Program Description

Computer Science is one of the most sought-after degree programs in California Community Colleges, as well as the transfer institutions of California State Universities and University of California campuses. The popularity of this program stems from software developed for computer platforms on desktop PCs, notebooks, and mobile devices. The gaming industry has contributed to this exciting field with creating distinct and powerful games.

This program is designed to provide students with programming skills in various languages, for transfer to four-year universities as well as gaining access into industries across the world. This program provides our students a path to success.

Staff

Please dial (661) 722-6300, then the 4 digit extension.

Division:

Christos Valiotis, Dean	x.6415
Suzanne Olson, Administrative Assistant	x.6415
Vacant, Clerical Assistant III	x.6415
Dr. Alexandra Schroer, Department Chair	x.6922

Faculty:

Richard Biritwum	x.6783

Adjunct V.M.

Manuel Hidalgo	2337
Mark Ivey	2128
Matthew McCloskey	2330
Nathan Wonnacott	2212

Career Options

Scientific Applications Programmer	Software Engineer
Software Application Specialist	Systems Analyst
	Systems Programmer

(Careers may require education beyond the two-year college level.)

Program Learning Outcomes

Business Computer Information Science
1. Create common documents in an Office Application Suite.
2. Design, create and test a program in a high-level, object-oriented, programming language based on a given set of specifications.
3. Identify the primary hardware components of a complete computer system.

Computer Software Developer
1. Design, create and test a program in a high-level, object-oriented, programming language based on a given set of specifications.
2. Design, create and test a program in assembly language based on a given set of specifications.
3. Solve common problems in the Binary and Hexadecimal numbering systems.

Associate in Science in Computer Science for Transfer
1. Design, create and test a program in a high-level, object-oriented, programming language based on a given set of specifications.
2. Design, create and test a program in assembly language based on a given set of specifications.
3. Solve common problems in the Binary and Hexadecimal numbering systems.

Certificate Programs

Business Computer Information Science

Certificate requires a minimum of 30 units. This program provides entry-level training to the person entering the computer field and focuses on the operation and programming of computers with an emphasis on business application. Computer Information Science jobs go by a variety of titles, including applications developer, programmer analyst, software developer, customer support specialist, help desk technician, workstation support specialist, database designer, database analyst, database security, network control operator, network security administrator, Internet developer, webmaster, Internet systems integrator, among others.

Required Courses:	units
ACCT 201, Financial Accounting	4
BUS 101, Introduction to Business *or* MGT 101, Mgt. Principles	3
BUS 105, Business Mathematics *or* MATH 128, College Alegebra for Liberal Arts *or* MATH 140, Precalculus	3-4
CA 103, Introduction to Computers and Digital Technology *or* CA 221, Computer Concepts and Applications in Business *or* CIS 101, Intro. to Computer Information Science	3-4
CA 121, Microcomputer Spreadsheets *or* ACCT 121, Computerized Accounting	2-3
CA 171, Introduction to Networking	3
CIS 111, Intro. to Programming and Algorithms *or* CIS 145, Intro. to Visual BASIC.NET Programming	3
CIS 141, Introduction to BASIC Programming	3
Program Electives	3-6
Total	**30**

Program Electives (Select 3-6 units):	units
ACCT 121, Computerized Accounting	3
BUS 101, Introduction to Business	3
BUS 105, Business Mathematics	3
CA 103, Introduction to Computers and Digital Technology	3
CA 121, Microcomputer Spreadsheets	3
CA 199, Occupational Work Experience	1-8
CA 221, Computer Concepts and Applications in Business	4
CIS 111, Introduction to Programming and Algorithms	3
CIS 145, Introduction to Visual BASIC.NET Programming	3
CIS 199, Occupational Work Experience	1-8
MATH 128, College Algebra for Liberal Arts	3
MATH 140, Precalculus	4
MGT 101, Management Principles	3

Computer Software Developer

The Computer Software Developer certificate requires a minimum of 36 units. This program provides entry-level training to the person entering the computer programming field. The focus is on software development, and allows specialization in several programming languages. Certificate recipientshave enhanced employability in several fields. Career choices include systems programmer, systems software developer, applications programmer, Web programmer and database administrator.

