

# Computer Science - Bachelor of Arts in Computer Science

For information, contact the Department of Computer Science and Software Engineering 262 McVey Data Science Building, 513-529-0340, e-mail [cseAdvising@MiamiOH.edu](mailto:cseAdvising@MiamiOH.edu), or visit <http://cse.MiamiOH.edu>.

If you want to change the world and you like to think analytically and solve problems, and have an aptitude for mathematics, then consider a major in computer science. Innovations such as the internet, mobile and web applications, video games, machine learning, and artificial intelligence all owe their foundations to developments in computer science.

The Bachelor of Arts degree in Computer Science provides students with an understanding of the key principles and practices of computing and includes a focus in a second area through the completion of a minor, a co-major, or a second major outside of Computer Science to create powerful combinations of expertise. In either the BS or BA degree program, you will study programming languages, algorithms, computer architecture, operating systems, and applications of computer science such as networks, security, virtual reality, and the ethical and social implications of computer technology.

The U.S. Bureau of Labor's job outlook for computer science graduates is excellent, and the number of positions is expected to increase by 25% between 2021 and 2031. This employment growth is due to the demand for increasing efficiency in network technology, computing speeds, software performance, and embedded systems. The median annual earnings for software developers were \$120,730 in May 2021. According to the National Association of Colleges and Employers, starting offers for graduates with a bachelor's degree in computer science average more than \$72,000.

Graduates from Department of Computer Science and Software Engineering programs may work as software engineers, consultants, programmers, network systems analysts, computer scientists, systems programmers, network administrators, or database administrators. The minor or second major completed as part of the Bachelor of Arts program can open additional possibilities when you graduate.

## Understanding the Bachelor of Arts and Bachelor of Science degree options

When deciding between a BA or a BS degree in Computer Science, begin by thinking about your interests:

- **Do you have an interest in another subject area that you would like to pursue alongside majoring in Computer Science?** If so, then consider the Bachelor of Arts degree. This degree requires a minor or second major outside of Computer Science and Software Engineering. This allows you to learn about business, the arts, education, science, or some other field of interest to you. It also gives you more flexible science options.
- **Would you like to take additional computer science electives, and strengthen your mathematics, statistics, and science knowledge?** If so, then the Bachelor of Science degree might be your best bet. It includes 3 additional Computer Science electives

(so, 7 electives in all), 3 additional electives in mathematics and/or statistics, and 2 science courses that are designed for science majors.

- **What if you are not sure?** No problem: the requirements look the same for roughly the first two years. An advisor from our department can help you plan your courses in a way that keeps your options open in case you would like to switch.

Students may not double major in both the BS and BA in Computer Science. The minor or additional major taken to meet BA degree requirements must be outside the Department of Computer Science and Software Engineering. At least nine credit hours taken to meet the requirements for the minor must be unique, additional credit hours beyond the requirements of the BA in Computer Science degree. Students who double major must take a minimum of 15 unique, additional credit hours in their second major beyond the requirements of the first major. There are no other restrictions on the discipline on which the minor may focus.

## Program Educational Objectives

Graduates from the Computer Science program are expected to attain or achieve the following Program Educational Objectives within a few years of graduation:

- Develop in their chosen profession and/or progress toward an advanced degree
- Provide innovative solutions using technical skills in their discipline
- Communicate effectively, demonstrate leadership, and work collaboratively in diverse teams/organizations
- Act responsibly and ethically in their profession and as informed citizens

## Student Outcomes

- Analyze a complex computing problem and 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.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

## Departmental Honors

If you excel in your studies, you may qualify for the University Honors Program or the program for Honors in Computer Science and Software Engineering. As a senior in these programs, you will have the opportunity to work closely with the faculty on research projects of interest.

## Credit/No-Credit Policy

All courses in mathematics, statistics and those in the College of Engineering and Computing (CEC, CPB, CSE, CYB, ECE, EGM, MME, QTM) that are used to fulfill requirements of the major must be taken for a grade.

## Divisional Policy

**MULTIPLE MAJORS:** Students with two or more majors in the College of Engineering and Computing must take a minimum of 15 unique, additional credit hours in each major.

## Graduate Study

The department offers a combined bachelor's/master's degree program that allows students to complete bachelor's and master's degrees in computer science in an accelerated manner. Students are eligible to apply for this program in their junior year. Please contact the CSE department office for more information.

Additional information is available from the CSE department office and website <http://cse.MiamiOH.edu>.

