# Computer Science

(Bachelor of Science)

Students interested in Computer Science have several options, including an emphasis in Cybersecurity, a more traditional emphasis in Software Engineering, and a minor. The two Computer Science emphases offer an expanding array of theoretical and applied work that prepares students to enter the job market or pursue graduate studies. The minor in Computer Science offers lower-level basic skills and an upper-level flexible approach that can be used to augment many majors, from business to the design arts and humanities.

The field of computer science is undergoing great changes as technology advances and the need for computer software increases. Students entering this field must not see a bachelor's degree in computer science as the culmination of study in the field. Rather, they must see it as the first step in a continuing education process that will last as long as they choose to stay in the field. The goal of the Computer Science major is to provide students with a strong foundation upon which they can continue to build as the field changes. Students can receive instruction in areas such as software design and project management, object-oriented programming, design of algorithms, operating systems, database management systems, neural networks, computer graphics, network programming, cybersecurity, and more.

Computer science courses are often mistaken for programming courses. In reality, they require much more than learning and mastering a programming language. The heart of software design is not the language, but the ability to define a problem, analyze various components, and project and evaluate potential solutions, all of which must be scalable and robust. This must also be done under the constraint that they are subject to limitations inherent in a given computer. Students must understand that in industry there must be more than just a working program. Good software must not only work but must be fully documented, clearly written, easily modifiable to meet changing and more extensive requirements, and engineered for stability, security, and correctness.

Equally important, the program provides a theoretical base for computer science and helps students understand there is more to computer science than software development. Students develop skills they can use upon graduation but they must be prepared to enter a field which is both diverse and rapidly changing and they must be able to adapt to new technologies. This requires a solid theoretical foundation with knowledge of how computers work and how they carry out tasks specified in applications software. It requires that students think beyond writing software and explore areas such as neural networks, computer graphics, algorithm analysis, or scientific applications. This knowledge is an important ingredient to professional development as it gives them the tools they need to analyze efficiency and evaluate various programming and data design options and to see the possible futures as computer science evolves. Simply providing them with skills necessary to enter the computing profession is not sufficient. Each student must be prepared to apply what he or she has learned in order to adapt to the inevitable changes that will occur. Each must also have the ability to learn new ideas and apply them.

Graduates of the Computer Science program are prepared to continue their education at the graduate level or to apply for entry-level positions in industry. Typical entry-level jobs are programmer or programmer/analyst positions.

All registered students have access to the University's computing facilities. Student accounts allow students to access a wide variety of both PC-compatible and Macintosh computers, Linux and database servers (for select courses), various software developer environments, and of course the internet. Labs are open seven days per week and are staffed by consultants who provide assistance in using the facilities. Classrooms also have network connections which allow demonstrations of software and internet applications to be integrated with classroom lectures. There is also a Computer Science teaching lab with 25 workstations and display facilities that support Computer Science instruction.

Computer Science courses have a strict prerequisite structure. It is imperative that students learn what courses are prerequisites for others and when they are offered. Students are strongly encouraged to talk to an adviser very early in their college career.

Students seeking information on teacher certification should contact the Education Office.

## Major Area of Emphasis (http://catalog.uwgb.edu/undergraduate/programs/computer-science/major/)

Students must complete requirements in one of the following areas of emphasis: (http://catalog.uwgb.edu/undergraduate/programs/computer-science/major/)

- Artificial Intelligence (http://catalog.uwgb.edu/undergraduate/programs/computer-science/major/)
- Cybersecurity (http://catalog.uwgb.edu/undergraduate/programs/computer-science/major/)

## Minor

| Code | Title | Credits |
|---|---|---|
| **Supporting Courses** | | **9** |
| COMP SCI 120 | Web Programming | |
| COMP SCI 130 | Computer Programming I | |

| | | |
|---|---|---|
| COMP SCI 240 | Discrete Mathematics | |
| **Upper-Level Courses** | | **13-15** |
| **Required** | | |
| COMP SCI 330 | Computer Programming II | |
| **Electives** | | |
| (choose four 300-level or 400-level COMP SCI courses): | | |
| **Total Credits** | | **22-24** |

