

# Computer Science

## Major

## Minor

## Concentration in

- NETWORKS

## Certificates in

- COMPUTING TECHNOLOGY
- SOFTWARE DEVELOPMENT
- PROGRAMMING
- NETWORKING

## See related programs

- COMPUTER INFORMATION SYSTEMS
- INFORMATION TECHNOLOGY
- INFORMATION TECHNOLOGY MANAGEMENT

### Professors:

Chitsaz, Rinard (Chair)

### Associate Professor:

Thiel

### Assistant Professor:

Crall, Song, Zhang, Zheng

### Lecturer:

M. Flinn

- Computer science courses must have a grade of C or better to be applied towards major or minor requirements.
- You will be de-registered from any computer science course for which you have not earned a C or better in the prerequisite computer science course(s).
- You may receive credit by examination for the following courses: COSC 100, 240, 350.
- The Department of Computer Science also offers four certificates to students in other majors and community members. (See separate section).

	MAJOR	FOR NETWORKS CONCENTRATION	MINOR
Hours Required in Computer Science:	50	50	20
Hours Required in Other Departments:	32	32	0
<b>Total Hours Required:</b>	<b>82</b>	<b>82</b>	<b>20</b>

## Mission Statement

The Computer Science Department's mission is to present our students with up-to-date curricula and pedagogy in the computer science and information systems disciplines, ensure that they have a solid foundation in the core concepts, equip them with problem solving and decision-making skills, and prepare them for lifelong learning in the discipline. The department provides for and encourages collegial, intellectual, and academic growth of its faculty. The department supports and encourages local and regional technology initiatives contributing to educational and economic advances.

## Program Educational Objectives

The Frostburg Computer Science program will graduate computer science professionals who have:

- a solid foundation in core computer science concepts reinforced with mathematics and natural science
- an ability to apply modern computer science concepts and theories to contemporary, real world problems
- an understanding of professional responsibility to evaluate their ethical obligations to society, employers, employees and their peers
- an understanding of the commitment needed to pursue life long goals through educational and professional endeavors

## Program Outcomes

The Frostburg Computer Science program will provide students with:

- an ability to apply knowledge of computing and mathematics appropriate to the discipline;
- an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- an ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- an ability to function effectively on teams to accomplish a common goal;
- an understanding of professional, ethical, legal, security, and social issues and responsibilities;
- an ability to communicate effectively with a range of audiences;
- an ability to analyze the local and global impact of computing on individuals, organizations and society;
- a recognition of the need for, and an ability to engage in, continuing professional development;
- an ability to use current techniques, skills, and tools necessary for computing practices;
- an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- an ability to apply design and development principles in the construction of software systems of varying complexity.

## Summary of Requirements for Major/Minor in Computer Science

Major	Minor
<p><b>1. Core Courses: (26 hours)</b></p> <p>COSC 101 The Discipline of Computer Science            COSC 102 Foundations of Computer Science            COSC 240 Computer Science I            COSC 241 Computer Science II            COSC 325 Software Engineering            COSC 365 Digital Logic            COSC 460 Operating Systems Concepts            COSC 489 Computer Science Capstone</p> <p><b>2. Required Advanced Courses: (18 hours)</b></p> <p>COSC 310 Data Structures &amp; Algorithm Analysis            COSC 331 Fundamentals of Computer Networks            COSC 350 Low-Level Programming Concepts            COSC 450 Programming Language Principles &amp; Paradigms            COSC 470 Compiler Design and Implementation            COSC 485 Introduction to the Theory of Computation</p>	<p><b>1. Core Courses: (11 hours)</b></p> <p>COSC 101 The Discipline of Computer Science            COSC 240 Computer Science I            COSC 241 Computer Science II</p> <p><b>2. Electives: (9 hours)</b>  <i>Three additional computer science courses.            Two must be at the 300-level or above.</i></p>

## COMPUTER SCIENCE

**Major** *(continued)***Minor****3. Other Required Courses:****Mathematics** (14 hours)

- MATH 236 Calculus I (*Core Skill 3*)  
 MATH 237 Calculus II  
 MATH 350 Linear Algebra I  
   or MATH 432 Differential Equations  
   or MATH 435 Numerical Analysis  
   or MATH 437 Combinatorics and Graph Theory  
   or MATH 470 Mathematical Models and Applications  
 MATH 380 Introduction to Probability & Statistics

**Science** (12 hours):

Select two courses from the following:

- BIOL 149 General Biology I  
 CHEM 101 General Chemistry I  
 GEOG 103 Physical Geography  
 PHYS 261 Principles of Physics I: Mechanics

AND select one course from the following:

- BIOL 150 General Biology II  
 CHEM 102 General Chemistry II  
 PHYS 262 Principles of Physics II: Electricity and Magnetism

**Other** (6 hours)

- CMST 102 Introduction to Human Communication  
 ENGL 338 Technical Writing (*Core Skill 2*)

