

DOCTOR OF PHILOSOPHY WITH A MAJOR IN COMPUTATIONAL SCIENCE AND ENGINEERING

The Computational Science and Engineering (CSE) program is an interdisciplinary program addressing the body of knowledge, skills, and practices associated with the study of computer-based models of natural phenomena and engineered systems. Students will be required to obtain a breadth of knowledge across a set of core areas, depth of knowledge in a specific computational specialization (e.g., numerical computing), and knowledge to apply computational techniques in a domain of application. Students will be expected to integrate principles from mathematics, computing, science, and engineering to be able to create significant computational artifacts (e.g., software), and to complete independent research that advances the state-of-the-art in the CSE discipline.

The CSE Ph.D. degree program is an interdisciplinary program offered by the College of Computing, the College of Engineering, and the College of Sciences. Once admitted, students follow the CSE program's degree requirements and curriculum.

All PhD programs must incorporate a standard set of Requirements for the Doctoral Degree.

| Code | Title | Credit Hours |
|---|--|--------------|
| Required Course | | |
| CSE 6001 | Introduction to Computational Science and Engineering | 1 |
| Core Courses | | |
| Select four of the following: | | 12 |
| CSE/MATH 6643 | Numerical Linear Algebra | |
| CSE 6140 | Computational Science and Engineering Algorithms | |
| CSE 6730 | Modeling and Simulation: Foundations and Implementation | |
| CSE/ISYE 6740 | Computational Data Analysis: Learning, Mining, and Computation | |
| CSE 6220 | High Performance Computing | |
| Computation Specialization | | |
| Select at least nine credit hours of specialization courses. ^{1,2} | | 9 |
| Application Specialization | | |
| Select at least nine credit hours of specialization courses. ^{2,3} | | 9 |
| Qualifying Exam ⁴ | | |
| Doctoral Thesis ⁵ | | |
| Total Credit Hours | | 31 |

- ² At least nine hours of PhD courses must be courses that do not carry the CS/CSE course designation. These hours may be taken in CEE. Hours taken as part of the computation and/or application specialization can be used to fulfill this requirement.
- ³ The application specialization includes at least nine hours of courses that increase depth of understanding in an application field; these need not be computation-focused courses.
- ⁴ A qualifying examination must be attempted by the end of the second year of enrollment in the CSE doctoral program (normally taken after the student completes CSE core coursework). A qualifying examination committee shall be appointed by the CSE program coordinator for each student and is responsible for making an overall recommendation concerning the outcome of the qualifying examination.
- ⁵ Students are required to complete a doctoral thesis reporting the results of independent research that advances the state-of-the-art in the computational science and engineering discipline. The thesis must be successfully defended to the student's thesis committee.

¹ The computational specialization includes at least nine hours of courses that increase the student's depth of understanding of computational methods in a specific area, as approved by the student's academic advisor. These courses must go beyond "using computers" to deepen understanding of computational methods, preferably in the context of some application domain.