DEGREES, CERTIFICATES, AND TRANSFER PREPARATION INFORMATION

COMPUTER SCIENCE

The field of computer science leads to a variety of careers that all require core computer science skills. These skills include theory Courses such as Computer Hardware, Data Structures, and Networks, as well as programming in different computer languages. Thereafter, within the field, areas of specialty lead into careers including software development, project management, system analysis, and maintenance among other areas. With the Internet being an integral part of everyday life, Web page authoring and Web application development have been other areas of high demand in the job market.

For additional career possibilities, visit the Career Services Center on the main campus to utilize computerized career information systems and other valuable career resources

Programs Offered

- Transfer Preparation

Degrees and Certificates

Associate Degrees

- Cloud Computing
- Computer Programming
- Computer Science
- Database Applications Developer
- Web Developer

Certificates of Achievement

- Blockchain Developer
- Cloud Computing
- Computer Programming
- Computer Science
- Data Analyst
- Data Science
- Database Applications Developer
- Information Systems Management
- Mobile Apps Development – Android
- Mobile Apps Development – iPhone
- System Administrator (formerly Networking)
- Web Developer

Department Certificates

- Cloud Computing
- Cybersecurity
- Entry Level Programmer
- Microsoft Azure

Associate Degree Requirements

An Associate degree is granted upon successful completion of a program of study with a minimum grade point average (GPA) of 2.0 (C) in degree applicable coursework and a minimum of **60 degree applicable semester units**, including:

- Completion of the area of emphasis with a grade of C or higher in each course, or with a P if the course was taken on a Pass/No Pass basis, and the P is equal to a C or higher;
- Completion of one of the following general education patterns: SMC GE, CSU GE, or IGETC;
- Completion of the SMC Global Citizenship graduation requirement.

Certificate of Achievement Requirements

A Certificate of Achievement is granted upon successful completion of a program of study with a minimum overall grade point average (GPA) of 2.0 (C) and a **designated minimum number of units**, including:

- Completion of the area of emphasis with a grade of C or higher in each course, or with a P if the course was taken on a Pass/No Pass basis, and the P is equal to a C or higher;
- Completion of at least 50% of area of emphasis units at Santa Monica College. Department Chairs have the discretion to waive the 50% minimum units required at SMC to meet the major or area of emphasis. All major coursework must be completed with a "C" or better grade.

Department Certificate Requirements

A Department Certificate is granted upon successful completion of a program of study with a **designated minimum number of units**, including:

- Completion of the area of emphasis with a grade of C or higher in each course, or with a P if the course was taken on a Pass/No Pass basis, and the P is equal to a C or higher;
- Completion of at least 50% of area of emphasis units at Santa Monica College. Department Chairs have the discretion to waive the 50% minimum units required at SMC to meet the major or area of emphasis. All major coursework must be completed with a "C" or better grade.

Note: Department Certificates are not noted on student transcripts. Students must submit a petition to the relevant academic department to be awarded a Department Certificate.

Catalog Rights

A student may satisfy the requirements of a degree that were in effect at any time of the student's ***continuous*** enrollment. Continuous enrollment means attendance in at least one semester (Fall or Spring) in each academic year.

Transfer Preparation

Many colleges/universities offer baccalaureate degrees in this field. Students planning to transfer to a four-year college or university should complete the lower-division major requirements and the general education pattern for the specific transfer institution. SMC has articulation agreements with the many UC and CSU campuses, as well as several private and out-of-state institutions.

Exact major requirements for UC and CSU campuses can be found online at assist.org.

A listing of private, nonprofit California colleges and universities can be found online at aiccu.edu. For articulation agreements between SMC and some of these institutions see smc.edu/articulation.

The University of California system has a transfer pathway for any UC campus that offers Computer Science. For more information, visit UC Transfer Pathways Guide.

Cloud Computing, Associate Degree or Certificate of Achievement

This certificate provides students with the industry skills to understand, build and maintain applications for the cloud. These skills include the technical principles of the hardware and software requirements to run systems in the cloud including storage, database management, and software systems, while maintaining secure access.