## Program Requirements

(80 semester hours)

| Code  | Title   | Credit Hours |
|---|---|--------------|
| <b>Core Requirements</b>  |   |              |
| STC 135<br>or APC 231<br>or ENG/IMS 224                               | Principles of Public Speaking<br>Small Group Communication<br>Professional Communication & Digital Rhetoric | 3            |
| Mathematics and Statistics  |   |              |
| MTH 151   | Calculus I  | 4            |
| MTH 231<br>or MTH 331   | Elements of Discrete Mathematics<br>Proof: Introduction to Higher Mathematics                               | 3            |
| STA 261<br>or STA 301<br>or ECE 345                                   | Statistics<br>Applied Statistics<br>Introduction to Probability, Statistics, and Random Processes           | 3-4          |
| <b>Minor, second major, or co-major outside of the CSE department</b> |   | <b>18-30</b> |
| <b>Computer Science Core</b>  |   |              |
| CSE 174   | Fundamentals of Problem Solving and Programming   | 3            |
| CYB 134<br>or CIT 258   | Introduction to Cybersecurity<br>Introduction to Global Cybersecurity                                       | 3            |
| CEC 111   | Imagination, Ingenuity and Impact I   | 2            |
| CEC 112   | Imagination, Ingenuity, and Impact II   | 2            |
| CSE 201   | Introduction to Software Engineering  | 3            |
| CSE 271   | Object-Oriented Programming   | 3            |
| CSE 274   | Data Abstraction and Data Structures  | 3            |
| CSE 278   | Systems I: Introduction to Systems Programming  | 3            |
| CSE 374   | Algorithms I  | 3            |
| CSE 381   | Systems 2: OS, Concurrency, Virtualization, and Security  | 3            |

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| CSE 383                                  | Web Application Programming  | 3         |
| CSE 448                                  | Senior Design Project I  | 2         |
| CSE 449                                  | Senior Design Project II   | 1-2       |
| CSE 465                                  | Comparative Programming Languages                                  | 3         |
| <b>CSE Electives (4 courses)</b>         |  | <b>12</b> |
| 9-12 hours of computer science electives |  |           |
| CSE/CYB 235                              | Computer Network Design and Administration                         |           |
| CSE 268                                  | Introduction to Knowledge Representation                           |           |
| CSE 302                                  | Software Construction  |           |
| CSE 382                                  | Mobile App Development   |           |
| CSE 385                                  | Database Systems   |           |
| CSE 386                                  | Foundations of Computer Graphics and Games                         |           |
| CSE 389                                  | Game Design and Implementation                                     |           |
| CSE 401                                  | Software Quality Assurance and Testing                             |           |
| CSE 432                                  | Machine Learning   |           |
| CSE 433                                  | Deep Learning  |           |
| CSE 434                                  | Generative Artificial Intelligence                                 |           |
| CSE 443                                  | High Performance Computing & Parallel Programming                  |           |
| CSE 444                                  | Applied Cryptography   |           |
| CSE 451                                  | Web Services and Service Oriented Architectures                    |           |
| CSE 468                                  | Applied Knowledge Representation                                   |           |
| CSE 470                                  | Special Topics in CSE  |           |
| CSE 473                                  | Automata, Formal Languages, and Computability                      |           |
| CSE 474                                  | Compiler Design  |           |
| CSE 484                                  | Algorithms II  |           |
| CSE 485                                  | Advanced Database Systems  |           |
| CSE 486                                  | Introduction to Artificial Intelligence                            |           |
| CSE 488                                  | Image Processing & Computer Vision                                 |           |
| CSE 489                                  | Advanced Graphics and Game Engine Design                           |           |
| CYB 334                                  | Network Security   |           |
| 0-3 hours of affiliate electives         |  |           |
| CSE 202                                  | Software Requirements  |           |
| CSE 212                                  | Software Engineering for User Interface and User Experience Design |           |
| CSE 262                                  | Technology, Ethics, and Global Society                             |           |
| CSE 270                                  | Special Topics   |           |
| CSE 273                                  | Optimization Modeling  |           |
| CSE 276                                  | Mathematics and Computer Science                                   |           |
| CSE 301                                  | Software Architecture and Design                                   |           |
| CSE 372                                  | Stochastic Modeling  |           |
| CSE 411                                  | Introduction to Model-Driven Software Engineering                  |           |
| CSE 440                                  | CSE Special Topics - Affiliate                                     |           |
| CSE 456/<br>BIO 485/MBI 485              | Bioinformatic Principles   |           |

CSE/BIO/CHM/ Bioinformatics Computing Skills  
 MBI 466

CYB 234 System Administration and Scripting  
 for Cybersecurity

CYB 236 Data Security

CYB 331 Software Security

ECE 287 Digital Systems Design

ECE 484 Embedded Systems Design

ECE 461 Network Performance Analysis

IMS 440 Emerging Technology Practicum

IMS 461 Virtual Reality

ISA 401 Business Intelligence and Data  
 Visualization

ISA 414 Managing Big Data

ISA 491 Introduction to Data Mining in  
 Business

0-3 hours of research electives

CSE 340U

CSE 480 Special Problems

CSE 491 Undergraduate Research

**Total Credit Hours**

**80-94**