COMPUTER SCIENCE MAJOR (B.S.)

https://ceps.unh.edu/computer-science/program/bs/computer-science

Description

Computer science focuses on problem solving with a particular emphasis on the design of computer-efficient solutions. Within a few years of obtaining a bachelor's degree alumni will have:

1. Engaged in successful careers in diverse areas of software development and will be pursuing advanced education in computer science or related fields;
2. Applied the full range of core computer science concepts and techniques to fill software development needs of an organization;
3. Adapted to changing directions of computing technology and used state-of-the-art techniques to confront new problems effectively;
4. Navigated the complex interconnections between software and the goals and constraints of the organization served;
5. Participated responsibly in the pervasive and changing role of computing technology in global society as both software engineers and citizens;
6. Operated collaboratively in a team environment and assumed leadership roles.

The B.S. in computer science program is accredited by the Computing Accreditation Commission of ABET.

Requirements

Degree Requirements

Minimum Credit Requirement: 128 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.
Major GPA requirements as indicated.

Major Requirements

Computer science majors must maintain an overall grade-point average of 2.0 or better in all required computer science, mathematics, and computer engineering courses in order to graduate. If at the end of any semester, including the first, a student's cumulative grade-point average in these courses falls below 2.0, the student may not be allowed to continue as a CS major.

In order to meet the CS major requirements, the following courses must be passed with a grade of C- or better CS 410C, CS 410P, CS 415, CS 416, CS 420, CS 515, CS 520, IT 403

If a student wishing to transfer into the computer science major has any coursework that is applicable to the major, the grades in those courses must satisfy the minimum grade requirements for the B.S. degree in computer science. The student must have an overall grade-point average of 2.0 or better in all courses taken at the university.

Computer science majors must complete the following coursework in computer science, mathematics, computer engineering, and science. (all courses are 4 credits unless indicated otherwise):

Code	Title	Credits
Computer Science Courses		
CS 400	Introduction to Computing	2
CS 415	Introduction to Computer Science I	4
or CS 410C	Introduction to Scientific Programming/C	
or CS 410P	Introduction to Scientific Programming/Python	
CS 416	Introduction to Computer Science II	4
CS 420	Foundations of Programming for Digital Systems	4
IT 403	Introduction to Internet Technologies	4
CS 501	Professional Ethics and Communication in Technology-related Fields	4
CS 515	Data Structures and Introduction to Algorithms	4
CS 518	Introduction to Software Engineering	4
CS 520	Computer Organization and System-Level Programming	4
CS 527	Fundamentals of Cybersecurity	4
CS 619	Introduction to Object-Oriented Design and Development	4
CS 620	Operating System Fundamentals	4
CS 659	Introduction to the Theory of Computation	4
CS 758	Algorithms	4
CS 761	Programming Language Concepts and Features	4
CS 791	Senior Project I	4
& CS 792	and Senior Project II	
or CS 799	Thesis	
Computer Science Electives:		
Select one course from the following implementation electives:		4
CS 712	Compiler Design	
CS 720	Systems Programming	
CS 730	Introduction to Artificial Intelligence	
CS 735	Introduction to Parallel and Distributed Programming	
CS 770	Computer Graphics	
Select one course from the following theory electives:		4
CS 723	Performance Evaluation of Computer Systems	
CS 745	Formal Specifications and Verification of Software Systems	
CS 750	Machine Learning	
CS 755	Computer Vision	
CS 757	Mathematical Optimization for Applications	
CS 759	Natural Language Processing	
Select two additional CS courses numbered 690-799 as general electives		8
Professional Electives [1]		
Select one course from the following:		3-4
CS 700-level course		
IT 502	Intermediate Web Design	
IT 604	Server-side Web Development	
IT 605	Client-side Web Development	
IT 612	Scripting Languages	
IT 630	Data Science and Big Data Analytics	
IT 666	Cybersecurity Practices	
IT 705	Project Management for Information Technology	
IT 780	Topics in Information Technology	
MATH 525	Linearity I	
MATH 526	Linearity II	
MATH 527	Differential Equations with Linear Algebra	
MATH 528	Multidimensional Calculus	
MATH 545	Introduction to Linear Algebra	
MATH 645	Linear Algebra for Applications	
MATH 647	Complex Analysis for Applications	
MATH 736	Advanced Statistical Modeling	
MATH 737	Statistical Methods for Quality Improvement and Design	
MATH 739	Applied Regression Analysis	
MATH 740	Design of Experiments I	
MATH 741	Survival Analysis	

