



Merritt College Computer Science Associate in Science Degree (pending)

Learn Design *and* Implementation - The Computer Science Associate in Science Degree allows students to gain skill in the design of software and the implementation of software designs. It incorporates study in Mathematics and Physics to enable the student to design models of systems that often cannot be directly measured and observed. This enables the creation of algorithms; an unambiguous specification of how to solve a class of problems. This skill is combined with instruction in implementation (coding), analysis of software designs, and use of a strongly typed programming language to create programs. These two distinct skill sets form the basis for continued study in Computer Science, Computer Engineering, and related fields.

Workforce *and* Transfer Degree – The Associate in Science in Computer Science is a terminal degree. It is a Career Education (CE) degree that enables the student to join the software development workforce at the entry level. This degree incorporates courses that confer skills that are responsive to community and industry needs including: Cybersecurity, DevOps, Blockchain Services, Mobile Applications, Agile Project Automation and Continuous Integration, High Performance Computing (HPC), Data Science and Artificial Intelligence. *Universities also consider this degree a transfer degree* that may fulfill the lower division course sequence of a Computer Science baccalaureate. This often permits entry to a baccalaureate program as a junior. The 2014 average salary for a software developer with a Bachelor of Science in Computer Science was \$140,000 per year. The Oakland Metropolitan Chamber of Commerce's 2016 Regional Occupational Analysis of the Bay Area Labor Market projected the demand for Software Developers in the East Bay to grow by 78% in the next 5 years, and to continue to be the top occupation for workforce development efforts Bay Area wide.

Computer Science *and* Cybersecurity - The Merritt College Computer Science A.S. degree infuses Computer Science competencies with Cybersecurity competencies and is aligned with [curricular guidance](#) from the governing bodies; 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. Cybersecurity Knowledge Units (KU) and course mappings are published by the National Initiative for Cybersecurity Careers and Studies (NICCS) at <https://niccs.us-cert.gov/training/search/merritt-college>. 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. Students in our Cybersecurity courses have earned national recognition fielding a team that finished #4 in the highest (Gold) bracket of 2017, and #5 in 2018 National Cyber League competition. This merging of Cybersecurity and Computer Science puts Merritt College at the cutting edge of two-year Computer Science programs.

Required Courses

CIS 006	Introduction to Programming	5
<i>or</i>		
CIS 007	Control Structures and Objects	4
CIS 033	Software Architectures and Algorithms	4
CIS 011	Discrete Structures and Logic	4
CIS 078	Digital Architectures for Computation	4
MATH 03A	Calculus I	5
Math 03B	Calculus II	5
PHYS 004A	General Physics with Calculus	5
	<i>MATH 011 accepted as substitute for CIS 011</i>	

Restricted Electives

Group A	Cybersecurity – Secure Software Development	
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 Penetration Testing	3

Group B

Cybersecurity – DevOps (Dev/Sec/Ops):

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 and QA	4
	<i>CIS 247 requires participation in one round of Ethical Hacking Competition: National Cyber League (NCL), Cyberpatriots, Cyberdefenders, or Equivalent.</i>	

Group C

Blockchain services and Mobile Applications

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

Group D

DevOps – Software Engineering and Continuous Integration:

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 and QA	4
CIS 179	Agile Software Management and Project Automation	3
	<i>This elective qualifies you for the Agile Certified Practitioner exam</i>	
	<i>https://www.pmi.org/certifications/types/agile-acp</i>	

Group E

High Performance Computing, Data Science, and Artificial Intelligence

CS 020	Python Application Programming	3
MATH 03E	Linear Algebra	3
CIS 008	Introduction to Parallel and Cloud Programming	4
CIS 060	Applications of Artificial Intelligence and Deep Learning	3

Major Requirements	31-32
Local Degree General Education Requirements*	19
Restricted Electives	12-17
Total Units	55-61

* Replace "Local Degree General Education" with CSU GE-Breadth (30 units min) or IGETC (37 units min) as appropriate

Recommended Course Sequence

1st Semester		
CIS 006	Introduction to Programming	5
or		
CIS 007	Control Structures and Objects	4
MATH 03A	Calculus I	5
ENGL 01A	Composition and Reading	4
Or	Critical Thinking in Reading and Writing	3
ENGL 005		
	1st Semester Units	16
2nd Semester		
CIS 033	Software Architectures and Algorithms	4
MATH 03B	Calculus II	5
PHYS 04A	General Physics with Calculus	5
	2nd Semester Units	14
3rd Semester		
CIS 011	Discrete Structures and Logic	4
Restricted Elective Courses		6
General Education Courses		5
	3rd Semester Units	15
4th Semester		
CIS 078	Digital Architectures for Computation	4
General Education Courses		5
Restricted Elective Courses		6
	4th Semester Units	15
	Total Units	60

