GRADUATE STUDENT HANDBOOK

Computer Science Ph.D. Program
University of New Hampshire

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1. Overview

A major emphasis in our program is the blending of theoretical and applied aspects of computer science. All students pursuing research in computer science theory will be required to develop a strong background in systems and will be encouraged whenever possible to identify potential or actual applications for theory. All students pursuing research in the applied areas of computer science will be required to base their work on strong theoretical foundations.

2. Admission to the Program

For admission to graduate study leading to a Doctor of Philosophy degree, students should have a strong academic record and a bachelor's or master's degree in computer science or a closely related area with a strong concentration in computer science. Qualified applicants who show a clear interest in obtaining a Ph.D. and who have research interests compatible with the existing research programs in the department will be admitted to the program.

3. Pre-candidacy

During pre-candidacy, the student is expected to acquire any general and specific background deemed necessary to complete the qualifying examination. The program of study includes major components in both the theoretical and applied aspects of computer science. Normally, students are expected to take the written component of the qualifying examination at the beginning of their second year of graduate study and complete all requirements of the qualifying examination by the end of their second year of study.

3.1 Course Credit Requirements

The formal coursework required is based on the background and needs of the student. Normally, however, a student will be expected to complete at least the equivalent of 16 semester courses (of at least 3 credits) beyond the bachelor's degree or 8 courses beyond the master's degree. These courses may include some 800-level courses that were not part of the student's undergraduate program. The formal coursework, however, need not be completed prior to completing the qualifying examination.

3.2 Qualifying Examination

The qualifying examination determines the students' broad mastery of computer science as well as his or her ability to pursue research in a specific area. The examination has two major components – a written breadth requirement and a depth requirement. The breadth requirement consists of a written examination. The department maintains detailed guidelines for the format and content of the written breadth examination and these guidelines are periodically reviewed. See sections 4 and 5 for the current description of the breadth and depth components of the qualifying examination.

3.3 Research Tool

Each student is required to acquire competence in the use of a research tool determined by the student's Guidance Committee. The research tool should contribute to the student's dissertation research and is expected to come from disciplines outside computer science, such as bioinformatics, mathematics, engineering, psychology, or linguistics. **A student working in bioinformatics might take an appropriate course in biology, genetics, biochemistry, or advanced statistics.** A student working in performance evaluation or modeling might satisfy the research tool requirement by taking courses in advanced probability and statistics. A student working in natural language processing might take advanced courses in linguistics or psychology. A student in computer graphics might take an appropriate mathematics course, an engineering course in light and color, or a psychology course in visual perception.

4. Qualifying Examination: Breadth Requirement

The breadth component of the qualifying examination is satisfied by successfully passing a written examination that is normally taken after completing the first two semesters of graduate studies. Students must complete a breadth examination that includes four different examination topic areas: one topic must be selected from the Theory Area; the other three topics must be selected from three different areas (which can include a second theory topic).

The list below identifies the six topic areas used for the Ph.D. breadth exam.

Area	Exam Topic(s)
1. Theory	Theory of Computation, Algorithm Analysis*, Formal Specification and Verification
2. Systems	Operating Systems, Computer Networks
3. Compiler and Language	Compilers
4. Database	Database
5. Artificial Intelligence	Artificial Intelligence
6. Interactive Systems	Graphics

*** Students should note that the foundation course for Algorithm Analysis is taught infrequently and should plan accordingly.**

The exam is given the Thursday and Friday of the week preceding each semester. By a specified time in the preceding semester, students must register for the exam and declare their four topics.

Syllabi covering exam topics are available to students on Blackboard. **These examples can be found on the Blackboard Computer Science Organization page under "Graduate Students – Syllabi for Comp. Exams." From there, click on "File Exchange."** The syllabi include subjects and reading lists covering tested material. The intent is that each topic syllabus be identified with a corresponding UNH course (which may have pre-requisites that do not correspond with the topics above). The syllabi for basic areas may be related to courses offered in our curriculum, but need not be.

The reading lists and syllabi for the examination are reviewed periodically, but will not be changed for at least four months prior to a scheduled exam. The written examination is administered by an Examination Committee appointed by the Department Chair and the Graduate Coordinator according to the following guidelines:

- The committee is chaired by the Graduate Coordinator and will normally include two faculty members representing each of the examination fields.
- The field faculty are responsible for creating and evaluating the questions for that field and passing or failing the student in that field.
- The Examination Committee, acting upon the recommendation of the field faculty, determines the examination results at a meeting; all faculty may attend but only the committee members may vote.
- For each section of the exam, the faculty can pass the student, fail the student, or recommend that the student be allowed to take the section again.
- Normally, a student is allowed to sit for the examination twice – the first time attempting all sections; the second time taking only those sections that were failed the first time.

The final decision concerning the satisfactory completion of the Breadth Requirement by the candidate is decided by the faculty as a whole upon the recommendation of the Examination Committee.

5 Qualifying Examination: Depth Requirement

The student must find a faculty member who agrees to serve as the depth supervisor. The supervisor directs the student in selecting a Guidance Committee which supervises the preparation of a depth requirement proposal, and the fulfillment of the depth requirement.

