

## Computer Science - A.S. Degree

---

### Description

Graduates of the Computer Science Associate in Science degree will have the skills required for entry level software development. This degree combines both CTE & Transfer outcomes and integrates entry level skills for software development with curriculum in secure coding, hacking techniques, automation of security operations, and DevOps. This Computer Science degree infuses Computer Science competencies with Cybersecurity competencies and is aligned with curriculum guidance (<http://ccecc.acm.org/files/presentations/ITICSE2016-Poster-final.pdf>) from governing bodies such as the Association of Computing Machinery (ACM) and the National Initiative for Cybersecurity Education (NICE). The curriculum is mapped to the nationally defined Knowledge Units (KU) and articulates into four-year programs in both Computer Science and Cybersecurity. The curriculum includes instruction in the fundamentals of problem solving and analysis, programming, data structures, and architecture. Additional requirements include Calculus, Physics and Discrete Mathematics. This program takes a contextualized approach to the CS major through the choice of language, C++, and the approach to curriculum subjects. It aims to develop skills in the design and implementation of software that operates correctly at extreme scale. It equips the graduate to select strategies and develop programs that solve complex problems within appropriate constraints such as time, connectivity, processing, or storage limitations.

This degree program may require additional semesters depending on chosen electives. The optional restricted electives prepare Computer Science graduates to enter specific software development workforce sectors and earn a corresponding salary premium. The Cybersecurity courses are part of state approved A.S. Degree and Certificate of Achievement programs and have been demonstrated to confer desirable workforce skills which command higher compensation when combined with the Computer Science software development skill set.

This program also prepares students for transfer to four-year colleges for further study in Computer Science or Cybersecurity, as well as related areas such as Computer Engineering. Students who are interested in transferring after completion of the two-year degree program should consult with the departmental faculty chair, read the "Transfer Information" section of the college catalog, and discuss their plans with their program advisor or counselor. If you wish to substitute one class for another because of specific requirements of the transfer institution you will attend, consult with a counselor. Four-year universities may have additional or different course requirements for completion of lower division courses. The website [transfer.assist.org](http://www.assist.org) (<http://www.assist.org/web-assist/welcome.html>) can provide additional information about applicable courses for transfer.

### Major Core Courses: 31- 32 units

**Units: 0.0**

CIS 006	Introduction to Computer Programming
OR	
CIS 007	Control Structures and Objects
CIS 011	Discrete Structures and Logic
CIS 033	Software Architectures and Algorithms
CIS 078	Digital Architectures for Computation
MATH 003A	Calculus I
MATH 003B	Calculus II

NOTE: MATH 011 accepted as substitute for CIS 011

**Optional Restricted Electives 12 - 17 units**

**Units: 0.0**

Select one group of Optional Restricted Electives from the list below:

**Group A: Cybersecurity - Secure Software Development**

**Units: 0.0**

---

CIS 071	Introduction to Information Systems Security
CIS 059	Applications in Information Security
CIS 056	Secure Coding in Java and .NET
CIS 057	Web Application PEN Testing

---

**Group B: Cybersecurity - DevOps (Dev/Sec/Ops)**

**Units: 0.0**

---

CIS 055	Hacker Techniques, Exploits & Incident Handling	
CIS 060	Computer Forensics Fundamentals	
CIS 247	Information Systems Skills Challenge	1.0
CIS 052	Cloud Security Fundamentals	
CIS 053	Intrusion Detection In-Depth: Compliance, Security, Forensics and Troubleshooting	
CIS 178	Build Automation for DevOps & QA	

---

**Group C: Blockchain Services and Mobile Applications**

**Units: 0.0**

---

CIS 066	XML Documents and Applications
CIS 093	Cross Platform Mobile Application Development
CIS 100	Introduction to Blockchain, Cryptocurrencies, and Identity
CS 043	High Performance Web Applications and Services

---

**Group D: DevOps - Software Engineering Automation and Continuous Integration**

**Units: 0.0**

---

CIS 051	Introduction to Information Technology Project Management
CS 020	Python Application Programming
CS 080	Software Engineering
CIS 178	Build Automation for DevOps & QA
CIS 179	Agile Software Management and Project Automation

---

**Group E: High Performance Computing, Data Science, and Artificial Intelligence**

**Units: 0.0**

---

CS 020	Python Application Programming	0.0
CS 060	Applications of Artificial Intelligence and Deep Learning	
CIS 008	Introduction to Parallel and Cloud Programming	
CIS 098	Database Programming with SQL	
MATH 003E	Linear Algebra	

---

**Group F: Swift Software Development****Units: 0.0**

CS 025 Swift Application Programming

AND

CS 026 Swift Data Structures and Algorithms

AND

CS 027 Swift Universal Framework Applications

AND

CS 247 Swift Multi-Platform Application Development

3.0

**Major Requirements****Units: 0.0**

31.0-32.0

Total Major Requirements

**General Education Requirements****Units: 0.0**

15.0-17.0

General Education Requirements (includes 2-4 double-counted units to achieve required minimum of 19)

**Degree Electives****Units: 0.0**

12.0-17.0

Degree Electives

**Minimum Total Units Required for the Degree****Units: 60.0****Total: 60.0**