

# COMPUTER SCIENCE AND ENGINEERING (MS, PHD)

The School of Computing offers both the Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) degrees.

## Requirements for the Master's Degrees

The M.S. program in Computer Science and Engineering is offered in two varieties: Plan A, requiring a master's thesis, and Plan B, based entirely on coursework. Each of these programs requires a total of 30 credits, with the thesis counting for nine credits in the Plan A program. Thus the Plan A program allows a student to combine individual study with general coursework. We strongly encourage the Plan A degree for students aspiring to pursue doctoral studies.

### M.S. Plan A Requirements

At least 21 credits of graduate level courses, excluding thesis research credits, reflecting a GPA of at least 3.0; at least nine credits of CSE graduate courses other than CSE 5097 Seminar, CSE 5099 Independent Study in Computer Science and Engineering, and CSE 5600 ; at most six credits, in total, of CSE 5097 Seminar, CSE 5099 Independent Study in Computer Science and Engineering, and CSE 5600 ; at most three credits of CSE 5097 Seminar; successful completion, with a grade of B- or better, of CSE 5050 Algorithms and Complexity, CSE 5500 Algorithms, or, at the discretion of the student's adviser, successful completion of a three credit graduate independent study with significant algorithmic content; at least nine credits of GRAD 5950 Master's Thesis Research; an oral presentation of a thesis research proposal; completion of a master's thesis and oral presentation of thesis work.

### M.S. Plan B Requirements

At least 30 credits of graduate level courses; at least 18 credits of CSE graduate courses other than CSE 5097 Seminar, CSE 5099 Independent Study in Computer Science and Engineering, and CSE 5600 ; at most six credits, in total, of CSE 5097 Seminar, CSE 5099 Independent Study in Computer Science and Engineering, and CSE 5600 ; at most three credits of CSE 5097 Seminar; successful completion, with a grade of B- or better, of CSE 5050 Algorithms and Complexity, CSE 5500 Algorithms, or at the discretion of the student's adviser, successful completion of a three credit graduate independent study with significant algorithmic content.

## Requirements for the Ph.D.

The Ph.D. program requires roughly two years of coursework beyond the M.S. and is intended to prepare students for a career in research. General requirements for the Ph.D. are coursework meeting the Ph.D. program requirements; a dissertation proposal with oral presentation and exam; Ph.D. dissertation and defense; Ph.D. publication requirement; the English proficiency requirement. The Ph.D. in Computer Science and Engineering does not have a related area or foreign language requirement.

### Ph.D. Course Requirements

Coursework requirements for the Ph.D. depend on whether the student has an existing M.S. degree in Computer Science, Computer Engineering, or Computer Science and Engineering.

Course requirements for students without an existing M.S. (in CS, CE, or CSE): At least 36 credits of graduate level courses, excluding thesis research credits; at least 18 credits of CSE graduate courses other than CSE 5097 Seminar, CSE 5099 Independent Study in Computer

Science and Engineering, and CSE 5600 ; at most 12 credits, in total, of CSE 5097 Seminar, CSE 5099 Independent Study in Computer Science and Engineering, and CSE 5600 ; at most three credits of CSE 5097 Seminar; satisfaction of the Ph.D. breadth requirements (see below); at least 15 credits of GRAD 6950 Doctoral Dissertation Research.

Course requirements for students with an existing M.S. (in CS, CE, or CSE): At least 24 credits of graduate level courses, excluding thesis research credits; at least 12 credits of CSE graduate courses other than CSE 5097 Seminar, CSE 5099 Independent Study in Computer Science and Engineering, and CSE 5600 ; at most nine credits, in total, of CSE 5097 Seminar, CSE 5099 Independent Study in Computer Science and Engineering, and CSE 5600 ; at most three credits of CSE 5097 Seminar; satisfaction of the Ph.D. breadth requirements (see below); at least 15 credits of GRAD 6950 Doctoral Dissertation Research.

### The Ph.D. Breadth Requirement

Ph.D. students must fulfill the breadth requirement by successfully completing four breadth courses selected from the areas below. These courses must additionally satisfy the following requirements: CSE 5500 Algorithms is mandatory and must appear in the breadth courses; the four breadth courses must be drawn from four distinct areas; and the average GPA for the breadth courses must be a 3.7.

- Algorithms (*mandatory*) CSE 5500 Algorithms;
- Programming Languages. CSE 5102 Advanced Programming Languages;
- Theory of Computing. CSE 5506 ;
- Networking. CSE 5300 Advanced Computer Networks;
- Operating Systems CSE 5306 ;
- Architecture. CSE 5302 Computer Architecture;
- Parallel and Distributed Computing. CSE 5304 or CSE 5510 ;
- Machine Learning and Data Mining. CSE 5713 Data Mining or CSE 5820 Machine Learning

### The English Proficiency Requirement

The program requires evidence of English competency for non-native English speakers. The requirement can be met in two ways: either through evidence of level B2 CEFR English competency (TOEFL Speaking score  $\geq 23$ , IELTS speaking score  $\geq 7.0$ , or official UCAELI assessment via interview); or through successful completion of a UCAELI Evening English Course (EEC).

### Ph.D. Publication Requirement

All CSE Ph.D. students are required to publish (or have accepted for publication) prior to their dissertation defense, a minimum of three conference level papers; each paper must be a peer-reviewed full conference article, i.e., submitted and reviewed as a full paper and not as an abstract. Published journal articles may also be used to fulfill the requirement, though they must substantially differ from any conference articles used to satisfy the requirement. Major advisers have the authority to establish a higher threshold of publications for their students.