Funding, Student Success, and Support Programs that *Help You Get Through*: Grants, programs, and scholarships are available to pay for completing this degree. Peralta Promise, California First Year Free, Oakland Promise and East Bay College Fund, EOPS/CARE, Puente, SANKOFA, Street Scholars, CAFYES



Free Head Start for Oakland Unified School District (OUSD) and East Bay Career Pathways Trust

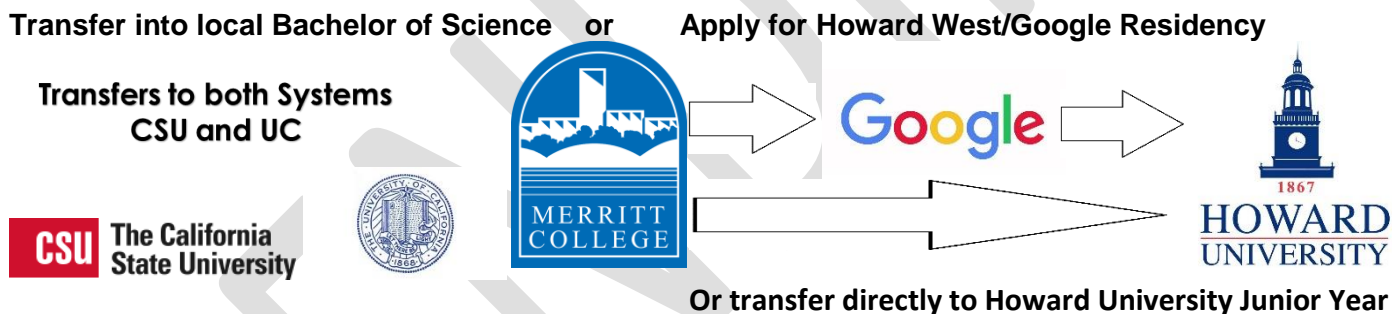
High School Students can earn both college and high school credit by completing preparatory courses through [Dual and Concurrent Enrollment](#) and the Merritt Summer Bridge to STEM program

Transfer Opportunities

Graduates of this program will have also completed preparation to transfer to a baccalaureate program in the Computer Science major, or related fields of study. They will have completed instruction in the subjects found in the lower division courses of a Computer Science baccalaureate:

1. Writing programs in an object oriented language
2. The Implementation and use of abstract data types, libraries, and frameworks.
3. Formal logic, proofs, estimation of algorithm completion, estimates of run time magnitude
4. Machine architecture, assembly language, combinatorial logic, and sequential logic
5. Calculus 1 - Including: Differential Equations, Limits, Theorems
6. Calculus 2 - Including: Definite integrals, Methods of integration, series, parametric equations
7. Physics - Topics including: Motion, forces, gravity, energy, momentum, equilibrium, oscillations

Courses are accepted for transfer to the University of California (UC) and California State University (CSU) systems, Cal Poly Pomona, and Howard University. [Merritt's participation in the Howard West initiative](#) enables transfer students to apply for a residency with Google as part of their baccalaureate program.



Workforce and Career Opportunities

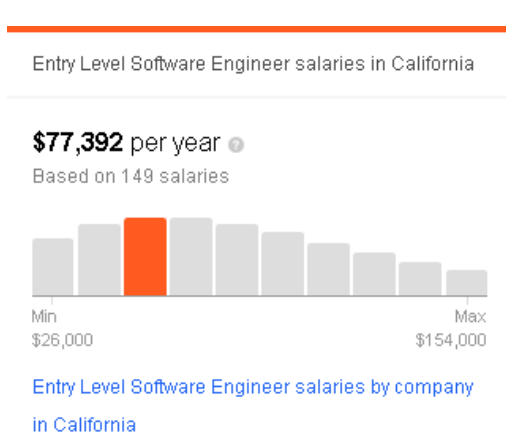
Graduates of this program who enter the workforce as entry level Software Developer gain access to rewarding jobs and careers. At Merritt, the entry level core skills are enriched by sets of restricted electives tailored to specific workforce sectors and job opportunities. These electives enable graduates to compete for positions in which knowledge of the elective subject matter commands a salary premium over baseline compensation. The information below is based on jobs posted on Indeed.com as of 12/2018.

