalgary.ca/unicard/use-unicard).

Telephone: 403.220.5541

Email: food.services@ucalgary.ca

Location: DC 18B, 2500 University Drive N.W.

Website: ucalgary.ca/ancillaryservices/foodservices

Hours of operation: Monday to Friday: 8:30 a.m. to 4:30 p.m.

All Food Services proceeds stay on campus; supporting student programming, academic, and research initiatives.

Hotel Alma

Hotel Alma treats guests to gracious service, affordable accommodations (special rates for staff and visiting families of students) and a host of meeting spaces. Accommodations include one, two and three bedroom apartments as well as traditional dormitory rooms and can accommodate groups of up to 1,122 people. Through the fall and winter season (late August through April), Seasonal Residence provides two bedroom, short-term residences to teams, student groups, exchange students, etc.

Telephone: 403.220.3203

Email: stay@hotelalma.ca

Location: 169 University Gate N.W.

Website: hotelalma.ca

Hours: 24-hours-a-day, seven-days-a-week

All Hotel Alma proceeds stay on campus; supporting student programming, academic, and research initiatives.

Information Technologies

The Information Technologies (IT) department provides computing and media services in support of learning, teaching, research, and administration at the University of Calgary.

IT supports many online services that students will utilize throughout their academic learning experience at the University of Calgary. For more information on IT services, visit ucalgary.ca/it/service-catalogue-list.

Telephone: 403.220.5555 or 888.342.3802

Email: itsupport@ucalgary.ca

Twitter: @UCalgary_IT

Location: 7th Floor, Mathematical Sciences Building

Website: ucalgary.ca/it

Libraries and Cultural Resources

Libraries and Cultural Resources (LCR) operates eight University of Calgary libraries on campus and across the city. Included in LCR are two art galleries: the Nickle Galleries and the Founders' Gallery at The Military Museums, as well as Archives and Special Collections, the University of Calgary Copyright Office, Research Data Centre and the University of Calgary Press.

For more information, refer to: lcr.ucalgary.ca/.

Parking and Transportation Services

Parking and Transportation Services is your one-stop shop for all of your parking and transportation needs at the University of Calgary.

Telephone: 403.220.6772

Email: parking@ucalgary.ca

Location: Olympic Volunteer Centre (OVC), 1833 Crowchild Trail N.W.

Website: ucalgary.ca/parking

Hours of operation: Monday to Friday: 7:30 a.m. to 5:00 p.m.

All Parking and Transportation Services proceeds stay on campus; supporting student programming, academic, and research initiatives.

Residence Services

Residence Services provides quality accommodations and programs, which enhance the student experience, support academic success and foster leadership development.

Student Housing

Residence buildings offer a variety of accommodation styles, including traditional dormitory (for first-year), studios, one-bedrooms, two bedrooms and four bedroom apartments, as well as two and three bedroom suite-style buildings. Housing options transition with students as they progress through their university experience. All buildings have an academic lounge where students can study or attend tutoring sessions and a recreational lounge to relax with friends.

Telephone: 403.220.3210

Email: residence@ucalgary.ca

Location: DC01, 124 University Gate N.W.

Website: ucalgary.ca/residence

Hours of operation: Monday to Friday 8:00 a.m. to 8:00 p.m., Saturday 10:00 a.m. to 3:00 p.m., Sundays and Holidays 10:00 a.m. to 3:00 p.m.

Student-Family Housing

Student-family housing consists of 250 townhouses, arranged in a garden court setting specially designed for students with families. In addition to the facilities offered, Residence Education Staff facilitate programs and services to meet family members' needs, including community barbecues, summer camps, ESL conversa-

tion groups, and the Jenna Chang Children's Resource Library.

Telephone: 403.220.7227

Email: family.housing@ucalgary.ca

Location: 3735 - 32 Avenue N.W.

Website: ucalgary.ca/residence

All Residence Services proceeds stay on campus; supporting student programming, academic, and research initiatives.

Student Legal Assistance (SLA)

Executive Director: Michelle Christopher

Student Legal Assistance (SLA) is the on-campus law clinic staffed by U of C law students who, with the assistance of volunteer advising lawyers, provide free representation and legal assistance to U of C students and needy Calgary and area residents who are unable to afford a lawyer. SLA provides services throughout the year in civil, criminal and family law matters, with evening clinics during the academic year and daytime clinics during the summer months.