Required Courses:	units
CA 131, Relational Database Management and Design	3
CA 151, Microcomputer Operating Systems	3
CIS 101, Intro. to Computer Info. Science	3
CIS 111, Intro. to Programming and Algorithms	3
CIS 113, Data Structures	3
CIS 121, Computer Mathematics	3
CIS 123, Assembly Language and Computer Architecture	3
CIS 161, Intro. to C Programming	3
MATH 128, College Algebra for Liberal Arts *or*	
MATH 150, Calculus and Analytic Geometry *or*	
MATH 220, Linear Algebra	3-5
PHIL 110, Intro. to Logic	3
Program Electives	4-6
	Total 36

Program Electives (Select 4-6 units):	units
CA 157, Introduction to LINUX	3
CIS 173, Introduction to C++ Programming	3
CIS 174, Introduction to C#.NET Programming	3
CIS 175, Java Programming	3
CIS 177, Introduction to Python	3
CIS 199, Occupational Work Experience	1-8
MATH 128, College Algebra for Liberal Arts	3
MATH 140, Precalculus	4
MATH 150, Calculus and Analytical Geometry	5
MATH 220, Linear Algebra	4

NOTE: Substitutions, with prior permission, may be made for certain courses that may not be offered in the two-year period.

For a Recommended Pathway, please refer to the Associate Degree plan minus the general education requirements.

Associate Degrees
Business Computer Information Science

The requirements for an associate degree in Business Computer Information Science may be satisfied by completing the certificate program in addition to the associate degree requirements. (See Graduation/Associate Degree Requirements.)

Students who complete the associate degree have enhanced employability in several fields. With a varied background in Business, Computer Programming and Computer Applications, students are well prepared for full-time, entry-level positions in the programming of business and other applications as well as advanced use of existing office applications in industry. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the physical environment, culture, and society in which they live, with the ability to think and communicate clearly and effectively.

Except in cases of a prerequisite requirement, it is not required that courses be taken in exactly this sequence; they are recommended in this order to facilitate success.

Recommended Pathway	
First Semester	**units**
BUS 101, Introduction to Business *or*	
MGT 101, Mgt. Principles	3
BUS 105, Business Mathematics *or* MATH 128, College	
Alegebra for Liberal Arts *or* MATH 140, Precalculus	3-4
CA 103, Intro. to Computers and Dig. Tech. *or* CA 221,	
Computer Concepts and Applications in Business *or*	
CIS 101, Intro. to Computer Info. Science	3-4
GE requirement Area D1 (ENGL 101)	3
Electives	3
	Total 15-18
Second Semester	
ACCT 201, Financial Accounting	4
CIS 141, Intro. to BASIC Programming	3
GE requirement Area B	3
GE requirement Area D2	3
Electives	3
	Total 16
Third Semester	
CA 121, Microcomputer Spreadsheets *or*	
ACCT 121, Computerized Accounting	2-3
CIS 111, Intro. to Programming and Algorithms *or*	
CIS 145, Intro. to Visual BASIC.NET Programming	3
GE requirement Area A	3
GE requirement Area C	3
Program Elective	2-3
	Total 14-15
Fourth Semester	
CA 171, Introduction to Networking	3
GE requirement Area E	3
GE requirement Area F (BUS 212 recommended)	3
Program Elective	0-3
Electives	3
	Total 15
	Degree Total 60

Please refer to the Program Electives listed under the certificate program.

Computer Software Developer

The requirements for an associate degree in Computer Software Developer may be satisfied by completing the certificate program in addition to the associate degree requirements. (See Graduation/Associate Degree Requirements.)

Students who complete the associate degree have enhanced employability in the field of computer programming/software development, and are well prepared for full-time, entry-level positions in such job titles as programmer or programmer/analyst. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the physical environment, culture, and society in which they live, with the ability to think and communicate clearly and effectively. Except in cases of a prerequisite requirement, it is not required that courses be taken in exactly this sequence; they are recommended in this order to facilitate success.

Required Courses (36 units):	units
CA 131, Relational Database Management and Design	3
CA 151, Microcomputer Operating Systems	3
CIS 101, Intro. to Computer Info. Science	3
CIS 111, Intro. to Programming and Algorithms	3
CIS 113, Data Structures	3
CIS 121, Computer Mathematics	3
CIS 123, Assembly Language and Computer Architecture	3
CIS 161, Intro. to C Programming	3
MATH 128, College Algebra for Liberal Arts *or* MATH 150, Calculus and Analytic Geometry *or* MATH 220, Linear Algebra	3-5
PHIL 110, Intro. to Logic	3
Program Electives	4-6
Total	**36**