Program Learning Outcomes: Upon completion of the program, students will demonstrate a high level of competency in the different operational levels of cloud computing, such as storage and software as a service, while applying security standards to their operation.

Area of Emphasis: (27 units)

Required Courses: (15 units)
CS 41, Linux Workstation Administration (3)
or
CS 43, Windows Network Administration (3)

CS 70, Network Fundamentals and Architecture (3)
CS 79A, Introduction to Cloud Computing (3)
CS 81, Javascript Programming (3)
CS 87A, Python Programming (3)

Select 1 Track: (9 units)
AWS Track:
CS 79B, Database Essentials in Amazon Web Services (3)
and
CS 79C, Compute Engines in Amazon Web Services (3)
and
CS 79D, Security in Amazon Web Services (3)
or
Azure Track:
CS 33, C# Programming (3)
and
CS 79Y, Microsoft Azure Database Essentials (3)
and
CS 79Z, Microsoft Azure Essentials (3)
Elective Courses: Select 1 course from the following: (3 units)
CS 55, Java Programming (3)
or
CS 79E, Best Practices in Amazon Web Services (3)
or
CS 79F, Machine Learning on AWS (3)
or
CS 82, ASP.NET Programming in C# (3)
or
CS 83R, Server-Side Ruby Web Programming (3)

Computer Programming, Associate Degree or Certificate of Achievement

A computer programmer is a professional who is skilled in writing medium to large-scale computer applications. This requires the knowledge and practice of a multitude of areas in computer science. This certificate focuses on learning and using advanced programming techniques to build software applications. In addition, it covers core computer science concepts such as operating systems and database theory.

Program Learning Outcomes: Upon completion of the program, students will design, code, test, and debug computer programs. They will understand and use the Internet and web, application software, the components of the system unit, input, output, storage, operating systems and utility programs, communications and networks, database management, information systems development, and project management. Students will also explain the social implications of technological development, and understand the capabilities of current-day computers and the possibilities for the future.

Area of Emphasis: (27 units)

Required Core Courses: (15 units)
CS 3, Introduction to Computer Systems (3)

CS 40, Operating Systems (3)
or
CS 80, Internet Programming (3)

CS 50, C Programming (3)
CS 60, Database Concepts and Applications (3)

MATH 4, College Algebra for STEM Majors (4)
or
One of the following: (3-5 units)
MATH 2, 3, 7, 8, 10, 11, 13, 15, 21, 26, 28, 29, 41, 54; PHILOS 9

Required Concentration Courses: Select 2 of the following groups: (12 units)
GROUP 1:
CS 15, Visual Basic Programming (3)
CS 19, Advanced Visual Basic Programming (3)
GROUP 2:
CS 81, Javascript Programming (3)
and
One course from the following: (3 units)
CS 82, ASP.NET Programming in C# (3)
CS 83, Server-Side Java Web Programming (3)
CS 83R, Server-Side Ruby Web Programming (3)
CS 84, Programming with XML (3)
CS 85, PHP Programming (3)
GROUP 3:
CS 65, Oracle Programming (3)
CS 66, Advanced Oracle (3)
GROUP 4:
CS 52, C++ Programming (3)
and
One course from the following: (3 units)
CS 20A, Data Structures with C++ (3)
CS 51, Visual C++ Programming (3)
GROUP 5:
CS 55, Java Programming (3)
and
One course from the following: (3 units)
CS 20B, Data Structures with Java (3)
CS 56, Advanced Java Programming (3)

Computer Science, Associate Degree or Certificate of Achievement

Computer Science covers a broad spectrum of courses ranging from core computer science to a variety of branch fields of computer science. This academic and career path provides the student with the basic skills required of core computer science. Courses include programming in low-level and essential languages, database theory, operating systems fundamentals, computer hardware and data structures. Students finishing this program are well equipped to work in the field of computer science, as well as transfer to a four-year degree program in this area.

Program Learning Outcomes: Upon completion of the program, students will manage projects, analyze systems, develop software, and program in a variety of computer languages; author webpages and develop web applications; utilize networks and computer hardware; and create and manipulate data structures.