Telephone: 403.220.6637

Location: 3390 Murray Fraser Hall

Website: slacalgary.ca/

Study Abroad Office/ International Learning

Students are encouraged to include an "international experience" in their time at university. This may include Study Abroad in credit programs such as student exchange programs with partner universities; group study programs led by University of Calgary professors; term abroad programs; research projects; practica, internships and co-operative education abroad; independent study approved for a Letter of Permission. It may also include approved volunteering abroad or non-credit experience abroad.

Telephone: 403.220.5581

Fax: 403.289.4409

Email: study.abroad@ucalgary.ca

Location: MacEwan Student Centre, Room 275 (CISSA)

Website: ucalgary.ca/uci/abroad

Taylor Institute for Teaching and Learning

The Taylor Institute for Teaching and Learning is dedicated to better understanding and improving student learning. The Taylor Institute brings together teaching development, teaching and learning research, and undergraduate inquiry learning under one roof.

Telephone: 403.220.4949

Fax: 403.282.0730

Email: taylorinstitute@ucalgary.ca

Location: Taylor Institute for Teaching and Learning, 434 Collegiate Blvd.

Website: ucalgary.ca/taylorinstitute/

Unicard Office

The Unicard is a multi-purpose campus card for all students, staff and faculty, and is the official University of Calgary identification and access card. It can also be used to check out books at the library, to access the gym and athletic facilities and as a debit card for purchasing products and services on campus ranging from meals and Bookstore merchandise to printing and photocopying.

Telephone: 403.220.7290

Email: unicard@ucalgary.ca

Location: Dining Centre 018, 124 University Gate N.W.

Website: ucalgary.ca/unicard

Hours of operation: Monday to Friday: 8:30 a.m. to 4:30 p.m.

All Unicard proceeds stay on campus; supporting student programming, academic, and research initiatives.

University Child Care Centre (UCCC)

The University Child Care Centre Society currently has two locations at the U of C: one located on Main Campus between Scurfield Hall and the Biological Sciences Building and the other on West Campus, across from the Alberta Children's Hospital. Both of our centres are licensed, monitored and regulated by both Alberta Human Services Child development branch and Alberta Environmental Health.

Email: waitlist@ucalgary.ca

Website: ucalgary.ca/uccc

Hours of Operation: 7:30 a.m. to 5:30 p.m., Monday through Friday.

University Theatre Services

University Theatre Services (UTS) is a support service department within the Faculty of Arts, with a primary function to support the academic programs of the departments in the Faculty. UTS also provides a wide variety of production, publicity, box-office and management support services to all users of the University Theatre, the Rozsa Centre including the Eckhardt-Gramatté Hall, the Boris Roubakine Recital Hall and the Reeve Theatre, including both on campus and off campus customers. The Rozsa Centre also provides complete facilities for small conferences and meetings.

For more information visit our website at: scpa.ucalgary.ca/theatre-services/welcome-theatre-services.

About the University of Calgary

The University of Calgary is a co-educational, non-denominational government supported institution possessing the right of conferring degrees, other than degrees in Divinity, within the Province of Alberta. It is a member of the Association of Commonwealth Universities and of Universities Canada.

The University of Calgary is Canada's leading next-generation university – a living, growing and youthful institution that embraces change and opportunity with a can-do attitude. Located in the nation's most enterprising city, the university is making tremendous progress on our journey to become one of Canada's top five research institutions, grounded in innovative learning and teaching and fully integrated with the community of Calgary.

As a comprehensive academic and research institution, the University of Calgary inspires and supports discovery, creativity and innovation across all disciplines. Through the Taylor Institute for Teaching and Learning, opening in Spring 2016, the university will take the lead in educational innovation by researching the most effective methods for engaging students, by supporting faculty to be the best teachers they can be and by providing some of the most innovative learning spaces available anywhere in North America.

The University of Calgary attracts and nurtures the talent that drives new knowledge creation, improves lives and betters our world. In this rich learning environment, the university serves over 31,000 students in more than 200 undergraduate, graduate and professional degree programs, and provides the community with diverse lifelong learning opportunities. International study, volunteer, work, and research programs provide global context while promoting diversity and excellence in learning, teaching and research.

The University of Calgary stands out among Canadian universities in how it actively engages students in leadership development in all areas – the arts, athletics, science, medicine, engineering, volunteerism and business. It is also a leader in sustainability with its set of values embraced by the campus through teaching, leadership and campus operations.

Research and Education

As a member of the U15 leading research-intensive universities in Canada, the University of Calgary is ranked one of the Top 10 research universities in the country. As a comprehensive research institution, the university houses 73 Canada Research Chairs and more than 50 research institutes and centres working to find solutions to some of the most challenging problems facing society today. It has over 1,800 academic staff actively engaged in research, scholarship and teaching in Canada and around the world.

