# Computer Science (BS) with an Emphasis in Software Engineering

*This program is offered by the George Herbert Walker School of Business and Technology/Computer and Information Sciences Department. It is offered at the St. Louis main campus.*

STEM program

## Program Description

The Bachelor of Science in Software Engineering equips students with the essential digital skills in high demand across industries. Software engineers play a key role in developing smart solutions, from mobile apps to systems for the Internet of Things, while also addressing the ethical and social impacts of technology. This program focuses on core areas of computer science, such as software design, validation, verification, data analysis, and project management. Students gain a solid foundation in programming, object-oriented design, security, and networks, with hands-on experience in various coding paradigms. Graduates are well-prepared to enter the workforce or pursue advanced studies in software engineering.

## Learning Outcomes

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

- Demonstrate proficiency in core knowledge areas of computer science, including but not limited to software development, algorithms, data structures, computer organization, hardware, architecture, data and information management.
- Apply ethical principles and understand the impact of technology on social issues and professional practices, promoting responsible and socially aware technology solutions.
- Demonstrate written and oral communication skills for conveying technical concepts clearly and professionally.
- Apply their problem-solving skills and knowledge of data and information management.
- Apply software engineering principles, practices and methodologies to develop and maintain software systems. They will demonstrate proficiency in software design development, testing, and project management, contributing to the creation of high-quality software solutions.
- Apply algorithms and data structures, design efficient and scalable software solutions. Analyze algorithmic complexities, optimize code, and employ data structures to manage and manipulate information effectively.
- Identify computer organization, hardware components, and system architectures. They will apply this knowledge to optimize software for specific hardware components, and system architectures.
- Evaluate and analyze software systems to identify and address issues in design and functionality.

## Degree Requirements

For information on the general requirements for a degree, see Baccalaureate Degree Requirements under the Academic Policies and Information section of this catalog.

- 60 required credit hours
- 30 Applicable University Global Citizenship Program hours
- 30 Elective credit hours

At least 30 of the required 60 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 3410 Computer and Information Security (3 hours)
- COSC 3510 Computer Architecture (3 hours)
- COSC 3810 Principles of Programming Languages (3 hours)
- COSC 4110 Database Concepts (3 hours)
- COSC 4120 Database Applications (3 hours)
- MATH 2410 Discrete Mathematics (3 hours)

### Emphasis Specific Required Courses

- COSC 3230 Human-Computer Interaction (3 hours)
- COSC 4030 Software Engineering Validation and Verification (3 hours)
- COSC 4250 Software Engineering I (3 hours)
- COSC 4260 Software Engineering II (3 hours)
- COSC 3500 IT Project Management (3 hours)

And choose **one** of the following: (3 hours)

- COSC 2050 Java Programming (3 hours)
- COSC 2110 Computer Language (3 hours)
- COSC 1800 Python Programming (3 hours)