

Doctor of Philosophy in Computer Science

The Doctor of Philosophy degree in computer science is awarded in strict conformity with the general requirements of the USC Graduate School.

Admission to the Ph.D. program in computer science is highly selective, based upon a superior academic record, prior training in computer science, letters of recommendation, a statement of purpose and Graduate Record Examinations scores. Applicants are expected to have completed the equivalent course work necessary to satisfy the general breadth requirements. Particular attention is given to the applicant's potential to perform original research in an area of computer science. Once admitted, the progress of each Ph.D. student is reviewed once a semester by the entire faculty and a determination is made as to whether the student will be allowed to continue in the program. Since research potential is a key factor in the evaluation, new students are strongly urged to begin research with a computer science faculty member as soon as possible. See general requirements for graduate degrees.

This document describes the requirements for a Ph.D. degree in the Computer Science department at the University of Southern California.

Introduction

The Ph.D. requirements have several components. A **unit** requirement ensures that students complete sufficient coursework, research and thesis credits for graduate study in Computer Science. The **breadth** course requirement introduces students to graduate-level topics in core Computer Science subjects and is designed to expose them to a variety of sub-disciplines. The **screening** procedure measures student progress towards their Ph.D. The **depth** requirement imparts the necessary coursework in a student's chosen research area to enable them to perform high-quality research. The **qualifying examination** tests student preparation and plans for the dissertation. Finally, the **dissertation defense** examination evaluates the student's completed research work. The student is deemed to have completed a Ph.D. when he or she has completed *all* of these requirements. The following sections describe each of these components in detail.

These components are not entirely independent of each other. Rather, the design of the core and breadth requirements are integrated with the design of the screening and qualifying exams so that between them they contribute to the student's steady progress towards the Ph.D. In this spirit, we have defined a set of **tracks** for research and study. The screening exam focuses on quality of course work, substantial progress towards the breadth requirement, selection of a research track and the agreement of a professor to supervise work in that area. The qualifying exam marks the completion of the breadth and depth requirements for courses, as well as substantial progress toward the dissertation. We also discuss the track structure below.

Unit Requirements

A student is required to complete a total of at least 60 units, at least 40 of which must be at the 500 level or above (beyond the bachelor's degree and including the required courses listed in the breadth and depth requirements below). A student must maintain a 3.5 GPA to remain in good academic standing.

Breadth

Each student is required to complete two semesters of CS 597 (1 units each, 2 maximum). In addition, a student must complete **one** class from **each** of the following 5 groups:

Group 1	Computer Architecture, EE 557 Operating Systems, CS 555 Computer Communications, CS 551
Group 2	Software Engineering, CS 577a Database Systems, CS 585 Web Technologies, CS 571
Group 3	Robotics, CS 545 Artificial Intelligence, CS 561 Brain Theory, CS 564
Group 4	Computer Vision, CS 574 3D Graphics and Rendering, CS 580 Geometric Modeling, CS 582
Group 5	Advanced Analysis of Algorithms, CS 670 Logic and its Applications, CS 581 Numerical Analysis, Math 501

Each student must select a specialization as his or her area of concentration. Each specialization requires a minimum of three additional courses. Specific specialization requirements (which may change as the fields change) will be provided to the students by the department.

Required courses may be taken in any chronological order, with due attention to prerequisites, and may precede or follow the Screening Evaluation.

A total of 60 units, at least 40 at the 500 level or above, beyond the bachelor's degree is required (including the above required courses). A minimum grade point average of 3.5 must be maintained. Students with a Master of Science degree may transfer up to 27 units.

Research Tracks

There are several research **tracks** that reflect the research areas that department faculty focus on. Each track is associated with a set of courses that defines the track, and each track is defined and administered by one faculty group (see below). These tracks provide a framework that can guide a student's selection of research area and depth coursework as well as help place their work in the context of research being conducted in the department. These tracks feature prominently in the screening requirement and the depth requirement, which are discussed below.

Because the department's research foci evolve continuously, this document does not list the research tracks. Rather, the "current" set of tracks is always maintained at the following website:

<http://www.cs.usc.edu/current/graduate/phdtracks.htm>

Tracks can be added, or removed, and courses can be added or removed from existing tracks by a vote of relevant faculty groups. The above web page will maintain a dated archive of track descriptions to enable students to determine if they met requirements that were in effect at some earlier point in time. The above web page also indicates which faculty groups administer which research tracks.