Innovation, discovery and learning are at the heart of all that we do. Our relentless pursuit of quality in our teaching and research programs is guided by our mission to contribute to the well-being of the people of Alberta, Canada and the world. Research brings significant benefits provincially, nationally and internationally, and is the foundation of Alberta's economic and social vitality. Interdisciplinary research is core to the university's teaching and research mandate.

The university offers a high quality undergraduate education that is characterized by the synthesis of research, teaching and learning. We mean to enhance the undergraduate learners' experience by using a student-centred focus that maximizes opportunities to provide a distinctive learning experience that fully integrates the features of a research university. The university is broadening opportunities for students to take inquiry-based courses that lead to greater critical thinking skills, increased exposure to undergraduate research and greater access to leading edge scholars. International study, volunteer, work, and research programs give graduates global context while promoting diversity and innovation in teaching and research.

Students at the University of Calgary are officially recognized for their involvement in campus activities outside of the classroom. The co-curricular record is an initiative that encourages and fosters a campus culture of volunteerism and community involvement amongst its students.

The University of Calgary stands out among Canadian universities in how it actively engages students in leadership development in all areas – the arts, athletics, science, medicine, engineering, volunteerism and business. It is also a leader in sustainability – living a set of values embraced by the campus through teaching, leadership, and campus operations.

Our efforts are to raise our global profile, enhance the quality of our undergraduate and graduate programs, promote innovation and excellence in scholarly activity and provide significant returns and tangible benefits to our community and economy.

Facilities

The MacEwan Student Centre is a hub of activity at the university. There is also a museum and art gallery, four performance theatres, two childcare centres and residences for single students and students with families. The university recently expanded the Engineering Complex and created new residences.

The Cumming School of Medicine and the Faculty of Veterinary Medicine are located on the south campus adjacent to the Foothills Hospital. Satellite institutes of the university include the Kananaskis Biogeoscience Institute, located a short drive from the city on the eastern slopes of the Rocky Mountains, the Rothney Astrophysical Observatory, located in the foothills south of the city, and a campus in Doha, Qatar, offering internationally accredited nursing degrees to students in the Middle East. Development of the university's west campus is currently taking place, and is the site of the Alberta Children's Hospital.

The University of Calgary features some of the finest athletic facilities in the country. The Olympic Oval is an international speedskating facility and houses the Canadian Sport Institute, a high-performance training centre and two Olympic-sized rinks where the reigning women's gold-medal hockey team trains. There are also tennis courts, a triple gymnasium, a yoga studio, an Olympic-size swimming pool, weight rooms, jogging tracks, an Outdoor Centre offering equipment rentals, courses and instruction, and a huge indoor climbing wall. Nearby is the home of the Dinos football team, McMahon Stadium.

Governance

The University of Calgary has two governing bodies:

The Board of Governors is the corporate body charged with the management and control of the University, its property, revenue, business and affairs.

The General Faculties Council (GFC) is responsible for the academic affairs of the

university, subject to the authority of the Board of Governors.

Each faculty has a Faculty Council empowered to determine the faculty's programs of study, conduct examinations, provide for the admission of students, determine conditions for withdrawal, and to authorize the granting of degrees, subject to conditions imposed by the General Faculties Council.

The Students' Union and the Graduate Students' Association provide for the administration of the affairs of students and the promotion of their general welfare.

More information can be found at: ucalgary.ca/secretariat.

Logo/Coat of Arms

The University of Calgary combines the best of long-established university tradition with Calgary's frontier spirit of originality and innovation.

Our logo was designed to reflect bold thinking and a connection with the origins of Calgary. The logo has two components: the crest and the wordmark. The crest represents and respects our historical heraldry while the more contemporary wordmark reflects our focus on the future.

The university also has an official Coat of Arms, which represents and respects our historical roots.

The Coat of Arms consists of a shield, an escroll containing the motto and the wordmark in vertical format.

The shield consists of two parts, the upper part (the chief) separated from the lower (the base) by an arched line symbolizing the Chinook arch. The ground colour of the chief is scarlet, commemorating the North West Mounted Police under whose influence Western Canada was settled. Upon this colour is a pair of open books bound in gold. Between the books is a white rose, symbolic of Alberta. The ground colour of the base is gold, indicative of golden sunshine or golden grain. Upon this is a black bull's head with red horns and crossed staves bearing red flags, reminiscent of the family crest of Lt. Col. J.F. Macleod, the NWMP officer who founded Fort Calgary.