Recommended Pathway	
First Semester	units
CIS 101, Introduction to Computer Information Science	3
MATH 128, College Algebra for Liberal Arts *or* MATH 150, Calc. & Analytic Geometry *or* MATH 220, Linear Algebra (GE D2)	3-5
CA 151, Microcomputer Operating Systems	3
GE requirement Area B (recommended HIST 102)	3
GE requirement Area D1 (ENGL 101)	3
Total	**15-17**
Second Semester	
CIS 111, Intro. to Programming and Algorithms	3
CIS 121, Computer Mathematics	3
CIS 161, Intro. to C Programming	3
PHIL 110, Introduction to Logic	3
Program Elective (recommended MATH 150)	5
Total	**17**
Third Semester	
CIS 113, Data Structures	3
CIS 123, Assembly Language and Computer Architecture	3
GE requirement Area A (recommended PHYS 110)	4
GE requirement Area F (recommended BUS 212)	3
Program Elective CA 157	3
Total	**16**

Fourth Semester	
CA 131, Relational Database Management and Design	3
GE requirement Area C	3
GE requirement Area E (recommended SOC 111)	3
Program Elective (recommended CA 177)	3
Total	**15**
Degree Total	**60**

Associate in Science in Computer Science for Transfer

The Associate in Science in Computer Science for Transfer (AS-T in Computer Science) degree is to provide students with a foundational knowledge of computer science, to enhance their problem-solving skills, sharpen their critical and the opportunity to seamlessly transfer to a California State University in advanced standing as a Computer Science major. Additionally, the degree can prepare students in areas of science and engineering.

The Associate in Science in Computer Science for Transfer (AS-T in Computer Science) degree meets the requirements of SB 1440 for Associate Degrees for Transfer (ADT). These degrees are intended to make it easier for students to transfer to California State University campuses but do not exclude admittance to other colleges or universities.

To earn the Associate in Science in Computer Science for Transfer (AS-T in Computer Science) degree a student must complete the following:

(1) Completion of 60-semester units that are eligible for transfer to the California State University, including both of the following:

(A) The Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education---Breadth Requirements.

(B) A minimum of 18-semester units in a major or area of emphasis, as determined by the community college district.

(2) Obtainment of a minimum grade point average of 2.0.

ADTs also require that students must earn a C or better in all courses required for the major or area of emphasis. A "P" (Pass) grade is also an acceptable grade for courses in the major if the course is taken on a Pass/No Pass basis.

*This degree may only be earned by completing the Intersegmental General Education Transfer Curriculum (IGETC) Requirements. Please consult a counselor for additional information.

Required Courses (29-30 units)

	units
CIS 111, Intro Programming & Algorithms	3
CIS 113, Data Structures	3
CIS 121, Computer Mathematics	3
CIS 123, Assembly Language & Computer Architecture	3
MATH 150, Calculus & Analytic Geometry	5
MATH 160, Calculus & Analytic Geometry	4
PHYS 110, General Physics	4
BIOL 110, General Molecular Cell Biology *or*	
BIOL 120, Gen Organ, Eco, and Evo Biol *or*	
CHEM 110, General Chemistry *or*	
PHYS 120, General Physics	4-5
	Total 29-30

Recommended Pathway

First Semester	units
CIS111, Intro Programming & Algorithms	3
CIS 123, Assembly Language and Computer Architecture	3
MATH 150, Calculus and Analytic Geometry (IGETC 2)	5
IGETC GE 1a (ENGL 101)	3
	Total 14

Second Semester	
CIS 113, Data Structures	3
MATH 160, Calculus & Analytic Geometry	4
IGETC GE 5b (recommended BIOL 104)	3
IGETC GE 1b (recommended ENGL 103)	3
	Total 13

Summer	
UC Transferable Elective	1
IGETC GE 3A (recommended FTV 108)	3
IGETC GE 1c	3
	Total 7

Third Semester	
CIS 121, Computer Mathematics	3
PHYS 110, General Physics (IGETC 5a/5c)	4
IGETC GE 3A/H (recommend MUSC 102 or MUSC 103 or	
MUSC 107 or MUSC 108)	3
IGETC 4 (recommended GEOG 105)	3
	Total 13

Fourth Semester	
BIOL 110, General Molecular Cell Biology *or*	
BIOL 120, Gen Organ, Eco, and Evo Biol *or*	
CHEM 110, General Chemistry *or*	
PHYS 120, General Physics	4-5
IGETC GE 3H (recommended HIST 110 or HIST 111)	3
IGETC GE 4 (recommended SOC 110)	3
IGETC GE 4 (recommended POLS 101)	3
	Total 13-14
	Degree Total 60

Computer Information Science Courses

CIS 101 *INTRODUCTION TO COMPUTER INFORMATION SCIENCE
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
This course is designed to introduce to the general concepts and basic vocabulary of computers and information systems. Students will be introduced to the organization and functions of basic computer and information processing systems components. Instruction in programming procedures and programming logic is provided. Other topics include Internet and networking fundamentals as well as basic computer software such as spreadsheets and database applications. Appropriate for the student with a general interest in this area as well as for the student desiring to pursue further training in computer science or information systems. (Engineering and science majors consult counselors.) (C-ID: BUS 140) (CSU, UC, AVC)

