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.

This major may also lead to many other careers. For additional possibilities, visit the Career Services Center on campus to utilize computerized career information systems and other valuable career resources.

### ASSOCIATE IN ARTS DEGREE - 60 UNITS

The Associate in Arts degree in Computer Science involves satisfactory completion of a minimum of 60 semester units with a C average or higher including at least 34 semester units in the Computer Science 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.

*Students must complete the area of emphasis (major) requirements in effect at the time enrollment begins or the requirements in effect at graduation as long as continuous enrollment is maintained.

*Continuous enrollment is defined as enrollment in each Fall and Spring semester until graduation.

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 SCIENCE (34 units)

Computer Science majors cover 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.

**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 one of the following groups:**

**Group 1:** CS 52, C++ Programming (3) and CS 20A, Data Structures with C++ (3)

**Group 2:** CS 55, Java Programming (3) and CS 20B, Data Structure with Java (3)

Additional general education and graduation requirements for the Associate in Arts 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)).
ASSOCIATE IN ARTS DEGREE - 60 UNITS

The Associate in Arts degree in Computer Science involves satisfactory completion of a minimum of 60 semester units with a C average or higher including at least 27-29 semester units in the Computer Programming 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.

*Students must complete the area of emphasis (major) requirements in effect at the time enrollment begins or the requirements in effect at graduation as long as continuous enrollment is maintained.

*Continuous enrollment is defined as enrollment in each Fall and Spring semester until graduation.

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** (27-29 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.

**Required Core Courses:** (17 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 20, Intermediate Algebra (5) *(or higher level courses)*

**Required Concentration Courses:** select two of the following groups:

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 15, Visual Basic Programming (3) <strong>and</strong> CS 19, Advanced Visual Basic Programming (3)</td>
<td>CS 81, JavaScript and Dynamic HTML (3) <strong>and</strong> (CS 82, ASP.NET Programming in C# (3) <strong>or</strong> CS 83, Server-Side Java Web Programming (3) <strong>or</strong> CS 84, Programming with XML (3) <strong>or</strong> CS 85, PHP Programming (3))</td>
<td>CS 65, Oracle Programming (3) <strong>and</strong> CS 66, Advanced Oracle (3)</td>
<td>CS 52, C++ Programming (3) <strong>and</strong> (CS 51, Visual C++ Programming (3) <strong>or</strong> CS 20A, Data Structures with C++ (3))</td>
<td>CS 55, Java Programming (3) <strong>and</strong> (CS 56, Advanced Java Programming (3) <strong>or</strong> CS 20B, Data Structures with Java (3))</td>
</tr>
</tbody>
</table>

Additional general education and graduation requirements for the Associate in Arts 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)).
ASSOCIATE IN ARTS DEGREE - 60 UNITS

The Associate in Arts degree in Computer Science involves satisfactory completion of a minimum of 60 semester units with a C average or higher including at least 33 semester units in the Database Application Developer 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.

*Students must complete the area of emphasis (major) requirements in effect at the time enrollment begins or the requirements in effect at graduation as long as continuous enrollment is maintained.

*Continuous enrollment is defined as enrollment in each Fall and Spring semester until graduation.

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.

DATABASE APPLICATIONS DEVELOPER (33 units)

A Database Applications Developer 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.

Required Courses: (27 units)

- CS 3, Introduction to Computer Systems (3)
- CS 9A, Technology Project Management I (3)
- 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 two of the following courses:

- 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)

Additional general education and graduation requirements for the Associate in Arts 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).
ASSOCIATE IN ARTS DEGREE - 60 UNITS

The Associate in Arts degree in Computer Science involves satisfactory completion of a minimum of 60 semester units with a C average or higher including at least 30 semester units in the Web Programmer area of emphasis (articulated below), fulfillment of the Global Citizenship requirements, and fulfillment of all Santa Monica College general education requirements, CSU GE or IGETC.

*Students must complete the area of emphasis (major) requirements in effect at the time enrollment begins or the requirements in effect at graduation as long as continuous enrollment is maintained.

*Continuous enrollment is defined as enrollment in each Fall and Spring semester until graduation.

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.

WEB PROGRAMMER (30 units)

A Web Programmer designs and develops 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.

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

Select one of the following two groups:

- CS 15, Visual Basic Programming (3) **and** CS 19, Advanced Visual Basic Programming (3)
- **or**
- CS 55, Java Programming (3) **and** CS 56, Advanced Java Programming (3)

Select one of the following courses: (3 units)

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

Select one of the following courses: (3 units)

- CS 37, Web Programming in VB .NET (3) **or** CS 82, ASP.NET Programming in C# (3) **or**
- CS 83, Server Side Java Web Programming (3) **or** CS 85, PHP Programming (3)

Additional general education and graduation requirements for the Associate in Arts 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

*Students must complete the area of emphasis (major) requirements in effect at the time enrollment begins or the requirements in effect at graduation as long as continuous enrollment is maintained.

*Continuous enrollment is defined as enrollment in each Fall and Spring semester until graduation.

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 in Computer Science for Transfer upon completion of the 34 required units listed under Computer Science Associate in Arts degree.

**COMPUTER PROGRAMMING** (27-29 units)

A Certificate of Achievement is granted in Computer Programming upon completion of the 27-29 required units listed under the Computer Programming Associate in Arts degree.

**DATABASE APPLICATIONS DEVELOPER** (33 units)

A Certificate of Achievement is granted in Database Applications Developer upon completion of the 33 required units listed under the Database Applications Developer Associate in Arts degree.

**WEB PROGRAMMER** (30 units)

A Certificate of Achievement is granted in Web Programmer upon completion of the 30 required units listed under the Web Programmer Associate in Arts degree.
DEPARTMENT CERTIFICATE

*Students must complete the area of emphasis (major) requirements in effect at the time enrollment begins or the requirements in effect at graduation as long as continuous enrollment is maintained.

*Continuous enrollment is defined as enrollment in each Fall and Spring semester until graduation.

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 certificate 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:** (12 units)
- 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)

A certificate in IS Management 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/CIS 9A, Technology Project Management I (3)
- CS 9B/CIS 9B, Technology Project Management II (3)
- CS 15, Visual Basic Programming (3)
- CS 88A, Independent Study (1)

Select one of the following courses:
- CS 19, Advanced Visual Basic Programming (3) or CS 32, Database Programming in Visual Basic .NET (3)
- or CS 37, Web Programming in Visual Basic.NET (3)
**DEPARTMENT CERTIFICATE**

*Students must complete the area of emphasis (major) requirements in effect at the time enrollment begins or the requirements in effect at graduation as long as continuous enrollment is maintained.

*Continuous enrollment is defined as enrollment in each Fall and Spring semester until graduation.*

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.

**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: (17 units)

- CS 9A, Technology Project Management I (3)
- 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)**

A certificate in Robotics and Artificial Intelligence (AI) 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”.

Required Courses: (16 units)

- CS 9A/CIS 9A, Technology Project Management I (3)
- 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)