Below the shield, printed on an escroll, is the university's motto, "Mo shuile togam suas" (translated as "I will lift up mine eyes"), rendered in Gaelic uncial letters. The scroll is white; the draped ends are red. They were granted to the university in 1966 by Lord Lyon King of Arms at Edinburgh.

Official Colours

The university has two official colours: red and gold.

Tartan

The University of Calgary has an official tartan that incorporates the university's official colours of red and gold in its design. It was designed by Jim Odell, a University of Calgary Education and Fine Arts graduate and accredited in a 2001 ceremony presided over by Duncan Paisley of Westerlea, President of the Scottish Tartans Society and director of the Register of All Publicly Known Tartans.

The Mace

Certain formal occasions involve the use of special regalia, the significance of which is now symbolic but most of which has practical origins. In early times the mace was used first as a weapon to protect and second as a symbol of authority.

The mace carried into Convocation is a symbol of the authority of the Chancellor. It represents the Crown and the authority vested in the Chancellor to grant degrees. It is always carried in front of the Chancellor at Convocation. One interesting tradition in the use of maces is that if the real authority (the Queen) was present in person, the mace would be inverted.

Administration and Governance

For information about senior administration and administrative departments, please visit: ucalgary.ca/secretariat.

Historical Highlights

Historical Highlights For more, see: ucalgary.ca/about/our-story/our-history.

1922

- Calgary Normal School (formerly Alberta Normal School) relocates onto the Institute of Technology and Art campus (now SAIT).

1945

- The Normal School becomes a southern extension of the University of Alberta Faculty of Education.

1946

- Citizens form the Calgary University Committee.

1947

- The Calgary Branch of the University of Alberta offers the first two years of a Bachelor of Education degree. A.L. Doucette is appointed the first director. Land is set aside in Houndsfield Heights for an eventual university.

1950

- The Board of Governors at the University of Alberta sells all land south of 24th Avenue because the Calgary Branch of the University of Alberta would never grow large enough to use it.

1951

- First years of the BA and BSc are offered.

1953

- First year of BComm is offered.

1957

- The name changes to University of Alberta in Calgary (UAC). By now the first years of the BSc (Eng) and BPE are offered.

1958

- Sod-turning for the present campus. The Department of Public Works begins levelling the land.

1960

- The new campus opens with two new buildings, Arts and Science A. McMahon Stadium opens. M.G. Taylor is appointed principal.

1961

- The name changes to University of Alberta, Calgary. The first physical education building opens.

1962

- The 80-acre research park is designated. Campus patrol arrives. Full degree study is offered.

1963

- Students begin a drive for autonomy from the University of Alberta.

1964

- H.S. Armstrong is appointed President. Name changes to University of Alberta at Calgary. The football Dinos begin to play.

1965

- On May 1 UAC is granted academic and financial autonomy. The residence complex, Calgary Hall (now Craigie Hall), Science B and the Meteorological Station are completed. The Faculty of Engineering and the Division of Continuing Education are founded.

1966

- The Universities Act passes, creating the University of Calgary. F. C. Manning is appointed as the first Chair of the Board of Governors. The Senate and School of Social Welfare are established.

1967

- The first convocation is held March 29.
- The first recipient of a degree, Doctor of The University of Calgary, is Lester B. Pearson.
- Faculties of Business and Fine Arts are established.

1969

- A.W.R. Carrothers is named President. School of Nursing is established.
- The Social Sciences Building, Mathematical Sciences Building and Physical Plant open.

1970

- General Faculty Council is renamed General Faculties Council.
- First students are admitted to the Faculty of Medicine.

1971

- Faculty of Environmental Design is established.
- Four year degree programs begin.
- Dinnies Den opens as the first pub on campus.

1974

- W.A. Cochrane is named President.

1975

- Faculty of Law is established.

1976

- Faculty of Arts and Science is divided into the University College and the Faculties of Science, Social Science, and

Humanities. Day Care Centre opens. Arctic Institute of North America is relocated here.

1978

- Norman E. Wagner is named President.

1979

- The Canadian Institute of Resources Law is established.

1981

- The University College becomes the Faculty of General Studies.
- The University of Calgary Press is established.

1982

- The University of Calgary is selected as the 1988 Olympic Games venue for the athletes' village and speed-skating events.

1984

- A $17 million supercomputer is acquired.

1985

- Calgary Hall is re-named Craigie Hall in memory of former Vice-President (Academic) Peter Craigie.

1988

- The Winter Olympics come to campus.
- Murray Fraser is named President.

1991

- The university celebrates its 25th anniversary.

1992

- NASA space shuttle Columbia blasts off carrying a University of Calgary science experiment.