MATH 743	Time Series Analysis	
MATH 744	Design of Experiments II	
MATH 745	Foundations of Applied Mathematics I	
MATH 746	Foundations of Applied Mathematics II	
MATH 747	Introduction to Nonlinear Dynamics and Chaos	
MATH 753	Introduction to Numerical Methods I	
MATH 755	Probability with Applications	
MATH 756	Principles of Statistical Inference	
MATH 760	Geometry	
MATH 761	Abstract Algebra	
MATH 767	One-Dimensional Real Analysis	
MATH 776	Logic	
MATH 783	Set Theory	
MATH 784	Topology	
MATH 788	Complex Analysis	
ECE 562	Computer Organization	
ECE 649	Embedded Microcomputer Based Design	
ECE 700-level course		
ENGL 502	Professional and Technical Writing	
GEN 604	Principles of Genetics	
GEN 711	Genomics and Bioinformatics	
Mathematics Courses		
MATH 425	Calculus I	4
MATH 426	Calculus II	4
MATH 531	Mathematical Proof	4
MATH 539	Introduction to Statistical Analysis	4
or MATH 644	Statistics for Engineers and Scientists	
Science courses [2]		
One Discovery Biological Science (BS) with Discovery Lab		4
One Discovery Physical Science (PS) with Discovery Lab		4
Other Courses		
Discovery requirements not already covered by required courses [3]		24
Total Credits		**129-130**

[1] Professional electives must either be chosen from the list of approved courses or another non-introductory CEPS course with significant science and/or engineering focus approved on a per-course basis by the undergraduate studies committee.

[2] Courses must carry the Discovery attributes of Biological Science or Physical Science and include Discovery lab (DLAB).

[3] One of these courses must be writing intensive.

Degree Plan

Recommended Plan of Study

First Year

Fall

		Credits
CS 400	Introduction to Computing	2
CS 415	Introduction to Computer Science I	4
IT 403	Introduction to Internet Technologies	4
MATH 425	Calculus I	4
Discovery I		4
	Credits	**18**

Spring

CS 416	Introduction to Computer Science II	4
CS 420	Foundations of Programming for Digital Systems	4
MATH 426	Calculus II	4
ENGL 401	First-Year Writing	4
	Credits	**16**

Second Year

Fall

CS 515	Data Structures and Introduction to Algorithms	4
CS 518 or CS 527	Introduction to Software Engineering or Fundamentals of Cybersecurity	4
MATH 531 or MATH 539 or MATH 644	Mathematical Proof or Introduction to Statistical Analysis or Statistics for Engineers and Scientists	4
CS 501	Professional Ethics and Communication in Technology-related Fields (Or Discovery II)	4
	Credits	**16**

Spring

CS 520	Computer Organization and System-Level Programming	4
MATH 539 or MATH 644 or MATH 531	Introduction to Statistical Analysis or Statistics for Engineers and Scientists or Mathematical Proof	4
CS 527 or CS 518	Fundamentals of Cybersecurity or Introduction to Software Engineering	4
Discovery II (or CS 501)		4
	Credits	**16**

Third Year

Fall

CS 619	Introduction to Object-Oriented Design and Development	4
CS 620	Operating System Fundamentals (Or Professional Elective)	4
CS 659	Introduction to the Theory of Computation	4
CS 761	Programming Language Concepts and Features (or Discovery III)	4
	Credits	**16**

Spring

Professional Elective (or CS 620)		4
Discovery III (or CS 761)		4
Discovery IV		4
CS 758	Algorithms (Or CS 700-level General Elective or Discovery V)	4
	Credits	**16**

Fourth Year

Fall

CS 791	Senior Project I	2
CS 700-level Implementation or Theory Elective		4
CS 700-level General Elective (or Discovery V)		4
Discovery V (or CS 758)		4
Discovery VI		4
	Credits	**18**

Spring

CS 792	Senior Project II	2
CS 700-level Implementation or Theory Elective		4

CS 700-level General Elective (or CS 758)	4
Discovery VII	4
Credits	**14**
Total Credits	**130**

Discovery (7): Historical Perspectives, Humanities, Fine and Performing Arts, Social Science, World Cultures, Physical Science Discovery Lab, Biological Science Discovery Lab with ONE mandatory course with Writing Intensive (WI) attribute

Student Learning Outcomes

Graduates of the UNH BS CS program will have an ability to:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.
- Learn independently about new technologies, and develop the skills needed to understand them.