

In a world that has become increasingly computer-dependent, the employment outlook for computer science majors should continue to be a bright spot in the jobs sector. The field of computer science will continue to expand as innovations in technology create new opportunities across different industries. (bureau of labor statistics, 2017)

The Bachelor of Science (BS) degree program in Computer Science at Webster University prepares you to meet the demands for innovation in the computer field. Webster's program is designed around identified core knowledge areas of computer science. The program includes theoretical and practical hands-on approaches preparing students to enter the IT workforce or continue their education in a professional graduate degree program.

## PROGRAM OUTCOMES

Upon completion of the program, students will be able to:

- Demonstrate mastery of computer science in the following core knowledge areas:
  - Software development
  - Algorithms and data structures
  - Computer organization, hardware, and architecture
  - Data and information management
- Describe how technological advances impact social issues and professional practice
- Write and orally communicate technical material effectively and professionally
- Apply problem-solving skills and the knowledge of computer science to solve problems

**STEM  
DESIGNATED  
PROGRAM**

## BACHELOR OF SCIENCE COMPUTER SCIENCE



## DEGREE REQUIREMENTS

A minimum of 128 credit hours consisting of the following:

- 51 required credit hours
- Applicable University Global Citizenship Program hours
- Electives

At least 30 of the 51 required hours must be taken at Webster University.  
All upper-level (3000 and above) courses must be taken at Webster University.

## REQUIRED COURSES

- **COSC 1550** Computer Programming I (3 hours)
- **COSC 1560** Computer Programming II (3 hours)
- **COSC 1570** Math for Computer Science (3 hours)
- **COSC 2610** Operating Systems (3 hours)
- **COSC 2670** Network Principles (3 hours)
- **COSC 2710** Social Engineering and Society (3 hours)
- **COSC 2810** Systems Analysis and Design (3 hours)
- **COSC 3050** Data Structures I (3 hours)
- **COSC 3100** Data Structures II (3 hours)
- **COSC 3230** Human-Computer Interaction (3 hours)
- **COSC 3410** Computer Security (3 hours)
- **COSC 3510** Computer Architecture (3 hours)
- **COSC 4110** Database Concepts (3 hours)
- **COSC 4120** Database Applications (3 hours)
- **MATH 3010** Discrete Mathematics (3 hours)

Students will choose two of the following courses:

- **COSC 3660** Network Concepts (3 hours)
- **COSC 3810** Principles of Programming Languages (3 hours)
- **COSC 4250** Object-Oriented Analysis & Design (3 hours)
- **COSC 4260** Object-Oriented Programming (3 hours)
- **MATH 3200** Statistics (3 hours)

## COURSE DESCRIPTIONS

### **COSC 1550 Computer Programming I (3)**

Introduces students to the C++ language in order to teach programming as a systematic discipline and as a problem-solving tool. Acquaints students with fundamental concepts of computers, information processing, algorithms, and programs. May be repeated once for credit. Only offered in a 16-week format.

### **COSC 1560 Computer Programming II (3)**

This course uses the C++ language to introduce students to programming concepts such as abstract data types, use of classes and objects, pointers, and advanced file operations. Prerequisite: COSC 1550 with grade of B- or better. May be repeated once for credit. Only offered in 16-week format.

### **COSC 1570 Math for Computer Science (3)**

Topics covered include number systems, computer arithmetic, binary, octal, hexadecimal, floating point operations, sets, and Boolean algebra.

### **COSC 2610 Operating Systems (3)**

An overview of the concepts and theories of operating systems. Examines the major components found in all operating systems including the memory, process manager, and device and file managers. Prerequisite: COSC 1550 and COSC 1570.

### **COSC 2670 Network Principles (3)**

In this course students examine the various technologies and applications of telecommunications. The course provides an analysis of the current and future trends in telecommunication technologies and services and includes an overview of the industry and the associated management and strategy issues. Prerequisite: COSC 1550 or permission of department.

### **COSC 2710 Social Engineering and Society (3 Hours)**

This course provides the student with current information defining the many methods of deception hackers use in order to gather information with the intent of executing identity theft, fraud, or gaining computer system access; discusses activities toward preventing social engineering threats ranging from elicitation, pretexting, influence and manipulation. The elements of social engineering are presented, discussed and explained by using real-world examples, and the science behind them to unravel the mystery in social engineering.