Area of Emphasis: (23 units)

Required Core Courses: (17 units)
CS 3, Introduction to Computer Systems (3)
CS 17, Assembly Language Programming (3)
CS 42, Digital Logic (3)
CS 50, C Programming (3)
MATH 7, Calculus 1 (3)
Required Concentration Courses: Select 1 of the following groups: (6 units)
GROUP 1:
CS 20A, Data Structures with C++ (3)
CS 52, C++ Programming (3)
GROUP 2:
CS 20B, Data Structures with Java (3)
CS 55, Java Programming (3)

Database Applications Developer, Associate Degree or Certificate of Achievement

This program develops the skills needed to design and build a database architecture, as well as interact with modern database management systems locally, remotely, or in the cloud. The program will provide an understanding on how to consistently design databases in an organized structure for storing and retrieving data. With increasing concerns over security, a database developer must also be able to write secure code that runs with minimum risk of attacks.'

Program Learning Outcomes: Upon completion of the program, students will demonstrate the ability to design, develop and populate databases locally, remotely, and in the cloud. Students will also demonstrate the ability

to properly organize and structure information for storing and retrieving different kinds of data at industry scale.

Area of Emphasis: (21 units)

Required Courses: (12 units)
CS 3, Introduction to Computer Systems (3)
CS 9A, Technology Project Management I *(same as CIS 9A)* (3)
CS 60, Database Concepts and Applications (3)
CS 79A, Introduction to Cloud Computing (3)
Select 1 courses from the following: (3 units)
CS 61, Microsoft SQL Server Database (3)
or
CS 65, Oracle Programming (3)
or
CS 79B, Database Essentials in Amazon Web Services (3)
or
CS 79Y, Microsoft Azure Database Essentials (3)
Select 1 track from the following: (3 units)
CS 55, Java Programming (3)
and
CS 65, Oracle Programming (3)
or
CS 87A, Python Programming (3)
and
CS 87B, Advanced Python Programming (3)

Web Developer (Formerly Web Programmer), Associate Degree or Certificate of Achievement

This program helps students develop skills to design interactive and responsive websites and apps. Web developers need to be knowledgeable on a variety of technologies such as HTML, CSS, JavaScript, programming languages, web frameworks, cloud hosting, networking, database management, and cybersecurity. Web developers are chiefly responsible for code implementation and maintenance of web applications at both the front-end and back-end. Web developers are instrumental in the success of an organization's online presence.

Program Learning Outcomes: Upon completion of the program, students will design and develop full stack web apps, as well as provide the code to make websites interactive or allow users to interact with back-end applications and databases.

Area of Emphasis: (27 units)

Required Courses: (18 units)
CS 60, Database Concepts and Applications (3)
CS 70, Network Fundamentals and Architecture (3)
CS 79A, Introduction to Cloud Computing (3)
CS 80, Internet Programming (3)
CS 81, Javascript Programming (3)
CS 87A, Python Programming (3)
Select 1 course from the following: (3 units)
CS 82, ASPEN.NET Programming in C# (3)
or
CS 83, Server-Side Java Web Programming (3)
or
CS 83R, Server-Side Ruby Web Programming (3)
or
CS 85, PHP Programming (3)
Select 1 course from the following: (3 units)
CS 73A, Fundamentals of Computer Security (3)
or
CS 73B, Computer Forensics Fundamentals (3)
or
CS 73C, Cybersecurity and Ethical Hacking (3)
or
CS 73L, Cybersecurity Literacy (3)
or
CS 79D, Security in Amazon Web Services (3)
Select 1 course from the following: (3 units)
CIS 67, WordPress (3)
or
CS 77A, Salesforce Administration Essentials (3)
or
CS 77B, Salesforce Developer Essentials (3)
or
CS 79B, Database Essentials in Amazon Web Services (3)
or
CS 79C, Compute Engines in Amazon Web Services (3)
or
CS 79E, Best Practices in Amazon Web Services (3)
or
CS 79Y, Microsoft Azure Database Essentials (3)
or
CS 79Z, Microsoft Azure Essentials (3)

Blockchain Developer, Certificate of Achievement

In this certificate, students study the world of blockchain technology and the promise it holds. Blockchain has always been synonymous with cryptocurrency, but its applications go far beyond financial transactions. Companies in every industry are finding value in understanding how to apply blockchain-based solutions to solve problems. Students will learn how cryptocurrencies, like Bitcoin, make use of the blockchain to facilitate peer-to-peer digital transactions. Students will identify the problems blockchain technologies aim to solve, as well as learn its underlying ability to facilitate a marketplace without traditional intermediaries, promoting widespread, transformational change. Students will design and code decentralized blockchain applications.