# Curriculum Guide

An example: Four-year plan for **Computer Science Major**

**120 credits necessary to graduate.**

Students must complete requirements in one of the following areas of emphasis: (http://catalog.uwgb.edu/undergraduate/programs/computer-science/major/)

- Artificial Intelligence
- Cybersecurity (http://catalog.uwgb.edu/undergraduate/programs/computer-science/major/)

The plan is a representation and categories of classes can be switched. Check with your advisor.

| Course | Title | Credits |
|---|---|---|
| **First Year** | | |
| **Fall** | | |
| COMP SCI 120 | Web Programming | 3 |
| ENGR 236 | Technical Writing and Information Literacy | 3 |
| COMM 133<br>or COMM 166<br>or COMM 237 | Fundamentals of Public Address<br>or Fundamentals of Interpersonal Communication<br>or Small Group Communication | 3 |
| GenEd Course 1 | | 3 |
| MATH 202 | Calculus and Analytic Geometry I | 4 |
| | **Credits** | **16** |
| **Spring** | | |
| COMP SCI 130 | Computer Programming I | 3 |
| COMP SCI 171 | Technology, Ethics, and Society | 3 |
| COMP SCI 251 | Computer Systems Fundamentals | 3 |
| GenEd Course 2 | | 3 |
| MATH 260 | Introductory Statistics | 4 |
| | **Credits** | **16** |
| **Second Year** | | |
| **Fall** | | |
| COMP SCI 140 | Programming for Quantitative Problem Solving | 3 |
| COMP SCI 240 | Discrete Mathematics | 3 |
| COMP SCI 330 | Computer Programming II | 3 |
| GenEd Course 3 | | 3 |
| GenEd Course 4 | | 3 |
| | **Credits** | **15** |
| **Spring** | | |
| COMP SCI 181 | Human-Centered Design | 3 |
| COMP SCI 221 | Database Design & Management | 3 |
| COMP SCI 348 | Computer Networks | 3 |
| GenEd Course 5 | | 3 |
| MATH 320 | Linear Algebra and Matrix Theory | 4 |
| | **Credits** | **16** |
| **Third Year** | | |
| **Fall** | | |
| COMP SCI 351 | Data Structures | 3 |
| COMP SCI 353 | Computer Architecture and Organization | 3 |
| COMP SCI 361 | Information Assurance and Security | 3 |
| COMP SCI 362 | Artificial Intelligence & Data Science | 3 |

| | | |
|---|---|---|
| GenEd Course 6 | | 3 |
| | **Credits** | **15** |
| **Spring** | | |
| COMP SCI 373 | Cloud Computing | 3 |
| COMP SCI 450 | Theory of Algorithms | 3 |
| COMP SCI 452 | Operating Systems Using Linux | 3 |
| Emphasis Elective 1 | | 3 |
| GenEd Course 7 | | 3 |
| | **Credits** | **15** |
| **Fourth Year** | | |
| **Fall** | | |
| Emphasis Elective 2 | | 3 |
| Emphasis Elective 3 | | 3 |
| GenEd Course 8 | | 3 |
| GenEd Course 9 | | 3 |
| Free Elective | | 3 |
| | **Credits** | **15** |
| **Spring** | | |
| COMP SCI 490 | Capstone in Computer Science | 3 |
| Upper-level Elective | | 3 |
| GenEd Course 10 | | 3 |
| Free Elective | | 3 |
| | **Credits** | **12** |
| | **Total Credits** | **120** |

# Faculty

**Tanim Ahsan**; Associate Professor; Ph.D., Marquette University*

**Iftekhar Anam**; Associate Professor; Ph.D., University of Memphis, chair*

**Nazim Choudhury**; Associate Professor; Ph.D., University of Sydney*

**Sayeda Farzana Aktar**; Assistant Professor; Ph.D., Marquette University

**Prakash Duraisamy**; Assistant Professor; Ph.D., University of North Texas

**Omar Meqdadi**; Assistant Professor; Ph.D., Kent State University*

**Md Golam Murshed**; Assistant Professor; Ph.D., Clarkson University