### **COSC 2810 Systems Analysis and Design (3)**

Covers the basic concepts involved in systems analysis, including effective communication,

analysis tools, and phases of the systems development life cycle. Prerequisite: COSC 1550 or permission of department.

### **COSC 3050 Data Structures I (3)**

Studies the design and implementation of the most common algorithms associated with the basic data types and with some elementary data structures using C++. The relationship of algorithm design to problem solving in general is studied. The course also covers algorithms to improve the robustness and user friendliness of programs. Prerequisite: COSC 1560, COSC 2610, COSC 2810 with a grade of B- or better.

### **COSC 3100 Data Structures II (3)**

This is a continuation of COSC 3050 Data Structures I. Students will program the data structures and algorithms using C++. Prerequisites: COSC 3050.

### **COSC 3230 Human-Computer Interaction (3 Hours)**

Human-computer interaction (HCI) is a field of study that focuses on designing the interactions between humans and computer systems and software. Students in this course will be introduced to user-centered design concepts and how these activities fit into the software development process. Students will also be introduced to usability testing, interactive technologies, and human factors and security. Prerequisite: COSC 1560 and COSC 2810.

### **COSC 3410 Computer Security (3 Hours)**

Students in this course will study the techniques for protecting data within a computer and protecting data as it moves through a network. Data and system security and reliability will be considered in a distributed environment. Topics will include encryption, authentication and digital signatures, threats to the computer system, and system reliability. Prerequisites: COSC 1560 and junior standing.

### **COSC 3510 Computer Architecture (3)**

This course will explore the concept of the modern computer based on layers of virtual machines. While computers may become quite complex, they may be more easily understood as virtual machines that perform a well-defined set of functions. Prerequisites: COSC 1560, COSC 1570, COSC 2610, and junior standing.

### **COSC 3660 Network Concepts**

Explores the basic concepts of computer networks. This course examines and compares network topologies, protocols, and national and international standards. It examines the similarities and differences in local area networks and wide area networks. Prerequisites: COSC 1560 and junior standing.

### **COSC 3810 Principles of Programming Languages (3 Hours)**

This course is a study of the design, evaluation, and implementation of programming languages. It focuses on the principles of design and evaluation and their relationship to the syntax, semantics, and pragmatics of programming languages. Prerequisites: COSC 1560 and junior standing.

### **COSC 4110 Database Concepts (3)**

Students in this course will study database design using the relational model and the Entity-Relationship model. Students will study and use the SQL query language. Database design considerations will include data integrity, relational integrity, redundancy, and security. Students will develop a logical design for a database that will be implemented in COSC 4120. Prerequisites: COSC 1560, COSC 2810 and junior standing.

### **COSC 4120 Database Applications (3)**

Continuation of COSC 4110. Students develop the logical design from COSC 4110 into a complete computer application with documentation. Focuses on specific applications that are important in a variety of computer information systems. Applications are examined from the perspective of user needs and program design. Students study program design using a database management system. Prerequisite: COSC 4110.

### **COSC 4250 Object-Oriented Analysis & Design (3 Hours)**

Designed to teach the student the fundamentals of object-oriented software analysis and design. Presents the theoretical aspects of object-oriented software design but focuses on the practical issues surrounding object-oriented software analysis and design and the format of the design process as it exists in an industrial setting. The student gains experience in the design aspect of the systems development life cycle. Prerequisites: COSC 2810 and COSC 3100.

### **COSC 4260 Object-Oriented Programming**

Continuation of COSC 4250 using C++. Prerequisite: COSC 4250.

### **MATH 3010 Discrete Mathematics (3)**

Discrete math deals with finite numbers and finite processes. This course uses the algorithmic approach to problem solving. Topics may include set, relations, and functions; graphs and trees; counting techniques; and recurrence relations. Prerequisite: MATH 1620 or may be taken concurrently.

### **MATH 3200 Statistics (3 Hours)**

Statistics is the science of analyzing data and arriving at reasonable and intelligent conclusions based upon that analysis. This course will acquaint students with the mathematical concepts of statistical analysis. Prerequisite: Sophomore standing. GCP Coding: (QL)

## ACCREDITATION

Webster University is accredited by  
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