**4. Electives:** (6 hours)

A minimum of 6 hours in at least two courses

- COSC 305 Computer Ethics  
 COSC 335 Network Architecture Design  
 COSC 345 The Internet and Multimedia Communications  
 COSC 390 Topics in Modern Programming Languages  
 COSC 415 Computer Interfacing  
 COSC 420 Robotics and Industrial Computer Applications  
 COSC 431 Secure Computing  
 COSC 435 Network Implementation and Testing  
 COSC 440 Database Management Systems  
 COSC 444 Introduction to Distributed Programming  
 COSC 445 Network and Distributed System Management  
 COSC 455 Artificial Intelligence  
 COSC 465 Computer Systems Architecture  
 COSC 475 Interactive Computer Graphics  
 COSC 491 Seminar in Computer Science  
 COSC 494 Field Exp. in Computer/Information Science  
 COSC 499 Individual Problems in Computer Science

**Requirements for Major Concentrating in Networks****1. Core Courses:** (26 hours)

- COSC 101 The Discipline of Computer Science  
 COSC 102 Foundations of Computer Science  
 COSC 240 Computer Science I  
 COSC 241 Computer Science II  
 COSC 325 Software Engineering  
 COSC 365 Digital Logic  
 COSC 460 Operating Systems Concepts  
 COSC 489 Computer Science Capstone

**2. Required Advanced Courses:** (15 hours)

- COSC 331 Fundamentals of Computer Networks  
 COSC 335 Network Architecture Design  
 COSC 345 The Internet and Multimedia Communications  
 COSC 431 Secure Computing  
 COSC 435 Network Implementation and Testing

**3. Other Required Courses:****Mathematics** (14 hours)

- MATH 236 Calculus I (*Core Skill 3*)  
 MATH 237 Calculus II  
 MATH 350 Linear Algebra I  
   or MATH 432 Differential Equations  
   or MATH 435 Numerical Analysis  
   or MATH 437 Combinatorics and Graph Theory  
   or MATH 470 Mathematical Models and Applications  
 MATH 380 Introduction to Probability and Statistics  
   or MATH 209/219 Elements of Applied Probability & Statistics  
   (*Core Skill 3*)

**Science: (12 hours):**

Select two courses from the following:

BIOL	149	General Biology I
CHEM	101	General Chemistry I
GEOG	103	Physical Geography
PHYS	261	Principles of Physics I: Mechanics

And select one course from the following:

BIOL	150	General Biology II
CHEM	102	General Chemistry II
PHYS	262	Principles of Physics II: Electricity and Magnetism

**Other: (6 hours)**

CMST	102	Introduction to Human Communication
ENGL	338	Technical Writing ( <i>Core Skill 2</i> )

**4. Electives: (9 hours)**

A minimum of 9 hours in at least three courses:

COSC	305	Computer Ethics
COSC	310	Data Structures and Algorithm Analysis
COSC	350	Low-Level Programming Concepts
COSC	390	Topics in Modern Programming Languages
COSC	444	Introduction to Distributed Programming
COSC	445	Network and Distributed System Management
COSC	450	Programming Language Principles & Paradigms
COSC	455	Artificial Intelligence
COSC	465	Computer Systems Architecture
COSC	485	Introduction to the Theory of Computation
COSC	491	Seminar in Computer Science
COSC	494	Field Exp. in Computer/Information Science
COSC	499	Individual Problems in Computer Science

**Certificates in**

- COMPUTING TECHNOLOGY
- SOFTWARE DEVELOPMENT
- PROGRAMMING
- NETWORKING

The four **computer science certificates** offer learning opportunities to a range of students, from computing novices to computing professionals.

Interested students might include:

- Degree-seeking undergraduates in any major who wish to develop computing skills beyond those required in their degree program. The certificate represents a credential that may enhance career opportunities in any field.
- Non-degree-seeking students who wish to develop computing and technical skills to increase opportunities for employment.
- Bachelor's degree holders and professionals in the field looking for career enhancement or change.
- If you are completing the networks concentration in the computer science major you cannot earn the networking certificate.

**Computing Technology (12 hours)**

COSC	100/110	Introduction to Computer Science (You may test out of COSC 100/110) (Tech. Fluency)
COSC	120	Introduction to Cyberspace
COSC	130	Introduction to Programming
COSC	220	Introduction to Software Applications

- A course of study for a learner with little or no computing experience looking to develop a solid skill set in computing basics.

**Software Development (14 hours)**

COSC	101	The Discipline of Computer Science
COSC	240	Computer Science I
COSC	241	Computer Science II
COSC	325	Software Engineering

- A study of programming fundamentals and software development methods for a student with basic computing skills.

**Programming (14 hours)**

COSC	101	The Discipline of Computer Science
COSC	240	Computer Science I
COSC	241	Computer Science II

And one of the following:

COSC	310	Data Structures & Algorithm Analysis
COSC	390	Topics in Modern Programming Languages

- A study sequence for students with basic computing skills that provides a foundation in computer programming fundamentals and working expertise in an object-oriented programming language.

**Networking (17 hours)**

COSC	241	Computer Science II (COSC 240 is prerequisite for COSC 241. Students may test out of COSC 240)
COSC	335	Network Architecture and Design
COSC	365	Digital Logic
COSC	435	Network Implementation and Testing
COSC	445	Network and Distributed System Management

- A study sequence for students with programming experience wishing to develop expertise in network theory, design, and application. Permission of department chair required.