



A Course of Study for  
**COMPUTER SCIENCE (AS)**  
**Associate Degree,**  
**Certificate of Achievement**  
**&**  
**Department Certificate Programs**

The field of computer science leads to a variety of careers that all require core computer science skills. These skills include theory classes such as Computer Hardware, Data Structures, Databases, 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.

## ASSOCIATE DEGREE - 60 UNITS

The Associate degree involves satisfactory completion of a minimum of 60 semester units with a C average or higher including the required units in the area of emphasis (articulated below), fulfillment of the Global Citizenship requirement, and fulfillment of all Santa Monica College general education requirements, CSU GE or IGETC.

Catalog rights dictate that a student may satisfy the requirements of a degree or certificate by completing the general education and major/area of emphasis requirements in effect at any time of their continuous enrollment. Continuous enrollment is defined as enrollment in consecutive Fall and Spring semesters until completion.

**At least 50% of the area of emphasis (major) units must be completed at Santa Monica College.**

**Each course in the area of emphasis (major) must be completed with a grade of C or higher.**

## COMPUTER PROGRAMMING (27 units)

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 World Wide 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.

*Required Core Courses: (15 units)*

**CS 3**, Introduction to Computer Systems (3)

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**CS 40**, Operating Systems (3)

**or**

**CS 80**, Internet Programming (3)

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**CS 50**, C Programming (3)

**CS 60**, Database Concepts and Applications (3)

**Math 20**, Intermediate Algebra (5) *(or higher level courses)*

*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 and Dynamic HTML (3) *and one of the following:*

**CS 82**, ASP.NET Programming in C# (3)

**CS 83**, Server-Side Java Web Programming (3)

**CS 84**, Programming with XML (3)

**CS 85**, PHP Programming (3)

**CS 83R**, Server-Side Ruby Web Programming (3)

### GROUP 3:

**CS 65**, Oracle Programming (3)

**CS 66**, Advanced Oracle (3)

### GROUP 4:

**CS 52**, C++ Programming (3) *and one of the following:*

**CS 51**, Visual C++ Programming (3)

**CS 20A**, Data Structures with C++ (3)

### GROUP 5:

**CS 55**, Java Programming (3) *and one of the following:*

**CS 56**, Advanced Java Programming (3)

**CS 20B**, Data Structures with Java (3)

Additional general education and graduation requirements for the Associate degree from Santa Monica College are listed on a separate sheet in the Transfer/Counseling Center, as well as online (go to [www.smc.edu/articulation](http://www.smc.edu/articulation)).

**COMPUTER SCIENCE (34 units)**

This program covers a broad spectrum of courses ranging from core computer science to a variety of branch fields of computer science. This major provides the student with the basic skills required of core computer science. Courses include programming in low-level and essential languages, Database Theory, Operating System Fundamentals, Computer Hardware and Data Structures. Students finishing this major 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, program in a variety of computer languages, author Web pages, and develop Web applications; utilize networks and computer hardware; and create and manipulate data structures and databases.

*Required Core Courses: (28 units)*

- CS 3**, Introduction to Computer Systems (3)
- CS 17**, Assembly Language Programming (3)
- CS 40**, Operating Systems (3)
- CS 42**, Computer Architecture (3)
- CS 50**, C Programming (3)
- CS 60**, Database Concepts and Applications (3)
- Math 7**, Calculus 1 (5)
- Math 8**, Calculus 2 (5)

*Required Concentration Courses; select 1 of the following groups: (6 units)*

**GROUP 1:**

- CS 52**, C++ Programming (3)
- CS 20A**, Data Structures with C++ (3)

**GROUP 2:**

- CS 55**, Java Programming (3)
- CS 20B**, Data Structure with Java (3)

Additional general education and graduation requirements for the Associate degree from Santa Monica College are listed on a separate sheet in the Transfer/Counseling Center, as well as online (go to [www.smc.edu/articulation](http://www.smc.edu/articulation)).

**DATABASE APPLICATIONS DEVELOPER (33 units)**

This program develops user-friendly interfaces to database applications. A database application is made of data, a database engine to store the data, and an interface to extract and display the data. The skills needed to build a database application range from database theory and design, using a database engine such as SQL server, or Oracle, to programming in ADO technologies to extract the data, as well as programming in Windows and Web applications on a client and server-side basis to present the data. In addition, 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 develop user-friendly interfaces based on Windows and the Web to extract data stored in databases; incorporate different security techniques to ensure the safe display and update of data; interface databases to the Internet; and install and administer Database Management Systems. In addition, students will design, build and populate databases with data and use programming languages and graphical interfaces to retrieve and manipulate data.

