

# 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

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. <sup>1</sup>		
Breadth Requirement <sup>2</sup>		
Research Tool <sup>3</sup>		
Depth Requirement <sup>4</sup>		
Dissertation <sup>5</sup>		
Total Credits		19

- <sup>1</sup> The courses must satisfy the following requirements:
- Two 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.
- <sup>2</sup> Courses must be taken from at least four breadth groups (see list below), with one of the groups being the Theory group. Students must obtain a 3.4 GPA in the four breadth courses. The student designates which four courses are used to compute the GPA.
- <sup>3</sup> A research tool represents knowledge and skills in another discipline that can help the student carry out his or her research plan. This is typically satisfied by taking a non-computer-science graduate level course.
- <sup>4</sup> 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 research tool requirement, the student is advanced to candidacy.
- <sup>5</sup> 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:

CS 812	Compiler Design	3
CS 830	Introduction to Artificial Intelligence	3

CS 835	Introduction to Parallel and Distributed Programming	3
CS 870	Computer Graphics	3
CS 980	Advanced Topics (Data Science)	3

## Breadth Course Groups

The list below identifies the seven 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.)

### Group: Introductory Course

#### Theory

CS 845	Formal Specification and Verification of Software Systems	3
CS 858	Algorithms	3

#### Systems

CS 823	Performance Evaluation of Computer Systems	3
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#### Compiler and Language

CS 812	Compiler Design	3
CS 835	Introduction to Parallel and Distributed Programming	3
CS 871	Web Programming Paradigms	3

#### Database

CS 853	Information Retrieval	3
CS 875	Database Systems	3

#### Artificial Intelligence

CS 830	Introduction to Artificial Intelligence	3
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#### Interactive Systems

CS 860	Introduction to Human-Computer Interaction	3
CS 870	Computer Graphics	3

#### Networks

CS 825	Computer Networks	3
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