DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

Credit hour requirements: 40 credit hours if entering with a Master of Science in Computer Science; 49 credit hours if entering with a master of science not in computer science; 72 credit hours if entering with a Bachelor of Science in Computer Science.

The doctoral program is designed for those students who have an interest in pursuing an academic or industrial research career. To be awarded a Ph.D. in Computer Science, a student must demonstrate mastery in several areas of computer science and must make a significant original contribution to research in the field of computer science. On entry into the program, a student is required to take coursework in a number of areas and pass written and oral qualifying exams. Next, the student must formulate a thesis research problem and present it and the proposed research to a committee of faculty at a comprehensive exam. Upon passing this examination, the student must carry out the research and write and defend a thesis, among other requirements.

Admission to the Ph.D. program is competitive and applicants must have high grade point averages, GRE scores, and (if required) TOEFL scores. Students who enter the program after completing a master’s degree (not necessarily in computer science) normally require three to four years of full-time work to complete the Ph.D. Part-time students require more time. Students may also enter the program directly after completing only a bachelor’s degree in computer science. The direct program enables bright, highly-motivated students to participate in departmental research programs immediately after their bachelor’s degree. Students in the direct program take extra coursework and normally require an additional year to complete the Ph.D. compared to students in the post-master’s program.

Overview
To receive a Ph.D., students must meet coursework requirements and pass qualifying exams, a comprehensive exam, and a thesis defense.

Curriculum
Students in the Ph.D. program have course requirements that depend on whether they enter the program with a Master of Science in Computer Science, a master of science not in computer science, or with a Bachelor of Science in Computer Science.

Students With a Master of Science in Computer Science
Minimum Total Credits Required 72
Maximum Transfer Credit 32
Maximum 400-Level Credit 12
500- and 600-Level Course Credit Required 15-30

Required Courses (10)
Select a minimum of three courses from three different core course groups as listed below. 9
CS 695 Doctoral Seminar 1

Readings and Special Problems Courses (0-12)
CS 597 Reading and Special Problems 0-12

General Electives (0-6)
Select zero to six credit hours 0-6

Ph.D. Research (24-36)
CS 691 Research and Thesis Ph.D. 24-36

Transfer Credit (32)
A maximum of 32 credit hours of masters transfer credit is allowed. 32

Students With a Master of Science Not In Computer Science
Minimum Total Credits Required 72
Maximum Transfer Credit 23
Maximum 400-Level Credit 12
500- and 600-Level Computer Science Course Credit Required 24-30

Required Courses (16)
Select a minimum of one course from each of the following groups: Theory of Computation, Systems, and Programming Languages 9
Select a minimum of two courses from two of the following groups: Networks and Security, Databases, Software Engineering, or Computational Intelligence 6
CS 695 Doctoral Seminar 1
Readings and Special Problems Courses (0-12)  
CS 597 Reading and Special Problems 1  

General Electives (0-9)  
Select zero to nine credit hours 0-9  

Ph.D. Research (24-36)  
CS 691 Research and Thesis Ph.D.  

Transfer Credit (23)  
A maximum of 23 hours of masters transfer credit is allowed.  

Students With a Bachelor of Science in Computer Science  
Minimum Credits Required 72  
Maximum 400-Level Credit 12  
500-Level Computer Science Course Credit Required 36-54  

Required Courses (16)  
Select a minimum of one course from each of the following groups: Theory of Computation, Systems, and Programming Languages  
Select a minimum of two courses from two of the following groups: Networks and Security, Databases, Software Engineering, or Computational Intelligence  
CS 695 Doctoral Seminar 1  
Readings and Special Problems Courses (6-12)  
CS 597 Reading and Special Problems 6-12  

General Electives (8-26)  
Select 8-26 credit hours 8-26  
Ph.D. Research (24-36)  
CS 691 Research and Thesis Ph.D.  

1 At least three credits of CS 597 or CS 691 are required in the first year.  

Notes  
• To be used to satisfy requirements, courses must be passed with a grade of “B” or better. CS 401, CS 402, CS 403, CSP, and accelerated courses cannot be used. With department approval, courses may be replaced by more advanced courses.  
• The 500- and 600-level electives can include credits from CS 595. They cannot include credits from CS 597, CS 691, or CS 695. With department approval, up to six credit hours may come from outside the CS department.  
• A student’s adviser may require other courses to be taken.  

Core Courses  
There are six core course areas. To meet a core requirement, a course must be taken at Illinois Institute of Technology as part of the Ph.D. program; transfer courses cannot be used.  

Group 1: Theory of Computation (15)  
CS 530 Theory of Computation 3  
CS 533 Computational Geometry 3  
CS 535 Design and Analysis of Algorithms 3  
CS 538 Combinatorial Optimization 3  
CS 539 Game Theory: Algorithms and Applications 3  

Group 2: Systems (9)  
CS 546 Parallel and Distributed Processing 3  
CS 550 Advanced Operating Systems 3  
CS 570 Advanced Computer Architecture 3  

Group 3: Programming Languages (12)  
CS 536 Science of Programming 3  
CS 540 Syntactic Analysis of Programming Languages 3  
CS 541 Topics in Compiler Construction 3  
CS 545 Distributed Computing Landscape 3
Ph.D. Qualifying Examination
The Ph.D. qualifying examination has two parts: three written examinations and an oral examination. The written exam is used to judge a student’s breadth of knowledge; the oral exam is used to judge a student’s research potential. See the computer science website (science.iit.edu/computer-science) and university Graduate Bulletin for details.

Master of Science Exit from Program
Students wishing to leave the direct Ph.D. program with the degree of Master of Science in Computer Science must satisfy all the requirements of the master’s degree and either write an M.S. thesis or pass the Ph.D. qualifying examination. In special circumstances students may petition the department for consideration.

Comprehensive (Research Proposal) Examination
The purpose of the comprehensive examination is to ensure that the candidate has the background to carry out successful research in the chosen area and that the research problem is properly formulated and has sufficient scholarly merit. The student (in concert with the student’s research adviser) must develop a written research proposal containing a literature review, a proposed research topic, and a program of research based upon this topic, and then present it orally as well. See the computer science website (science.iit.edu/computer-science) and university Graduate Bulletin for details.

Thesis Defense
Each student must present an oral defense of his/her Ph.D. thesis. The thesis review committee is appointed in much the same way as the Ph.D. comprehensive examination committee. It will examine the written thesis and examine the student during the oral defense. All Ph.D. thesis defenses are open to the public. See the computer science website (science.iit.edu/computer-science) and university Graduate Bulletin for details.