1993

- The university raises more than $45 million in its first national fundraising campaign. Students commit $2.2 million to the Building on the Vision campaign.

1994

- The University of Calgary hosts the 1994 Learned Societies Conference in June and welcomes a record 8,100 delegates representing 105 societies and conferences from 24 countries.

1995

- Site dedication ceremony held for the new Rozsa Centre.

1996

- Terry White is appointed President.

1997

- The university launches U of C 101 - a four-day orientation session for new students and the first program of its kind in Canada.

1999

- Largest Information Commons of its kind in North America opens in MacKimmie Library.
- New 400-bed Cascade Hall residence welcomes students.

2001

- Dr. Harvey P. Weingarten is appointed as seventh President and Vice-Chancellor of the University of Calgary.

2003

- The Libin Cardiovascular Institute of Alberta is created with a $15-million gift from the Alvin and Mona Libin Foundation and a $5-million donation by David and Gail O'Brien helped launch a world-class undergraduate educational centre in the Faculty of Medicine.

2004

- Allan Markin, chairman of Canadian Natural Resources, donates $18 million to establish an Institute for Public Health.

2005

- Seymour Schulich donates $25 million to the university's engineering faculty. The faculty is renamed the Schulich School of Engineering in honour of the donation.

2006

- The university marked its 40th anniversary with a series of celebrations touching on almost every area of the campus community.

2007

- Official opening of a branch campus called University of Calgary-Qatar, will bring state-of-the-art nursing education, in Qatar's capital city of Doha.

2008

- University of Calgary launches Canada's fifth veterinary program in the new Faculty of Veterinary Medicine.

2010

- Elizabeth Cannon, Dean of the Schulich School of Engineering, is officially selected as the University of Calgary's eighth president and vice-chancellor.

2011

- Taylor Family Digital Library (TFDL) opens January 2011.
- The new Energy Environment and Experiential Learning (EEEL) Building opens.

2013

- The Taylor family donates $40 million to establish the Taylor Institute for Teaching and Learning.
- The Faculty of Education is re-named Werklund School of Education in recognition of Dr. David P. Werklund's $25 million donation.

2014

- The University of Calgary is named the number one university in Canada under the age of 50 and ranked as one of the top ten young international universities.
- The Faculty of Medicine is re-named the Cumming School of Medicine in honour of a $100 million donation from Geoffrey Cumming.

2015

- Two new residences: Aurora Hall (for undergraduate students) and Crowsnest Hall (for graduate students) open on main campus.

2016

- The University of Calgary marked its 50th Anniversary as an autonomous institution.

Research Centres, Groups and Affiliations

The University of Calgary is a comprehensive academic and research institution, with a mission to discover new knowledge and translate our discoveries into applications that provide benefits to our society and global communities. It is the creation of new knowledge in all forms that distinguishes us as a research university.

For more information on research at the University of Calgary refer to: http://ucalgary.ca/research/.

Institutional Strategies

Institutional Strategies Refer to https://www.ucalgary.ca/about/our-strategy for information on the University of Calgary's institutional vision and strategy.

To view the Eyes High document: https://www.ucalgary.ca/about/our-strategy/our-strategies-and-plans.

Alcohol Policy (Use of)

Alcohol Policy (Use of) The Use of Alcohol policy deals with the consumption of alcoholic beverages on the campus and at University functions. No one may bring or consume liquor on campus except as permitted under the University's Institution License from the Alberta Gaming and Liquor Commission.

Details regarding the University's liquor policy may be obtained from Risk Management & Insurance under Policies and Guidelines. See Special Events & Use of Alcohol: ucalgary.ca/riskmgmt/home/policies-procedures-handbooks-legislation/alcohol-policy-use.

If there are concerns about student misconduct, please refer to: ucalgary.ca/conduct/.

Smoking Policy

Smoking Policy The University strives to provide a safe and healthy work, learning and living environment for all staff, faculty, students and visitors. Smoking is not permitted indoors nor within 7.5 metres of building entrances and air intake vents. Please respect everyone's right to clean air and a healthy environment.

For details see the Smoking Policy at: ucalgary.ca/policies/files/policies/smoking-policy.

Scent-Free Awareness

Scent-Free Awareness There is a growing understanding that the health of some people is adversely affected by exposure to scented products. There are members of our community who may not be able to use facilities such as study spaces, libraries, theatres, classrooms, and work spaces due to the presence of scented personal care products.

Please see the website: ucalgary.ca/safety/indoor for information about the health effects related to scented personal care products and alternatives that you can choose.

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