

COMPUTATIONAL MATHEMATICS AND DATA- ENABLED SCIENCE & ENGINEERING (PH.D.)

Computational Mathematics and Statistical Sciences Track

The doctoral program in CDS&E is a research-oriented program that requires a minimum of 72 credit hours beyond the Bachelor's degree or a minimum of 48 credit hours beyond the Master's degree. The program shares resources with the departments and schools offering concentrations in CDS&E and operates under the College of Science, Engineering, and Technology (CSET). The CDS&E program seeks to improve our ability to extract knowledge from large and complex digital data as we endeavor to meet the national imperative to accelerate discoveries in science and engineering, strengthen our national security and transform teaching and learning. The concentration in Computational Mathematics and Statistical Sciences track is an interdisciplinary program designed to ensure that the student acquires knowledge in a broad spectrum of the mathematics and statistical sciences through quantitative exploration of data. The program of study is structured to reflect the belief that a student in the program should not only be proficient in a specialized track, but also understand how it relates to other academic fields and big data and be able to recognize opportunities for developing new ideas of the track and solve real-world problems. As a result, the Ph.D. graduate in computational mathematics and statistical sciences is equipped with all necessary tools and skills to recognize opportunities for developing and advancing mathematics and statistical ideas arising from many domain fields and for work outside of the traditional mathematics and statistics academic setting. In addition to opportunities for consulting experience through the Laboratory for Interdisciplinary Statistical Analysis through Quantitative Exploration of Data (LISA-QED), students in the track may have opportunities for participation on research projects through other facilities on campus designed for computational and quantitative simulations, exploration, and visualization of data, and make presentations at professional CDS&E conferences.

Admission Requirements

To be considered for admission, the following requirements should be met:

- Applicants must have completed the Graduate Application for Admission.
- Applicants must have provided official copies of transcripts from all colleges/universities attended.
- The applicant must have a Bachelor's or Master's degree from an accredited college or university in a STEM field or related fields, and
- A minimum GPA of 3.00 (on a 4.00 scale) on the highest degree earned.
- A satisfactory TOEFL score for international students whose native language is not English.

- Three letters of recommendation from three professors or professionals knowledgeable of the applicant's professional or academic ability, job experiences, and leadership potential.
- A statement of purpose.

Degree Requirements

- Common Core = 12 credit hours
- Track Requirement = 12 credit hours
- Track electives = 24 credit hours
- Dissertation = Not more than 24 credit hours

Please refer to College of Science, Engineering and Technology section of the catalog for all the details regarding the CDS&E Ph.D. degree completion. Students are advised to follow the guidelines given by the Division of Graduate Studies for the completion of the Doctorate degree.

Ph.D. Examination Procedures

- Comprehensive Qualifying Examination (GNST 700 APPS FOR GRAD DEG CAND DOCTORA)
- Graduate Area Comprehensive Examinations (GNST 888 GRAD COMP EXAM(DOCTORAL LEVEL))
- The Dissertation (Thesis)
- Final Defense of Dissertation
- Comprehensive Qualifying Examination (GNST 700 APPS FOR GRAD DEG CAND DOCTORA)

To ensure that the skills and basic knowledge have been acquired to carry out the research necessary for the dissertation, the student must demonstrate competence in the common core and concentration track areas. Competence will be demonstrated by a comprehensive qualifying examination which shall consist of written examinations over each of these two areas. The two parts comprehensive qualifying examination will consist of 3 of the 4 common core courses (CSC 601 COMPUTER ALGORITHMS, CSC 620 DATABASE MANAGEMENT SYSTEMS, and STAT 661 PROBABILITY AND STATISTICS or STAT 672 COMPUTATIONAL STATISTICS) as Part I and all the 4 required courses for the chosen track as Part II. A good performance on both Part I and Part II exams will be required for passing. Knowledge of the content of the courses listed in the common core and specialized concentration tracks, such as the typical course sequence listed under each area, should be adequate preparation for the comprehensive qualifying examination. Study guides for each of the examination areas will also be available.

A Comprehensive qualifying examination will normally be scheduled at the beginning of the spring semester and once during the summer. To show satisfactory progress in his/her graduate studies, a student is normally expected to complete his/her comprehensive qualifying examinations by the end of the second full academic year of Ph.D. work or equivalently, completing the common core and concentration track course work. A student will be allowed to repeat an examination only once or as recommended by the faculty advisory committee.

Graduate Area Comprehensive Examinations (GACE)

When the comprehensive qualifying examinations have been passed, the Graduate Advisory Committee is formed. The Doctoral Committee and mentor are selected with the dissertation research topic chosen, and when all course work on the program of study has been completed,

the student may request the Graduate Area Comprehensive Examination [GACE] to be scheduled. The GACE will be an examination in the core courses as well as an in-depth examination in the track. It will be administered by the student's doctoral committee and must contain an oral component. Pass or fail will be determined by majority vote of the committee. The oral component of the examination is open to members of the faculty.

The Dissertation

After the GACE has been passed, the student's doctoral committee will be reconstituted to form the dissertation committee. The student and the major professor of the doctoral committee will select the student's dissertation committee, subject to the approval of the CDS&E Ph.D. Advisory Committee. The dissertation committee will consist of at least five graduate faculty members, including a major professor and at least three additional graduate faculty members from the other concentration tracks, including an external member. The primary responsibility of the committee will be to supervise the student's research and writing of the dissertation in the chosen concentration track, and its members should be chosen with this mission in mind. In the early stages of the research effort, the student will make a formal dissertation proposal to the dissertation committee. The dissertation will be an original work that makes a significant contribution to the student's area of specialization. An external person who has expertise in the dissertation area will be enlisted by the student and his/her committee to serve as an external examiner for the dissertation. This person will read the dissertation and submit written comments regarding its quality and significance to the student's committee. It is highly recommended that at least two publications in professionally refereed journals be resulted from the dissertation.

Final Defense Examination

After all other examinations and the dissertation have been completed, the student's committee will schedule the final defense examination for the student. This examination will consist of an oral defense of the dissertation and will be open to the public. After consultation with the CDS&E Ph.D. program Coordinator, the major professor will publicize the time and place that the examination will be held. This announcement should be at least one week prior to the scheduled date of the examination. A pass or fail on this examination will be determined by a majority vote of the student's committee. In making its decision, the committee will give due consideration to the external examiner's assessment of the dissertation and the refereed publications that resulted from the dissertation.