Doctoral Programs in Computer Science and Engineering

If you entered Doctoral Program **prior to Fall 2001** see our Former Curriculum Requirements.

CSE offers doctor of philosophy (PhD) degrees in computer science and computer engineering, providing a research-oriented education in preparation for a research, industrial or entrepreneurial career. These programs explore both the fundamental aspects and application of computation, spanning theory, software, hardware and applications. Our particular areas of research expertise include:

- Algorithms and Complexity
- Artificial Intelligence
- Bioinformatics
- Computer-Aided Design
- Computer Vision
- Data and Knowledge Base Systems
- Embedded Systems
- Graphics
- Network Security and Cryptography
- Parallel and High-Performance Computation
- Processor Architecture and Compilation
- Programming Systems
- Software Engineering
- Systems and Networking
- Ubiquitous Computing

Transition Plan

Effective Fall 2002, the PhD curriculum has been revised to increase the quality of our graduate program by fostering a high-quality, active and interdisciplinary research environment. To transition between the two programs,

- Students who entered the PhD program prior to Fall 2001 will not be affected by the new graduate curriculum change. Written comprehensive exams in their current form will be continued as needed.
- Students who enter the program at or after Fall 2002 will follow the new PhD curriculum.
- Students who entered the program in Fall 2001 will, by the end of Fall 2002, choose which of the two programs they wish to follow.

Competency Requirement

We consider command of the materials covered in the following courses to be an adequate background for the PhD program. The competency requirement is intended to ensure that PhD students already have or acquire this undergraduate background. Students, who do not have this background at the time of entry, may be asked to either enroll in the following undergraduate class or to study it independently and demonstrate their knowledge by obtaining a B+ or better in the class or in the final exam. Whether

enrolling in or auditing any of the Undergraduate competency requirement courses listed below, satisfactory completion of that requirement should be met PRIOR to enrolling in the relevant Graduate course. Students should plan their schedule carefully in order to complete any competency requirement deficiencies within the first year of graduate study.

- CSE 101 (Algorithms)
- CSE 105 (Theory of Computation)
- CSE 120 (Principles of Computer Operating Systems)
- CSE 130 (Programming Languages: Principles and Paradigms)
- CSE 131 (Compiler Construction)
- CSE 141 (Introduction to Computer Architecture)

Course Requirements

The course requirement is intended to ensure that students are exposed to fundamental concepts and tools (core requirement), a deep up-to-date view of their research area (depth requirement), and advanced, up-to-date view of the some topics outside their area (breadth requirement). PhD students are expected to complete the core, depth and breadth requirements in the first two years of the program. All required coursework must be taken for a letter grade except for CSE 291 (Topics in CSE), CSE 292 (Faculty Research Seminar), CSE 299 (Research) and CSE 500 or CSE 501 (Teaching Assistantship) for which only S/U grades are allowed.

Units obtained from a single course cannot count more than once towards satisfying the requirement in each of the core, depth, breadth, and elective areas. PhD students who have taken similar courses elsewhere may petition for a waiver of the required courses or for substitution by alternative courses.

Core Requirements. The core requirements ensure that the PhD students share knowledge of fundamental concepts and tools. Each PhD student must take these courses for letter grade and maintain an overall core course GpA of 3.3 with no grade lower than a B- (except for CSE 292, for which a letter grade is not assigned). A student will typically complete all the core courses within the first year of the graduate study, and must complete all core courses within two years of entry.

- CSE 202 (Algorithms)
- CSE 221 (Operating Systems)
- CSE 240A (Architecture)
- CSE 200 (Complexity) for Computer Science **OR**
- CSE 241A (VLSI Integration of Computing Circuitry) for Computer Engineering
- CSE 292 (Faculty Research Seminar)

Depth Requirements. The depth requirement ensures that a PhD student has, early on in his or her career, acquired some depth of knowledge in a general research area. Each PhD student must select one of the following areas as his or her major area. The student must take three courses (12 units) from this major area. The student must take these courses for letter grade and maintain an overall depth course GpA of 3.4 with no grade lower than B- in these courses. One of these three courses can be either a Topics in CSE (CSE 291) or an Independent Study (CSE 299), which are not taken for a letter

grade. The department will maintain a list of appropriate courses for each major area. The major areas are:

- Theoretical Computer Science (CSE 200, 201, 203-208)
- programming Languages, Compilers, and Software Engineering (CSE 210, 211, 218, 230, 231, 238, 270, 271, 275)
- Computer Systems (CSE 222-228, 260-262, 268A)
- Database Systems (CSE 133, CSE 232, CSE 232B, CSE 233)
- Computer Engineering (CSE 231, 240B-248, CSE 237A-D plus ECE 260A-C, ECE 284)
- Artificial Intelligence (CSE 250A-251, 253-256, CSE 258A plus Cognitive Science 200, 260)
- Graphics and Vision (CSE 252, 252A, 252B, 252C, 272)
- Bioinformatics (CSE 280A, 280B, 282, 283, Math 283)

Breadth Requirements. Research in Computer Science and Engineering is increasingly interdisciplinary, and acquiring a broader view of the field in general is important. Each PhD student must take three courses (12 units) from at least two other areas different from the major area. Any course that is listed in a student's depth area cannot be used to fulfill the breadth requirement, even if it is cross listed in another area. Courses must be taken for letter grade and students must maintain an overall breadth course GpA of 3.0 with no grade lower than B- in these courses. Units obtained in CSE 209 series, 229 series, 239 series, 249 series, 259 series, 269 series, 279 series, 289 series, 290, 292, 293, 294, 298, 291, 299, 500, 501, and 599 do not count toward the breadth requirement.

Electives. In addition to the above required course work, each student is expected to take two additional courses (8 units.) Students must obtain no grade lower than C- in these courses. Undergraduate upper-division courses, CSE 291, and CSE 299 may fulfill this requirement. Units obtained in CSE 209 series, 229 series, 239 series, 249 series, 259 series, 269 series, 279 series, 289 series, 290, 292, 293, 294, 298, 500, 501, and 599 do not count toward the elective requirement.

Research Exam Requirement

The research exam is intended to verify three components of the student's preparation for PhD research: (1) breadth of comprehension sufficient to enable Computer Science research in areas beyond the topic(s) of the research exam and thesis; (2) ability to perform critical study, analysis and writing in a focused area; and (3) research experience.

The research exam has both an oral part and a written part. The oral part of the research exam is distinct from, and cannot be combined with the University Qualifying Exam. Grading criteria for each part, and standards for passing, are available from the CSE Department Graduate Office.

The research exam is conducted by a committee of three faculty members approved by the Graduate Committee and the Chair of the department. At least two committee members must be CSE senate faculty, and the student's adviser must be a member of the committee. The normative time for passing the research exam is by the end of the second year of study; the exam must be passed by the end of the third year if the student is to continue in the PhD program. passing the research exam enables a PhD student to receive the MS degree. PhD students who do not pass the exam after two attempts will be given the opportunity to write a thesis in order to receive a terminal MS degree. The MS Degree is only granted to those students who do not already hold an MS degree prior to entering the CSE Department

at UCSD.

Teaching Assistant Requirement

All students enrolled in the PhD program must have one quarter of training as a teaching assistant. This is a formal degree requirement and must be completed before the student is permitted to graduate. The requirement is met by serving as a 50 percent teaching assistant and taking either CSE 500 or CSE 501 (Teaching Assistantship).

Qualifying Examination and Advancement to Candidacy

The qualifying examination is a requirement for advancement to candidacy. prior to taking the qualifying examination a student must have satisfied the departmental competency, course and research exam requirements and must have been accepted by a CSE faculty member as a PhD thesis candidate. All doctoral students are expected to advance to candidacy by the end of their third year, and advancement is mandatory by the end of the fourth year. The examination is administered by a doctoral committee appointed by the Dean of Graduate Studies and Research and consists of faculty from CSE and other departments. More information on the composition of the committee can be obtained from the CSE graduate office. The examination is taken after the student and his or her adviser have identified a topic for the dissertation and an initial demonstration of feasible progress has been made. The candidate is expected to describe his or her accomplishments to date as well as future work.

Dissertation

The dissertation defense is the final PhD examination. A candidate for the PhD is expected to write a dissertation and defend it in an oral examination conducted by the doctoral committee.

Departmental PhD Time Limit Policies

Students must be advanced to candidacy by the end of four years. Total university support cannot exceed seven years. Total registered time at UCSD cannot exceed eight years.