*Required Courses: (27 units)*

- CS 3**, Introduction to Computer Systems (3)
- CS 9A**, Technology Project Management I (3) (*same as CIS 9A*)
- CS 15**, Visual Basic Programming (3)
- CS 19**, Visual Basic Advanced Programming (3)
- CS 32**, Database Programming in VB.NET (3)
- CS 37**, Web Programming in VB.NET (3)
- CS 60**, Database Concepts and Applications (3)
- CS 61**, Microsoft SQL Server Database (3)
- CS 65**, Oracle Programming (3)

*Select 2 courses from the following: (6 units)*

- CS 8**, Systems Analysis and Design (3)
- CS 9B**, Technology Project Management II (3)
- CS 84**, Programming with XML (3)
- CS 85**, PHP Programming (3)
- CS 86**, Android Development (3)
- CS 87A**, Python Programming (3)

Additional general education and graduation requirements for the Associate degree from Santa Monica College are listed on a separate sheet in the Transfer/Counseling Center, as well as online (go to [www.smc.edu/articulation](http://www.smc.edu/articulation)).

**WEB PROGRAMMER (30 units)**

This program helps design and develop applications and scripts for the World Wide Web (WWW). Web programmers need to be knowledgeable on a variety of Internet technologies (HTML, CSS, XML, JavaScript, Perl/CGI, Java, JSP, PHP, and the Microsoft .Net platform), networking, and database management. They are chiefly responsible for providing the programming which makes Web pages interactive or allows users to interact with back-end applications and databases. Web programmers are instrumental in making electronic commerce on the Internet possible.

**Program Learning Outcomes:** Upon completion of the program, students will design and develop applications and scripts for the World Wide Web, and provide the programming which makes Web pages interactive or allows users to interact with back-end applications and databases.

*Required Courses: (18 units)*

- CS 3, Introduction to Computer Systems (3)
- CS 60, Database Concepts and Applications (3)
- CS 70, Networking Theory and Essentials (3)
- CS 80, Internet Programming (3)
- CS 81, JavaScript and Dynamic HTML (3) *and one of the following:*
- CS 84, Programming with XML (3)
- CS 86, Android Development (3)

*Select 1 of the following three groups: (6 units)*

**GROUP 1:**

- CS 15, Visual Basic Programming (3)
- CS 19, Advanced Visual Basic Programming (3)

**GROUP 2:**

- CS 55, Java Programming (3)
- CS 56, Advanced Java Programming (3)

**GROUP 3:**

- CS 87A, Python Programming (3) and 1 course from the following: CS 15, 19, 55, 56

*Select 1 course from the following: (3 units)*

- CS 32, Database Programming in VB.NET (3)
- CS 61, Microsoft SQL Server Database (3)
- CS 65, Oracle Programming (3)

*Select 1 course from the following: (3 units)*

- CS 37, Web Programming in VB.NET (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)

Additional general education and graduation requirements for the Associate degree from Santa Monica College are listed on a separate sheet in the Transfer/Counseling Center, as well as online (go to [www.smc.edu/articulation](http://www.smc.edu/articulation)).

**CERTIFICATES OF ACHIEVEMENT**

Catalog rights dictate that a student may satisfy the requirements for a certificate of achievement by completing the major/area of emphasis requirements in effect at any time during the student's continuous enrollment. Continuous enrollment is defined as enrollment in consecutive Fall and Spring semesters until completion.

**At least 50% of the units required for Certificates of Achievement must be completed at Santa Monica College.**

**Students must receive a grade of C or higher in each course to successfully complete the Certificates of Achievement.**

**COMPUTER SCIENCE (34 units)**

A Certificate of Achievement is granted upon completion of the required courses listed under the Associate degree.

Students who successfully complete this Certificate of Achievement may elect to receive an Associate degree by satisfying additional general education requirements listed on the Associate degree.

**COMPUTER PROGRAMMING (27 units)**

A Certificate of Achievement is granted upon completion of the required courses listed under the Associate degree.

Students who successfully complete this Certificate of Achievement may elect to receive an Associate degree by satisfying additional general education requirements listed on the Associate degree.

