

# Merritt College

## Computer Science

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### Overview

College	Merritt - Division II
Originator	Courtney Brown
Award Type	A.S. Degree

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### Codes and Dates

State Approval Date	12/22/2021
Curriculum Committee Approval Date	5/14/2021
Board of Trustees Date	12/14/2021
Current Effective Date	1/01/2022
Program Control Number	37964
Top Code	0707.00* - Computer Software Development

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### 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](#) 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](https://transfer.assist.org) can provide additional information about applicable courses for transfer.

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### Career Opportunities

Career opportunities include entry-level positions as Application Software Developers (SOC 15-1132), Computer Systems Analysts (SOC 15-1121), Systems Software Developers (SOC 15-1133), Information Security Analysts

(SOC 15-1122), and Network and Computer Systems Administrators (SOC 15-1142). Additional career opportunities include entry-level jobs in the fields of software development, cybersecurity (secure software development), DevOps – the use of software to automate operations, blockchain services and mobile applications, high performance computing, data science, and artificial intelligence.

## Program Learning Outcomes

Upon successful completion of this program, students will be able to:

1. Select the appropriate design and implementation to solve a problem within given constraints
2. Analyze computer architecture to formulate estimates of performance
3. Explain the fundamentals of problem solving and analysis
4. Analyze software design and/or implementation and make suggestions to improve security.
5. Design and Implement software to automate security operations.

## Degree Requirements:

### Major Core Courses: 31- 32 units

**Credit Hours:** (0 Required)

CIS 006 or	Introduction to Computer Programming	5
CIS 007	Control Structures and Objects	4
CIS 011	Discrete Structures and Logic	4
CIS 033	Software Architectures and Algorithms	4
CIS 078	Digital Architectures for Computation	4
MATH 003A	Calculus I	5
MATH 003B	Calculus II	5
PHYS 004A	General Physics with Calculus	5

*NOTE: MATH 011 accepted as substitute for CIS 011*

### Optional Restricted Electives 12 - 17 units

**Credit Hours:** (0 Required)

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

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

**Credit Hours:** (0 Required)

CIS 071	Introduction to Information Systems Security	3
CIS 059	Applications in Information Security	3
CIS 056	Secure Coding in Java and .NET	3
CIS 057	Web Application PEN Testing	3

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

**Credit Hours:** (0 Required)

CIS 055	Hacker Techniques, Exploits & Incident Handling	3
CIS 060	Computer Forensics Fundamentals	3
CIS 247	Information Systems Skills Challenge	1
CIS 052	Cloud Security Fundamentals	3
CIS 053	Intrusion Detection In-Depth: Compliance, Security, Forensics and Troubleshooting	3
CIS 178	Build Automation for DevOps & QA	4

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

**Credit Hours:** (0 Required)

CIS 066	XML Documents and Applications	2
CIS 093	Cross Platform Mobile Application Development	4
CIS 100	Introduction to Blockchain, Cryptocurrencies, and Identity	3

CS 043	High Performance Web Applications and Services	3
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**Group D: DevOps - Software Engineering Automation and Continuous Integration** **Credit Hours:** (0 Required)

CIS 051	Introduction to Information Technology Project Management	4
CS 020	Python Application Programming	3
CS 080	Software Engineering	3
CIS 178	Build Automation for DevOps & QA	4
CIS 179	Agile Software Management and Project Automation	3

**Group E: High Performance Computing, Data Science, and Artificial Intelligence** **Credit Hours:** (0 Required)

CS 020	Python Application Programming	0
CS 060	Applications of Artificial Intelligence and Deep Learning	3
CIS 008	Introduction to Parallel and Cloud Programming	4
CIS 098	Database Programming with SQL	4
MATH 003E	Linear Algebra	3

**Group F: Swift Software Development** **Credit Hours:** (0 Required)

CS 025 and	Swift Application Programming	4
CS 026 and	Swift Data Structures and Algorithms	4
CS 027 and	Swift Universal Framework Applications	4
CS 247	Swift Multi-Platform Application Development	3

**Major Requirements** **Credit Hours:** (0 Required)

Total Major Requirements	31 - 32
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**General Education Requirements** **Credit Hours:** (0 Required)

General Education Requirements (includes 2-4 double-counted units to achieve required minimum of 19)	15 - 17
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**Degree Electives** **Credit Hours:** (0 Required)

Degree Electives	12 - 17
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**Minimum Total Units Required for the Degree** **Credit Hours:** (60 Required)

**Total: 60**

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