Program Learning Outcomes: Upon completion of the program, students will demonstrate the ability to create and deploy blockchain technology to support different industries.

Area of Emphasis: (15 units)

Required Courses: (15 units)
CS 20A, Data Structures with C++ (3)
or
CS 20B, Data Structures with Java (3)
or
CS 81, Javascript Programming (3)
or
CS 87B, Advanced Python Programming (3)

CS 73A, Fundamentals of Computer Security (3)
CS 76A, Cryptocurrency and Cryptoassets (3)
CS 76B, Fundamentals of Blockchain (3)
CS 79A, Introduction to Cloud Computing (3)

Data Analyst, Certificate of Achievement

Data science is an applied field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from both structured and unstructured data sources.#Data analysts#incorporate data mining, machine learning and big data to make predictions and identify actions that organizations can take to be more effective.#Data analysts are responsible for breaking down big data into usable information and creating software and algorithms that help companies and organizations determine optimal operations.#This certificate will prepare students for jobs in this field by providing students with skills in different technologies and techniques that are used for data science and machine learning.#Students may also choose to transfer to four-year universities with established undergraduate programs in data science.

Program Learning Outcomes: Upon completion of the program, students will be able to analyze data and employ different software tools to make certain predictions and optimize organizational operations.

Area of Emphasis: (12units)
Required Courses: (9 units)
CIS 30T, Tableau Desktop Essentials (3)
CS 82A, Introduction to Data Science (3)
CS 82B, Principles of Data Science (3)
Select 1 Course from the following: (3 units)
CS 82C, R Programming (3)
CS 87A, Python Programming (3)

Data Science, Certificate of Achievement

Data science is an applied field that uses scientific methods, processes, algorithms, and systems to extract knowledge and insights from both structured and unstructured data sources. Data science incorporates data mining, machine learning, and big data to make predictions and identify actions that organizations can take to be more effective. Data scientists are responsible for breaking down big data into usable information and creating software and algorithms that help companies and organizations determine optimal operations. This certificate will prepare students for jobs in this field by providing students with skills in different technologies and techniques that are used for data science and machine learning. Students may also choose to transfer to four-year universities with established undergraduate programs in data science.

Program Learning Outcomes: Upon completion of the program, students will be able to analyze data and employ different software tools to make certain predictions and optimize organizational operations.

Area of Emphasis: (24 units)
Required Courses: (21 units)
CIS 30T, Tableau Desktop Essentials (3)
CS 79A, Introduction to Cloud Computing (3)
CS 82A, Introduction to Data Science (3)
CS 82B, Principles of Data Science (3)
CS 82C, R Programming (3)
CS 87A, Python Programming (3)
CS 87B, Advanced Python Programming (3)
Elective Courses: Select 1 course: (3 units)
CS 79F, Machine Learning on AWS (3)
or
CS 79X, Data Science on Azure (3)

Information Systems Management, Certificate of Achievement

This program aims to provide Computer Science students with the knowledge needed to develop information systems in a real-world setting. Students learn how to develop medium to large scale applications while applying the skills needed to plan and budget resources in development projects from conceptual design to deployment.

Program Learning Outcomes: Upon completion of the program, students will understand the real-world complexity of information systems in industry today. Students will learn how to plan and budget resources for the successful implementation of Information Systems.