**DATABASE APPLICATIONS DEVELOPER (33 units)**

A Certificate of Achievement is granted upon completion of the required courses listed under the Associate degree.

Students who successfully complete this Certificate of Achievement may elect to receive an Associate degree by satisfying additional general education requirements listed on the Associate degree.

**WEB PROGRAMMER (30 units)**

A Certificate of Achievement is granted upon completion of the required courses listed under the Associate degree.

Students who successfully complete this Certificate of Achievement may elect to receive an Associate degree by satisfying additional general education requirements listed on the Associate degree.

**DEPARTMENT CERTIFICATE**

Catalog rights dictate that a student may satisfy the requirements of a certificate by completing the major/area of emphasis requirements in effect at any time of their continuous enrollment. Continuous enrollment is defined as enrollment in consecutive Fall and Spring semesters until completion.

**At least 50% of the units required for Department Certificates must be completed at Santa Monica College.**

**Students must receive a grade of C or higher in each course to successfully complete the Department Certificate.**

**COMPUTER PROGRAMMING (12 units)**

This program provides the student with the basic skills needed to enter the world of programming. It covers a range of programming language courses that expose the student to the spectrum of different languages that are popular today.

*Required Courses:*

- CS 3**, Introduction to computer applications (3)
- CS 15**, Visual Basic (3)
- CS 17**, Assembly Language Programming (3)
- CS 52**, C++ Programming (3)

**INFORMATION SYSTEMS MANAGEMENT (13 units)**

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.

*Required Courses: (10 units)*

- CS 9A**, Technology Project Management I (3) (*same as CIS 9A*)
- CS 9B**, Technology Project Management II (3) (*same as CIS 9B*)
- CS 15**, Visual Basic Programming (3)
- CS 88A**, Independent Studies in CIS (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 Visual Basic.NET (3)

## MOBILE APPS DEVELOPMENT - ANDROID (15 units)

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 teaching 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.

*Required Courses: (12 units)*

**CS 86**, Android Development (3)

**CS 55**, Java Programming (3)

**CS 56**, Advanced Java Programming (3)

**Graphic Design 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 (15 units)

This program provides students with the knowledge and skills necessary to work in the emerging mobile career field. Students learn to design and write apps for either the iPhone/iPad/iPod platform. In addition to programming courses, the program includes courses teaching 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.

*Required Courses: (12 units)*

**CS 53A**, iOS Development with Objective-C (3)

**CS 53B**, iOS Mobile App Development (3)

**CS 53C**, iOS Advanced Mobile App Development (3)

**Graphic Design 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)

## NETWORKING (17 units)

The IT world is integrated by networks. 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 networks security.

Network engineers and other qualified IT specialists must understand the various protocols, programs' interfaces to them, how networks are presented and managed on Unix and Windows platforms, specific server programs and their clients, and what the inherent risks are.

*Required Courses:*

**CS 9A**, Technology Project Management I (3) (*same as CIS 9A*)

**CS 41**, Linux Network Administration (3)

**CS 43**, Windows Network Administration (3)

**CS 70**, Network Fundamentals & Architecture (3)

**CS 75**, Network Protocols and Analysis (2)

**CS 78**, Secure Server Installation & Administration (3)

**ROBOTICS AND ARTIFICIAL INTELLIGENCE (16 units) - This program is temporarily suspended. Many of the required classes are not being offered at this time. If you are interested in this program, contact the Computer Science department at 310-434-4295.**

This program aims to provide Computer Science students with the knowledge and skills needed to work in the emergent AI career field, which includes robotics, knowledge engineering, and virtual human design. Students learn how to program embedded systems to operate mobile robotics that can interact with changing environments, how to create and maintain expert systems, and how to design and build virtual humans that converse much like people. All classes are very much “hands-on”.

**Program Learning Outcomes:** Upon completion of the program, students will design, program, and operate mobile robots and chatbots that interact with changing environments and people. They will design solutions and write programs for real world applications using embedded systems that interact with external hardware.

*Required Courses:*

**CS 9A**, Technology Project Management I (3) (*same as CIS 9A*)

**CS 22**, Introduction to Mobile Robots (3)

**CS 23**, Expert Systems and Chatbots (3)

**CS 25**, Embedded Systems (3)

**CS 42**, Computer Architecture (3)

**CS 88A**, Independent Study (1)