Screening

The screening procedure is used to evaluate a student's progress in required coursework, and in selecting a research advisor.

When a student has completed 21 units or more of graduate level studies or no later than his or her fourth semester in computer science at USC, he or she must apply for screening. The screening evaluation takes place during the regular review of Ph.D. students; based upon the student's performance in course work, overall record, and research potential, the screening evaluation determines whether or not the student will be allowed to continue toward the Ph.D. A screening determination of "pass," "no pass" or "postpone" is made; in the latter case, the student must reapply for screening the subsequent semester(s) until a "pass" or "no pass" determination is made.

Guidance Committee

After passing the screening procedure, the student must select a dissertation advisor and form a guidance committee consisting of the dissertation advisor and at least four other faculty members. The committee must include a faculty member from another department who does not hold a joint appointment in computer science. All guidance committees must be approved by the department chair and the Graduate School.

Depth Requirement

The depth requirement is intended to prepare the student for conducting research in a topic belonging to a particular track.

To satisfy the depth requirement, a student must complete **three** courses which may include CS 599s but not Directed Research units or thesis credits. In most cases, these courses will be chosen from among those associated with their declared track. However, students may (in consultation with the research advisor) satisfy this requirement by including one or more classes *not* associated with their declared track. In particular, students are permitted to satisfy this requirement with courses listed in departments other than Computer Science (including departments outside the School of Engineering), with the advisor's consent. This flexibility is intended to foster interdisciplinary research.

Qualifying Examination

All doctoral students must pass a qualifying examination in Computer Science. Before passing the qualifying examination, the student must have completed his/her breadth *and* depth requirements.

The qualifying examination is administered by a guidance committee consisting of the dissertation advisor and at least **four** other faculty members. The committee must include at least one USC faculty member from another department whose primary appointment is not in Computer Science. All guidance committees must be approved by the department chair and by the Graduate School. In exceptional cases, the guidance committee may include faculty from other universities; in these cases, the procedures established by the Graduate School must be followed.

Prior to the qualifying examination, the student must present a written document that consists of three parts:

1. A thorough review of the literature highlighting inadequacies and open problems that present challenges to the proposed thesis.
2. A presentation of completed work that demonstrates the student's capability to conduct research on the proposed topic.
3. A succinct thesis statement, a list of expected contributions, and a research plan together with a timeline for accomplishing the plan.

The qualifying examination itself is an oral examination usually based on the written document.

Permission to take the qualifying examination must be obtained from the Dean of Graduate Studies at least 60 days in advance. The exam must be completed in the semester for which permission is granted. Prior to the qualifying examination, the student must list the courses that he/she intends to use towards the breadth and depth course requirements. This list must be checked by the Ph.D. advisor and must be approved by

the guidance committee. If the student fails the examination, the guidance committee may recommend that the student re-take the examination 6-12 months later. A student may not take the examination more than two times.

Dissertation

An acceptable dissertation based upon original research is required. The dissertation must show mastery of some special field, must be an original contribution to that field and must be presented in scholarly form.

Defense of the Dissertation

When all other requirements are satisfied, the candidate must pass a public final oral examination in defense of the dissertation.

Time Limits

A student must pass the qualifying exam within **four years** of being admitted to the Ph.D. program. The defense must be completed within **seven years** of being admitted to the Ph.D. program (six if the student arrives with a relevant M.S. degree).

An extension to either time limit requires approval of 2/3rds of the CS faculty. In no case may the granted extensions exceed the time limits set by the graduate school.

Absences

Doctoral students may be granted a maximum of 24 months (not necessarily consecutive) leave of absence by the department chair, or by a committee appointed by the department chair with the approval of the Graduate School. During these absences, the clock defining the time limits for the qualifying and defense examinations stops. The clock is resumed when the student returns from the leave of absence.

Any leaves longer than 24 months, or leave applied for within four months of the expiration of a time limit, requires an approval of 2/3rds of CS faculty. Absences longer than 24 months also require graduate school approval.

Transfer Requirements

Students with an M.S. degree from another university may transfer courses towards satisfying the breadth requirement and the depth requirement. Such transfers require the approval of a faculty member and the graduate school.