Area of Emphasis: (13 units)
Required Courses: (10 units)
CIS 9A, Technology Project Management I (3)
or
CS 9A, Technology Project Management I *(same as CIS 9A)* (3)

CIS 9B, Technology Project Management II (3)
or
CS 9B, Technology Project Management II *(same as CIS 9B)* (3)

CS 15, Visual Basic Programming (3)
CS 88A, Independent Studies in Computer Science (1)
Select 1 course from the following: (3 units)
CS 19, Advanced Visual Basic Programming (3)
CS 32, Database Programming in Visual Basic.Net (3)
CS 37, Web Programming in VB .NET (3)

Mobile Apps Development – Android, Certificate of Achievement

This program provides students with the knowledge and skills necessary to work in the emerging mobile career field. Students learn how to design and write apps for the Android platform. In addition to programming courses, the program includes courses that teach the fundamentals of mobile app and icon design.

Program Learning Outcomes: Upon completion of the program, students will design — and use the Eclipse environment to develop, test, and debug — apps that run on the Android platform for mobile phones and tablets. In addition, students will use the Android Framework to develop apps for mobile devices that incorporate audio, pictures, animation, maps, networking, and the Internet.

Area of Emphasis: (15 units)
Required Courses: (12 units)
CS 55, Java Programming (3)
CS 56, Advanced Java Programming (3)
CS 86, Android Development (3)
GR DES 75, Mobile Design 1 (3)
Select 1 course from the following: (3 units)
CIS 60A, Photoshop I (3)
CS 60, Database Concepts and Applications (3)
CS 84, Programming with XML (3)

Mobile Apps Development – iPhone, Certificate of Achievement

This program provides students with the knowledge and skills necessary to work in the emerging mobile career field. Students learn how to design and write apps for the iPhone/iPad/iPod platform. In addition to programming courses, the program includes courses that teach the fundamentals of mobile app and icon design.

Program Learning Outcomes: Upon completion of the program, students will design, develop, test, and debug iOS apps using XCode environment for iPhone, iPad, and iPod. In addition, students will develop iOS apps using Cocoa Framework that incorporate the address book, audio, video, networking, and the Internet.

Area of Emphasis: (12 units)
Required Courses: (9 units)
CS 53A, iOS Development with Swift (3)
CS 53B, iOS Mobile App Development (3)
GR DES 75, Mobile Design 1 (3)
Select 1 course from the following: (3 units)
CIS 60A, Photoshop I (3)
CS 60, Database Concepts and Applications (3)
CS 84, Programming with XML (3)

System Administrator (Formerly Networking), Certificate of Achievement

The IT world is integrated by networks of connected devices, each secured and properly configured. Success in IT disciplines like database, website, or e-commerce development demands a supporting grasp of the network environment. Major technologies are the networks themselves, their fit within the operating platforms they connect to, specific network applications, and measures to achieve network security. System administrators and other qualified IT specialists must understand the various protocols, programs' interfaces, how networks are presented and managed on Unix and Windows platforms, specific server programs and their clients, and what the inherent risks are.

Program Learning Outcomes: Upon completion of the program, students will design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Students will also perform network modeling, analysis, and planning; design network security measures; and research and recommend network and data communications hardware and software.

Area of Emphasis: (14-15 units)

Required Courses: (9 units)
CS 9A, Technology Project Management I *(same as CIS 9A)* (3)
CS 70, Network Fundamentals and Architecture (3)
CS 84A, Google IT Support Fundamentals I (3)
Select 1 Course from the following: (3 units)
CS 41, Linux Network Administration (3)
or
CS 43, Windows Network Administration (3)
or
CS 84B, Google IT Support Fundamentals II (3)
Select 1 Course from the following: (2-3 units)
CS 75, Network Protocols and Analysis (3)
or
CS 78, Secure Server Installation and Administration (3)
or
CS 84C, Google IT Support Fundamentals III (3)

Cloud Computing, Department Certificate

This program provides the industry standard skills to understand and develop applications for the cloud. Students learn a range of topics that cover the technical principals of the hardware and software requirements to run systems in the cloud including storage, database management, and software systems, while maintaining secure access.

Program Learning Outcomes: Upon completion of the program, students will have the ability to host a database and run queries using an interface from a commercial provider. Students will also have the ability to run a file-server service using a provider of their choice.

