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The PhD in Computational Data Science and Engineering (CDSE) is an interdisciplinary graduate program designed for students who seek to use advanced computational methods to solve problems involving big data, extensive computations, and complex modeling, simulation, optimization and visualization.

The mission of the Department of Computational Data Science and Engineering is to graduate professionals who (a) have expertise in developing novel computational methodologies and products, and/or (b) have extended their expertise in specific disciplines (in science, technology, engineering, and socioeconomics) with computational tools.

Research in Computational Data Science and Engineering includes: big data and computational statistics, AI and Machine Learning, internet of things, large and complex systems, intelligent transportation and infrastructure systems, remote sensing, autonomous vehicles, virtual and augmented reality, e-commerce, image and video processing, scientific and interactive visualization, high-performance computing, scalable algorithms, bioinformatics, and multi-scale multi-physics engineering systems.

#### **Additional Admission Requirements**

- Master of Science or Engineering degree in computational, computer, or data science and engineering or in an allied field in science, engineering, business, economics, and technology.
- Admission to the PhD program is also possible with a B.S. in computational, computer, or data science and engineering or in an allied field in science, engineering, business, economics, and technology, with additional requirements for admission and graduation.

#### **Program Outcomes:**

- Graduates shall demonstrate expertise, critical thinking and the ability to conduct research and development in scalable computing, computational methods, artificial and computational intelligence, complex system modeling and simulation, and data science and engineering.
- Graduates shall have mastery of communicating, planning, and implementing solutions and research and development products in computational approaches in various applications in science, technology, engineering, and mathematics, including the use of advanced visualization and analytics techniques.
- Graduates shall develop skills and abilities to be effective educators in computational and data science and engineering disciplines at the university level.
- Graduates shall demonstrate the ability to conduct novel and independent research and scholarly activity.

#### **Degree Requirements**

Total credit hours: 44 (post MS)

- Core courses (12 credits): CSE 702, 703, 801, 804
- Electives (24 credits): Take 24 credit hours from engineering, computer science, mathematics, physics, chemistry, biology, economics, business, agricultural science, or other courses approved by the CDSE Department, with approval of Advisor
- Take 3 additional credit hours to complete the requirement of a total of 44 credit hours. These credit hours can be from Dissertation-CSE 997, Continuation of Dissertation-CSE 999,

Supervised Teaching-CSE 993, Supervised Research-CSE 994, or approved graduate level courses, with approval of Advisor

- At least 26 credit hours should be at 800-900 level
- Seminar (CSE 992: 2 credits)
- Dissertation (CSE 997: 15 credits)
- Pass the Qualifying Exam, Preliminary Exam, and Dissertation Defense
- If the student was admitted based on a BS degree only, the student must take 18 additional credit hours from engineering, computer science, mathematics, physics, chemistry, biology, economics, business, agricultural science, or other courses approved by the CDSE Department, with approval of Advisor. For post-BS admission, a total of 62 credit hours is required for graduation.

### **Dissertation Research:**

A student may not register for dissertation credits before passing Qualifying Examination. No more than 15 dissertation credits are counted toward the total credit hours requirement for the degree.

### **Qualifying Examination:**

The Qualifying Examination is given to assess the student's competence in a broad range of relevant subject areas. Only students with unconditional status and in good academic standing may take the Qualifying Examination. A student who wants to retake the Qualifying Examination must apply to retake the Qualifying Examination by the posted deadline. No student is permitted to take the Qualifying Examination more than twice. A student not recommended for re-examination or who fails the exam on a second attempt may be dismissed from the doctoral program.

### **Preliminary Oral Examination:**

The Preliminary Oral Examination is conducted by the student's dissertation committee and is a defense of the student's dissertation proposal. Passing this exam satisfies requirements for Ph.D. Candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Admission to Candidacy**

Student will be admitted to candidacy upon successful completion of the Qualifying Exam and the Preliminary oral Exam.

### **Final Oral Examination:**

The Final Oral Examination is conducted by the student's dissertation committee. This examination is the final dissertation defense presentation that is scheduled after a dissertation is completed. The examination may be held no earlier than one semester (or four months) after admission to candidacy. Failure on the examination may result in dismissal from the doctoral program. The student's Advisory Committee may permit one re-examination. At least one full semester must elapse before the re-examination. Failure on the second attempt will result in dismissal from the doctoral program.

### **Submission of Dissertation:**

Upon passing the Ph.D. Final Oral Examination, the Ph.D. student must have the dissertation approved by each member of the student's dissertation committee. The approved dissertation must be submitted to The Graduate College by the deadline given in the academic calendar, and must conform to the Graduate College's guidelines for theses and dissertations.