Departmental Written Examination for PhDs

The requirements for our Departmental Written Examination state:

This exam is intended to ensure that the PhD candidate has background knowledge of the broad area of specialization. The scope of the exam is indicated by a reading list, prepared by the supervisor in consultation with the Supervisory Committee, approved by the Supervisory Committee, and given to the candidate at least two months prior to the exams. The Departmental written examination is taken by the candidate after course work is completed and within one month before the Faculty oral candidacy examination.

http://www.cpsc.ucalgary.ca/grad/programs/doctorate

This document provides guidelines to the expected structure and content of the written examination. Note that this is a living document... it will be extended to reflect experiences gained over time.

1. Breadth vs. Depth

The Departmental Written Examination is not a breadth-based examination, i.e., it is not intended to test their general knowledge of all of Computer Science. Rather, it is a depth-based examination to make sure the student has the background knowledge necessary for them to pursue their research specialty.

2. The Structure of the Reading List

The reading list forms the heart of the written examination. The best reading lists are created in cooperation with the student, the supervisor, and the supervisory committee.

The reading list usually covers three areas. Each area must be highly relevant to the student’s research program, where they cover essential material the student must know if he or she is to pursue their research. Depending on the student’s area, various forms of the reading list are possible.

**Progressive depth.** If the student’s research relies on a narrow specialization of a well-known sub-discipline of Computer Science, then the three sections of the reading list could be:

- Breadth of sub-discipline
- Specialization within that sub-discipline
- Highly specialized area specific to the research topic.

For example, a student pursuing security in wireless networks may have a reading list of (a) networking, (b) wireless networks, and (c) security aspects of wireless networks.

**Cross-area breadth.** If the student’s research is at the intersection of several sub-disciplines of Computer Science, then the three sections of the reading list may cover those sub-disciplines:
• Breadth of sub-discipline a
• Breadth of sub-discipline b
• Breadth of sub-discipline c

For example, a student whose research applies information visualization techniques to data base problems may have a reading list of (a) data bases, (b) graphics and (c) information visualization.

**Cross-area breadth and Progressive depth.** Combinations of the above are possible, as a student’s research may be at the intersection of two sub-disciplines while still narrowing down between them.

• Breadth of sub-discipline a
• Breadth of sub-discipline b
• Specialization within a combination of the above

For example, a student working in multimedia networking as applied to groupware technologies may have a reading list of two ‘breadth’ areas: (a) multimedia, (b) computer supported cooperative work, and the single highly specialized ‘depth’ area (c) multimedia groupware.

In general, if there is a choice of how one can choose areas for the reading list, progressive depth reading lists are preferred over cross-area breadth.

### 3. The Content of the Reading List

Once the areas have been defined, the next question is what actual readings should be included and how many of there should be. There are no firm guidelines here, except to say that it should be a reasonable tradeoff between:

- what the student really needs to know to do their research vs.
- what the student can reasonably study in depth during the preparation period.

While there is no recipe for choosing what readings should be included (or excluded) from the area sections, some rules of thumb are:

• If an area covers the breadth of a well-known sub-discipline, try to use relevant chapter(s) from appropriate senior or graduate-level text books.
• If an area covers a specialization within a sub-discipline, try to use either chapters from texts (as above), or chapters from specialized books and collections (e.g., monographs, book of readings, review articles, special editions of journals), or seminal research papers.
• If an area covers a highly specialized area specific to the research topic, then you will likely have to use research papers (e.g., journals, proceedings, etc.).

The level of sophistication of these readings should be chosen appropriately. Again, the bottom line is: is the knowledge gained from these readings sufficient preparation for the student to pursue the research described in their proposal? For example, readings providing a breadth review of a sub-discipline could be at (say) a senior undergraduate or introductory graduate level if the goal is to see if the student has good background knowledge of the general area. On the other hand, the area readings chosen to cover a
very narrow research specialization may be quite advanced, for they may strongly influence how the student will proceed in their research.

