

COMPUTER SCIENCE (PH.D.)

<https://ceps.unh.edu/computer-science/program/phd/computer-science>

Description

The Ph.D. program is designed to develop a student's ability to carry out advanced research, as well as ensure the breadth and depth of computer science knowledge required to obtain a faculty position in academia or a research position in industry or at a national laboratory. Students first work to obtain breadth knowledge and a faculty research mentor. Then, working with their mentor, they carry out advanced work that results in original research publications and a doctoral dissertation.

Requirements

Code	Title	Credits
CS 900	Graduate Seminar	1
Select six CS graduate courses (of at least 3 credits each) beyond the M.S. or twelve CS graduate courses beyond the B.S. ¹		
Breadth Requirement ²		
Interdisciplinary breadth requirement ³		
Depth Requirement ⁴		
Dissertation ⁵		

- The courses must satisfy the following requirements:
 - Two courses must be implementation intensive (see list below).
 - All students must take CS 845 Formal Specification and Verification of Software Systems.
 - At most two can be CS 998 Independent Study. If two CS 998 courses are taken, they must be taught by different instructors.
- At least two courses must be taken from the three different breadth areas (see list below). Students must pass these classes with a minimum grade of B-.
- This requirement must be satisfied by taking a non-CS 800-level or 900-level course. The course must be approved by the student's research mentor.
- Under the direction of a depth adviser and a depth committee, the student carries out some preliminary research that is likely to lead to a dissertation topic. The student must produce two written reports (a literature survey and a research report) and make a presentation as part of an oral examination on the material. After the student has successfully completed the depth exam and has satisfied the interdisciplinary breadth requirement, the student is advanced to candidacy.
- The student must complete original research and present and defend a dissertation describing that research. The research is carried out under the supervision of a faculty member dissertation adviser and a dissertation committee of at least five members, including one from outside the department.

Implementation Intensive Courses

Implementation intensive courses include:

Code	Title	Credits
CS 812	Compiler Design	3
CS 820	Systems Programming	3
CS 830	Introduction to Artificial Intelligence	3
CS 835	Introduction to Parallel and Distributed Programming	3

CS 870	Computer Graphics	3
CS 953	Data Science for Knowledge Graphs and Text	3

Breadth Course Groups

The list below identifies the three breadth course groups and introductory (800-level) graduate courses in each group. It is also acceptable to satisfy a group requirement by taking an advanced course (900-level) in the specified area. (Note that there are courses in the curriculum that are not in any of the identified groups.)

Code	Title	Credits
Artificial Intelligence		
CS 830	Introduction to Artificial Intelligence	3
CS 833	Mobile Robotics	3
CS 850	Machine Learning	3
CS 857	Mathematical Optimization for Applications	3
CS 931	Planning for Robots	3
CS 950	Advanced Machine Learning	3
CS 953	Data Science for Knowledge Graphs and Text	3
Systems		
CS 820	Systems Programming	3
CS 823	Performance Evaluation of Computer Systems	3
CS 825	Computer Networks	3
CS 827	Software Security	3
CS 853	Information Retrieval	3
CS 920	Distributed Systems and Algorithms	3
CS 925	Advanced Computer Networks	3
CS 927	Software Security Analysis	3
Software		
CS 812	Compiler Design	3
CS 835	Introduction to Parallel and Distributed Programming	3
CS 845	Formal Specification and Verification of Software Systems	3
CS 858	Algorithms	3
CS 870	Computer Graphics	3
CS 871	Web Programming Paradigms	3
CS 875	Database Systems	3
MCBS 913	Applied Bioinformatics	3

Student Learning Outcomes

Graduates of the UNH Ph.D. CS program will have an ability to:

- Understand and apply a wide breadth and depth of computer science knowledge.
- Carry out advanced independent computer science research that results in original publications and a doctoral dissertation.
- Obtain a faculty position in academic, or a research position in industry or at a national laboratory.