5.1 Guidance Committee

The student and his or her advisor must nominate a Guidance Committee, which consists of the depth supervisor and three additional faculty members. **Once the student and advisor complete the Guidance Committee nomination form, which is the same form as that for the Doctoral Committee, it is sent to the Graduate School**. **Even though the forms for the Guidance and Doctoral Committees is the same, these are two different committees which may but do not have to consist of the same members.** The Guidance Committee is then appointed by the Dean of the Graduate School upon recommendation of the Department Faculty.

NOTE: The Guidance Committee nomination form can be found online at http://www.gradschool.unh.edu/pdf/PhD_Committee_form.PDF.

As described below, the principal responsibilities of the Guidance Committee are

- To approve the depth requirement proposal that defines the scope of the student's depth requirement.
- To approve the student's research tool requirement, survey of the literature, and research report, as defined by the depth proposal.
- To supervise the oral examination.
- To approve the satisfactory completion of the depth component.

5.2 Depth Requirement Proposal

The supervisor directs the student in writing a depth proposal that defines the student's area of specialization and specifies

- the scope of a review of literature
- the format of a research report
- a detailed syllabus, including a bibliography, of the topics for which the candidate will be held responsible in the oral exam, and
- the research tool requirement.

The Guidance Committee should approve the depth proposal, and the approved proposal should be distributed to all faculty members at least two months prior to the oral examination.

5.3 Depth Requirement Components

The components of the depth requirement are a Survey, a Research Report, and an Oral Examination. These three requirements must be approved by the guidance committee in the above order, only after approval of the depth proposal.

Survey. A written survey that records the candidates review of the literature in the area of specialization as defined in the depth proposal. The format of the written survey, which may be combined with the research report, if appropriate, is to be proposed by the depth supervisor and approved by the Guidance Committee.

Research Report. A research report covering some specific topic in the area of specialization. The format of the report is proposed by the depth supervisor and approved by the Guidance Committee. Examples of appropriate formats include the following:

- Conference or Journal article. (Note that the acceptance of such a paper by the conference or journal is neither a necessary nor sufficient condition for satisfying this part of the depth requirement.)
- In-depth analysis of a set of research papers (4-5) within a specified time (3-4 months).
- Report that identifies research problem(s) in the area of specialization and preliminary results that support pursuing further investigation.

Oral Examination. An oral examination is conducted by the student's Guidance Committee. All faculty may attend, but only the committee members vote to determine if a student passes. The oral examination consists of an oral presentation followed by a question and answer period aimed at testing the student's understanding and depth of knowledge in the area of specialization as defined by the depth proposal.

The oral examination cannot be taken until after the student has satisfied the breadth requirement, as well as the Graduate Committee's approval of the written depth proposal, survey, and research components.

The satisfactory completion of the depth requirement is decided by the Guidance Committee on the basis of the depth proposal, written survey, the research report, and the oral examination. For each of the components, the outcome of the evaluation can be pass, fail, or a recommendation to submit a revised written document(s), or take the exam again.

6 Advancement to Candidacy

After the candidate has successfully completed the qualifying examination and has satisfied the research tool requirement, a doctoral committee is appointed for that student for the purpose of supervising and approving the dissertation work and administering the final defense. **The committee is nominated by the department and appointed by the Dean of the Graduate School.** It shall consist of a minimum of five members, **and the process of nominating the committee should begin with the student filling out a Supervisory Committee Nomination Form, which is the same form as for the Guidance Committee. These two committees may, but do not have to, have the same members. The form can be found online at** http://www.gradschool.unh.edu/pdf/PhD_Committee_form.PDF. Normally, two members of the committee are members of departments other than computer science or qualified professionals from other universities, industry or government. The Dean of the Graduate School is an ex-officio member of all Doctoral Committees. The candidate's major advisor is the chairperson of the Doctoral Committee. The Graduate Coordinator informs the Department Faculty of the members of each Doctoral Committee before sending the nomination of the committee to the Graduate School.

6.1 Dissertation Proposal

The candidate must make a formal presentation of the proposed research work, including both written and oral components, at least six months prior to the awarding of the degree. A written proposal must be distributed to all committee members at least two weeks before the oral presentation and should be made available to other faculty members upon request. The oral presentation is open to the public and should be scheduled and announced at least two weeks in advance. Following the oral presentation, the committee meets privately and with the candidate to determine if, and under what conditions, the proposal is acceptable. Other faculty may attend, but only members of the committee may participate in the decision. The committee decision, including any conditions, must be stated in writing, signed by all committee members, and filed with the written proposal in the student's file.

6.3 Dissertation Research

A minimum of two semesters of registration in Doctoral Research is required. However, doctoral students at candidacy must register for 999 each semester during the academic year, even if the minimum requirement has been met.

6.2 Final Defense

The candidate must make a formal oral presentation of the completed dissertation research in accordance with the requirements of the Graduate School. The written version of the thesis to be defended should be distributed to all committee members at

least three weeks before the defense and should be made available to other faculty members upon request. The oral presentation is open to the public and should be scheduled and announced at least two weeks in advance. Following the oral presentation, the committee meets privately and with the candidate to determine if, and under what conditions, the thesis is acceptable. Other faculty may attend, but only members of the committee may participate in the decision. Following the Graduate school policy, the majority of the committee members must approve the final dissertation.