

# COMPUTER SCIENCE (PH.D.)

The Doctor of Philosophy degree is conferred upon individuals who have demonstrated the ability to make original contributions to the knowledge in the field of computer science.

The Ph.D. program develops experts and professionals who will continue in academic work, industry, or government. It encourages the attainment of excellence in research and scholarship necessary to catalyze the advancement of computer science. The fulfillment of the doctoral degree requirements is monitored primarily through the proficiency, qualifying, and prospectus examinations, and the presentation of the dissertation.

The doctoral program emphasizes research and the Department encourages prospective Ph.D. candidates to involve themselves in faculty projects at their earliest possible opportunity.

## Admission Requirements

Admission to this program is contingent upon admission to the Graduate School (<http://bulletins.wayne.edu/graduate/general-information/admission/>). The successful applicant should possess a bachelor's or master's degree with a major in computer science or related field. In addition, applicants are expected to have attained a level of scholarship equal to a 3.3 grade point average or better in their most recent degree, along with adequate preparation in the computer science field and supporting courses in mathematics. Normally, the admitted student will be expected to have fulfilled the equivalent requirements for the Bachelor of Science in Computer Science, and to have satisfied any deficiencies in course content by successfully completing the pre-requisite course work prior to becoming an applicant for the advanced degree.

Applicants must submit to the Department official transcripts from each college or university that they have attended, three letters of recommendation, Graduate Record Examination scores, a statement of approximately 300 words describing the applicant's academic and professional goals, and the Computer Science Graduate Evaluation Form.

The Doctor of Philosophy degree requires ninety credits beyond the baccalaureate degree, thirty of which must be earned as dissertation credit. All course work must be completed in accordance with the regulations of the Graduate School (<http://bulletins.wayne.edu/graduate/general-information/academic-regulations/>) and the College of Engineering (<http://bulletins.wayne.edu/graduate/college-engineering/academic-regulations/>).

The computer science doctoral program is designed to be flexible, in order to meet the individual student's interests and to reflect the dynamic nature of the field. It is comprised of seven major stages:

- 1. Advisor/Program Selection:** The first stage is devoted to the selection of a faculty advisor, taking course work, and the production of a Plan of Work in consultation with the student's faculty advisor. Students are encouraged to investigate the different areas of research available by talking with various graduate faculty members and attending research seminars held by the Department. Advisor selection must be done within the first semester of admission. The student will then begin course selection and outlining the Plan of Work. The approved Plan of Work must designate a primary area of research and a minor field outside the Department. The student is encouraged, in consultation with their advisor, to define his/her own primary and minor fields of interest by the selection of a cohesive grouping of available graduate courses. The Plan of Work must include at least thirty credits in course work at, or above, the 7000 level. Twenty-one of these credits must be in course work other than
- directed study (CSC 7990). Both CSC 6500 and CSC 6580 must be part of the students' plan of work.
- 2. Proficiency Examination:** In order to demonstrate knowledge of undergraduate-level computer science fundamentals, Ph.D. students admitted in a Fall semester are required to pass the proficiency examination within the first year of starting the program. PhD students admitted in a Winter semester may elect to, with approval of the research adviser, take the proficiency examination either in March of the same year or in March of the next year. This exam is given in March of each Winter semester. All three subject tests (Discrete Mathematics, Data Structures, and Computer Programming) must be attempted. Students are given a single attempt to pass the exam. The final pass/fail decision will be made by the graduate committee, which considers exam scores in the three subject areas, GPA after admission to the graduate program, the research adviser's input and other evidence as determined appropriate by the graduate committee. The graduate committee may render a decision of conditional pass if necessary, in which the student must take a remedial course in the following semester, as determined by the graduate committee. This remedial course must be passed with a grade of 'B' or better. Otherwise, the student will not be allowed to continue in the Ph.D. program.
- 3. Qualifying Examination:** The Qualifying Exam is designed to determine the student's capacity for critical thinking as evident in both written and oral presentations. By the end of the second year in the program, students are required to make their first attempt at this exam. The exam consists of two parts. In the first portion of the exam the student must demonstrate his/her knowledge of theoretical computer science at the graduate level in each of the two core theory areas taught in CSC 6500 and CSC 6580, both of which the student must have passed with grades of 'B' or better, or must take an additional written exam on each subject. In the second portion of the exam, the competency of the student in their major area of the research is to be demonstrated in the form of a written document and accompanying oral presentation. The exam is offered in March and November, and the student will have two opportunities to pass both parts. Failure to pass both parts of the qualifying examination by the end of the fifth semester will result in the student's removal from the Ph.D. program. Upon successful completion of this requirement, a Report on Doctor of Philosophy Oral Examination form is submitted to the Graduate School.
- 4. Dissertation Committee Formation:** With the approval of the Department Graduate Committee, the student establishes a Dissertation Committee that consists of four members. If there are co-chairs, the committee will consist of five members. At least two committee members are from the student's home department, Computer Science. The Chairperson and one additional member must hold a Regular Graduate Faculty appointment in the Department of Computer Science. The committee will also include an external member from outside the department. This Committee is responsible for administering the prospectus and the dissertation defense of the candidate.
- 5. Candidacy:** Candidacy is reached after the Plan of Work has been approved, the written qualifying examination has been passed, approximately fifty credits in course work have been completed, and the dissertation committee has been formed. Upon completion of these requirements, a Recommendation for Doctor of Philosophy Candidacy Status form is submitted to the Graduate School in order to advance the Ph.D. applicant to Candidate Status.
- 6. Prospectus:** After completion of the written qualifying exam, the student will continue to develop the dissertation prospectus, a document that provides evidence that the prospective doctoral candidate has completed adequate preliminary research on the topic of the proposed doctoral dissertation. The principles for determining

the scope of the prospectus are detailed in the Doctoral Dissertation Outline and Record of Approval form (<http://wayne.edu/gradschool/>).

- Dissertation:** The final stage is devoted primarily to the research and preparation of the dissertation. The thirty credit dissertation registration requirement is fulfilled by registering for the courses CSC 9991, CSC 9992, CSC 9993, and CSC 9994 (Doctoral Dissertation Research and Direction I, II, III, and IV, respectively), in consecutive academic year semesters. The dissertation research is presented and defended before the Dissertation Committee in a public lecture presentation.

## Bioinformatics and Computational Biology (Ph.D.)

The concentration in bioinformatics and computational biology is intended for doctoral students in computer science who wish to receive research training in this specialization. Students will be prepared to do inter-disciplinary work in computer science, biology, and biomedical research. They will be trained to identify important biological problems that require bioinformatics and computational solutions, and to identify and apply appropriate approaches to address these problems. This concentration has been developed to provide outstanding and highly-motivated students with the specialized training needed to initiate productive work in their chosen careers. General admission and degree requirements are the same as cited above for the Ph.D. program. Concentration requirements are as follows:

Code	Title	Credits
<b>Required Courses</b>		
CSC 7300	Bioinformatics I: Biological Databases and Data Analysis	3
CSC 7301	Bioinformatics I: Programming Lab	1
CSC 7410	Bioinformatics II	4
MGG 7010	Molecular Biology and Genetics	4
<b>Total Credits</b>		<b>12</b>

**Electives** appropriate to each student's background and interests will be selected by the student and his/her advisor and could include courses such as: IBS 7030/MGG 7030, Functional Genomics and Systems Biology.

*Note:* students must complete MGG 7010 before enrolling in the Bioinformatics CSC courses and CSC 7300 and CSC 7301 must be completed before CSC 7410.