Area of Emphasis: (15 units)

Required Courses: (12 units)
CS 79A, Introduction to Cloud Computing (3)
CS 79B, Database Essentials in Amazon Web Services (3)
CS 79C, Compute Engines in Amazon Web Services (3)
CS 79D, Security in Amazon Web Services (3)
Select 1 course from the following: (3 units)
CS 55, Java Programming (3)
CS 82, ASPEN.NET Programming in C# (3)
CS 83R, Server-Side Ruby Web Programming (3)
CS 87A, Python Programming (3)

Cybersecurity, Department Certificate

This certificate will prepare students for an entry-level position in the field of information security. They will gain an understanding of technological needs, threats, and weaknesses in cybersecurity. Through this certificate, students will learn the tools needed to manage computer systems as well as gain insight into the legal, and social aspects of the cyber universe.

Program Learning Outcomes: Upon completion of the program, students will be able to analyze potential cyber threats to an organization network, and recommend and apply the proper tools to defend against those attacks.

Area of Emphasis: (12 units)

Required Core: (12 units)
CS 70, Network Fundamentals and Architecture (3)
CS 73A, Fundamentals of Computer Security (3)
CS 73B, Computer Forensics Fundamentals (3)
CS 73C, Cybersecurity and Ethical Hacking (3)

Entry Level Programmer, Department Certificate

This certificate provides students with the knowledge and practice needed to develop small-scale applications. The certificate also provides students with the building blocks to pursue further studies in computer science and/or start an entry-level position in the software development industry.

Program Learning Outcomes: Upon completion of this program, students will design, code, test and debug computer programs. They will understand and use application software and the various components involved in system development. Student will also learn the social implications of technological development and understand the capabilities of current day computers and the possibilities for the future.

Area of Emphasis: (12 units)

Required Course:
CS 3, Introduction to Computer Systems (3)
Complete any 3 courses from the following:
CS 15, Visual Basic Programming (3)
CS 17, Assembly Language Programming (3)
CS 18, Advanced Assembly Language Programming (3)
CS 19, Advanced Visual Basic Programming (3)
CS 20A, Data Structures with C++ (3)
CS 20B, Data Structures with Java (3)
CS 30, MATLAB Programming (3)
CS 32, Database Programming in Visual Basic.Net (3)
CS 33, C# Programming (3)
CS 34A, Game Programming 1 (3)
CS 37, Web Programming in VB .Net (3)
CS 50, C Programming (3)
CS 51, Visual C++ Programming (3)
CS 52, C++ Programming (3)
CS 53A, iOS Development with Swift (3)
CS 53B, iOS Mobile App Development (3)
CS 55, Java Programming (3)
CS 56, Advanced Java Programming (3)
CS 80, Internet Programming (3)
CS 81, Javascript Programming (3)
CS 82, ASP.NET Programming in C# (3)
CS 83, Server-Side Java Web Programming (3)
CS 83R, Server-Side Ruby Web Programming (3)
CS 85, PHP Programming (3)
CS 86, Android Development (3)
CS 87A, Python Programming (3)

Microsoft Azure, Department Certificate

This program provides the industry standard skills to understand and develop applications for the cloud using the Microsoft Azure platform. Students learn a range of topics that cover the technical principles of the hardware and software requirements to run systems in the cloud, including storage, database management, and software systems, while maintaining secure access.

Program Learning Outcomes: Upon completion of the program, students will design and develop full stack web apps, as well as provide the code to make websites interactive or allow users to interact with back-end applications and databases. Students will be able to host a database and run queries using an interface from a commercial provider. Students will be able to run a file-server service using a provider of their choice.

Area of Emphasis: (9 units)

Required Courses: (6 units)
CS 79A, Introduction to Cloud Computing (3)
CS 79Z, Microsoft Azure Essentials (3)
Select 1 course from the following: (3 units)
CS 33, C# Programming (3)
or
CS 79Y, Microsoft Azure Database Essentials (3)
or

CS 82, ASP.NET Programming in C# (3)
or
CS 83R, Server-Side Ruby Web Programming (3)
or
CS 87A, Python Programming (3)

Robotics and Artificial Intelligence, Department Certificate

This program is temporarily suspended. Many of the required classes are not being offered at this time. Students interested in this certificate program should contact the Computer Science department at 310-434-4295.