Graduates of the two-year program in Computer Science also meet the qualifications for employment in the California STEM Core Network; a partnership of major scientific/technical employers including NASA and federally funded laboratories, and other employers. Merritt College is a partner in the STEM Core network as well as an awardee in the National Science Foundation Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science ([NSF INCLUDES](#)) initiative.

The Entry Level Software Developer - will have the main competencies to develop software as part of a team, for their own business, or for purposes of investigation and invention. They 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 a problem-solving approach and analysis.

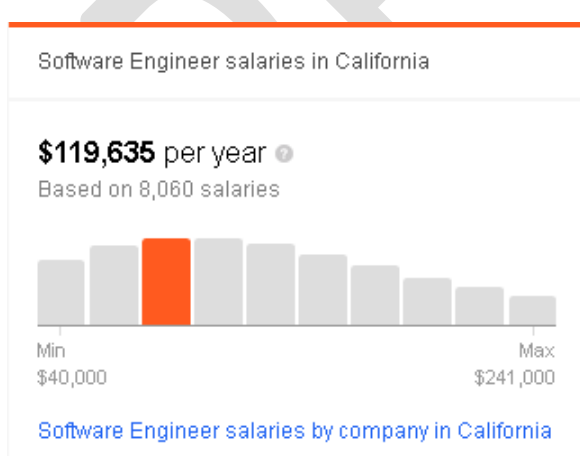
These competences enable the student to create or interpret software designs, discuss design choices, align their efforts with project goals, and estimate how well the program will perform in the intended computer system. The Entry Level Software Developer has sufficient skill to join a software team and work under the supervision of more senior members. They have the foundation to quickly recognize classes of problems and communicate using appropriate Terms of Art specific to the software domain and contribute to team efficiency and goals.



Entry Level software developer					
Salary Est.	# Jobs	Position Types		Location	
		\$50,000	160	Full-time	171
\$65,000	124	Internship	17	San Jose,	17
\$85,000	94	Temporary	15	California	12
\$100,000	62	Contract	10	Los Angeles	8
\$120,000	33	Part-time	7	San Diego	7
Total		473			

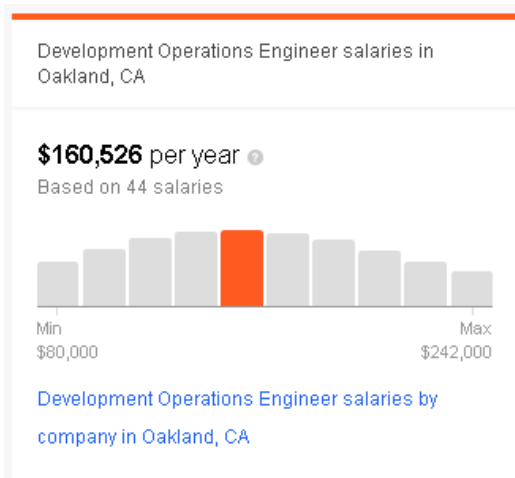
[Source: Indeed.com](https://www.indeed.com) <- click to view

The Secure Software Developer has sufficient skill to join a software team and work under the supervision of more senior members. The elective provides instruction and application of best practices for securing data whether stored (at rest) or in transit. Covers use of public key encryption, secure authentication and authorization (OAUTH), Web Application Penetration testing, and the use of hashes to protect integrity and detect tampering.



Cybersecurity - Secure Software Development					
Salary Est.	# Openings	Position Types		Location	
		\$75,000	2824	Full-time	3263
\$105,000	2226	Contract	142	San Diego	252
\$120,000	1668	Part-time	87	San Jose	213
\$130,000	1235	Internship	84	Sunnyvale	172
\$145,000	579	Commission	49	Los Angeles	145
\$145,000	579	Temporary	36		
Total		8532			

[Source: Indeed.com](https://www.indeed.com)



Cybersecurity - DevOps (Dev/Sec/Ops)					
Salary Est.		# Jobs	Position Types		Location
\$110,000		105	Full-time	116	Santa Clara 27
\$125,000		86	Internship	11	San Francisco 20
\$130,000		70	Contract	6	San Diego 15
\$140,000		50	Temporary	2	Palo Alto 13
\$150,000		24	Part-time	1	Sunnyvale 7
Total		335			

Source: [Indeed.com](https://www.indeed.com)

The *Cybersecurity Dev/Sec/Ops Software Developer* has completed instruction in Cybersecurity Operations and is prepared to use software **development** skills to implement systems software that automate **security operations** (Dev/Sec/Ops.) They have completed instruction in intrusion detection, systems and network administration, forensics and cloud security. They have taken part in ethical hacking competition which includes practice of skills in network analysis, penetration, and defense.