4. The Take Home Examination

The take home examination consists of a question (or group of connected questions) that should enable the student to write a research-style paper or essay responding to this question. It tests the student’s comprehension and ability to apply the knowledge gained on their reading list. Within this context, the student is expected to write a research-style paper or essay in response to a single question. The subject of the question should be beyond or outside the specific research proposal. The question should avoid enabling the answer to merely summarize or restate the proposed research. Good example question types include (but are not limited to):

- Social implications of the research / intended work
- Consequences of the research / intended work
- Application of the research to a different area
- An alternate approach to the work
- An attack or supporting arguments to the underlaying assumptions of the work
- Applying some specified techniques or methodologies to a specified problem or model related to the proposed research

The duration of the take-home examination is normally 3 to 5 days.

The student is allowed full use of any materials (including the Internet), although they must follow scientific convention of citing any materials used. The student must write this examination independently; he or she is not allowed to have others review, proof read, or contribute intellectually to their answers.

An example take-home examination is included in Appendix 1.

5. Setting and Grading of Questions

In the best of worlds, the whole supervisory committee would set and grade the questions.

In practice, this may not work. It may be that the depth-base readings are unfamiliar to all but the supervisor. When that happens, the supervisor may find him or herself setting and grading the exam.

Whatever means is chosen, all members of the supervisory committee must review the question before it is finalized. They should analyze the question for coverage, for sophistication, and for fairness. Similarly, even if the supervisor does all the grading, all members of the supervisory committee should review the grading and add comments as needed.
To help all members of the supervisory committee recognize strengths and weaknesses in the examination, the grader should include a letter grade, as well as explanatory comments.

6. Departmental Written Examination and the Candidacy

The departmental written examination is a department requirement, and it must be done before the candidate can proceed to the Faculty of Graduate Studies oral candidacy examinations.

However, the two examinations are strongly linked.

a) The reading list for the Written and the Candidacy examination are one and the same.

b) To write the research proposal required for the Candidacy, the student will likely require much of the material found in the reading list.

c) The student needs the same knowledge to answer potential questions posed in either the Candidacy or the Written examination.

d) During the Candidacy examination, examiners normally (but not always!) begin the first round of questions probing areas suggested by the student’s answer on the Departmental Written. Once examiners are satisfied with the departmental written, they usually (but not always) move on to more general questions scoped by the reading list. Finally, the examiners move on to questions about the research proposal itself.

7. Rationale

This set of guidelines is intended to promote a consistent written examination experience across students and faculty. For students, it should make the process more predictable. For faculty, it should help them create a fair examination that matches what other students in the department are getting.
Appendix 1 Example Take Home Examination

Open book, 72 hours (3 full days).
You may use material from your reading list and other sources you may be aware of, and you may build upon the material already presented in your research proposal. The library of Saul Greenberg will be available to you if you require it. Feel free to use any library and the World Wide Web to search for information e.g., the HCI Bibliography or the ACM Digital Library. However, you are not to consult other experts in the area. Citations to portions of this material used to inform your discussion must be included, and direct extracts from these works must be quoted (i.e., as in a normal scientific paper)

Format: The format should be somewhat close to the ACM CHI format for papers in terms of two columns, font size, spacing, etc.: http://sigchi.org/chi2004/cfp/papers.html. The paper should be around 10 pages long (it is probably too short if its less than 8 pages, and too long if it is more than 20 pages). Pages used for listing references are not included in this count.

Write a conference-style paper titled

Interpersonal Awareness in the Home: Learning from Theory, Observations and Technologies

The goal of this paper is to take the work you have done and situate it within the knowledge you have gleaned from your reading list. You may include knowledge acquired from other sources, but we do not expect nor recommend that you read new material during this examination period.

The papers of interest are those that touch upon the home as a social place, that investigate domestic culture, and that discuss the design of home technologies. Your task is to assemble and synthesize this knowledge as a unified work. For example, you may decide that several key concepts emerged from your readings, where you organize your paper around those concepts. You may also decide to consider the interplay between the knowledge of the home setting and the technological solutions offered. Cite the literature as needed.

You may assume that the reader has passing knowledge of human computer interaction, CSCW and groupware, casual interaction, ubiquitous computing, and context-aware computing.