Blockchain Services and Mobile Applications					
Salary Est.		# Jobs	Position Types		Location
\$95,000		14	Full-time	15	San Francisco 5
\$120,000		11	Internship	1	Los Angeles 3
\$125,000		10	Part-time	1	San Francisco Bay Area 2
\$130,000		5	Temporary	1	Foster City 2
\$135,000		4			Woodland Hills 1
Total		44			

Source: [Indeed.com](https://www.indeed.com)

The *Blockchain Services and Mobile Applications Software Developer* has completed instruction in Blockchain – a cryptography based distributed ledger. This technology enables reliable global transactions without intermediaries. The graduate has completed instruction in XML and self-validating documents, cross platform mobile applications development, and implementation of transaction oriented high performance web services. This enables the graduate to implement an integrated combination of mobile applications and back-end services that enables new classes and categories of global applications based on Blockchain technology.

Development Operations Engineer salaries in California

\$137,891 per year

Based on 5,191 salaries



Development Operations Engineer salaries by company in California

DevOps - Software Engineering Automation and Continuous Integration

Salary Est.	# Jobs	Position Types		Location	
\$115,000	310	Full-time	355	San Francisco	76
\$125,000	262	Contract	13	San Diego	41
\$130,000	217	Internship	12	Palo Alto	33
\$140,000	141	Commission	1	San Jose	20
\$145,000	91			Sunnyvale	20
Total				1021	

Source: Indeed.com

The DevOps – Software Engineering Automation and Continuous Integration Software Developer has instruction in how to automate the build, test, and deployment of software in a Continuous integration (CI) pipeline. They are essential members of a software team, or an independent entrepreneur using automation to streamline their efforts while delivering reliable products. Completing the elective qualifies the graduate to take the [Project Management Institute Agile Certified Practitioner \(PMI-ACP\)](#) exam and gain a globally recognized occupational certificate.

Machine Learning Engineer salaries in California

\$156,444 per year

Based on 1,311 salaries



Machine Learning Engineer salaries by company in California

High Performance Computing, Data Science, and Artificial Intelligence

Salary Est.	# Jobs	Position Types		Location	
\$90,000	20	Full-time	33	East Palo Alto	10
\$110,000	16	Contract	1	Santa Clara	7
\$130,000	12	Internship	1	Palo Alto	4
\$145,000	8			Sunnyvale	3
\$160,000	4			San Francisco Bay Area	3
Total				60	

Source: Indeed.com

The High Performance Computing, Data Science, and Artificial Intelligence (AI) Software Developer has instruction in the use of parallel programming including Graphics Processing Units and cloud computers. They also have instruction in the use of AI Libraries and scripting languages to create systems that learn from data, detect patterns, classify artifacts, and make suggestions.

Start Where You Are Today



Merritt College offers the rare opportunity to learn Computer Science and Cybersecurity from the world's leading industry experts — for a fraction of the cost of bootcamps or 4-year universities. And with the California Promise Grant, first year registration fees are free. Our accredited 2-year program offers a mix of in-person and online learning, allowing students to prepare for a new career while maintaining other obligations. The Cybersecurity program is now in its fourth year of helping students win national competitions and find jobs with top companies. [Your AC Transit EasyPass](#) makes it easy to reach our campus located in the beautiful rolling hills of Oakland, CA. Merritt College welcomes people from all backgrounds to apply.

High School Students: Apply to Join a Merritt College STEM Core Program Cohort



High School students finishing their Junior year should apply for one of the 35 spots in the fall Merritt Stem Core Computer Science Program. This cohort based program includes an embedded student support specialist facilitating student success through tutoring, community building events, and access to guidance and counseling resources. Activities begin the fall of senior year with Dual Enrollment in Merritt college courses. The embedded support specialist continues support through the spring term courses and facilitates participation in Merritt Summer Bridge activities. Students will also hear directly from industry professionals about their college career and learn the in's and out's of being a successful college student. During fall and spring, Merritt math and Computer and Information Systems faculty will teach dual-credit courses on-site at the high schools, preparing students to take college Calculus, with a specific degree path in mind, upon high school graduation. Through membership in student success programs like SANKOFA and Puente, students gain additional benefits that include priority registration, transition and retention support.

[Apply and Enroll!](#)

<http://www.merritt.edu/wp/steps/>