CIS 111 *INTRODUCTION TO PROGRAMMING AND ALGORITHMS
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
***Advisory:** Completion of CA 103 or CA 221 or CIS 101, and completion of Intermediate Algebra or higher or placement by multiple measures.*This is a first course for students planning or exploring a career in software design and development. This course emphasizes a careful disciplined approach to computer programming. Problem solving through stepwise development of algorithms is presented. Students will learn programming language syntax, coding, program logic, and program testing. Students will plan, create, test, and run their own programs to solve typical problems. **BEFORE ENROLLING**, students should have basic computer experience and be able to save and retrieve files, run applications, and print documents. (Engineering and science majors consult counselors.) (C-ID: COMP 122) (CSU, UC, AVC)

CIS 113 *DATA STRUCTURES
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
***Advisory:** Completion of MATH 128 or MATH 140.*
***Prerequisite:** Completion of CIS 111.*
This course continues the introduction to programming and algorithms initiated in CIS 111, with a particular focus on the ideas of data abstraction and object-oriented programming. Topics include object-oriented programming, fundamental data structures, design and implementation of abstract data types, common types of collections (such as stacks, queues, lists, graphs, trees and sets), algorithm analysis and complexity, search and sort algorithms, and the use of recursion. Students plan and create programs using data structures and collection types to solve problems frequently encountered by professional computer scientists. This course is intended for students majoring in CIS. (Engineering and science majors consult counselors.) (C-ID: COMP 132) (CSU, UC, AVC)

CIS 121 *COMPUTER MATHEMATICS
3 units
3 hours weekly
Advisory: *Completion of CIS 111, CIS 113, and MATH 128 or MATH 140.*
This is an introductory course in the area of mathematics applicable to computer science. Topics include logic and circuits, sets, mathematical induction, graphs, trees, algorithm development and refinement, and computational models like finite state automata and Turing machines. Emphasis is placed on problem solving and application of mathematical theory to data structures and database construction and operation. (Engineering and science majors consult counselors.) (C-ID: COMP 152) (CSU, UC, AVC)

CIS 123 *ASSEMBLY LANGUAGE AND COMPUTER ARCHITECTURE
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
Advisory: *Completion of CIS 111*
This course introduces assembly language programming and computer architecture to enable students to understand how programs are actually executed at the machine level. Students will use Intel-compatible personal computers for the detailed study of the Intel IA-32 processor instruction set and architecture and to develop programs using a macro assembler. Both 32-bit Windows console programming and 16-bit real-mode programming are covered. Topics include machine/ assembly level programming, instruction formats, internal data representation, addressing modes, procedure call and return mechanisms, and how high-level language constructs are implemented at the machine level, basic microcomputer organization, instruction execution cycle, memory segmentation and paging, and details of programming the processor in both protected-mode and in real-mode. **BEFORE ENROLLING**, students should be proficient in writing programs in a high-level language. (Engineering and science majors consult counselors.) (C-ID: COMP 142) (CSU, UC, AVC)

CIS 161 *INTRODUCTION TO C PROGRAMMING
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
Advisory: *Completion of CIS 101, and Eligibility for MATH 128.*
This course is designed to give the student an introduction to the C programming language. Students will learn the basic elements of the C language and a disciplined approach to program development using structured programming techniques for readability, maintainability and defensive programming. Problem solving through stepwise development of algorithms and the mechanics of running, testing, and debugging programs is presented. Students will plan, create, test, and run their own programs to solve typical problems. **BEFORE ENROLLING,** students should have basic computer experience and be able to save and retrieve files, run applications, print documents, and have sufficient aptitude with mathematics to solve simple algebraic equations and to appreciate the use of mathematical notation and formalism. (Engineering and science majors consult counselors.) (CSU, UC, AVC)

CIS 173 *INTRODUCTION TO C++ PROGRAMMING
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
Advisory: *Eligibility for MATH 128.*
Prerequisite: *Completion of CIS 161.*
Students will learn the syntax and semantics of the C++ programming language, what modifications and additions were made to the C programming language to produce C++, and how to implement an object-oriented design in C++. The course will include designing, implementing, and testing C++ programs that solve representative problems from business, science, mathematics, and engineering. This course is intended for students majoring in CIS. (CSU, UC, AVC)

CIS 174 *INTRODUCTION TO C# PROGRAMMING
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
Advisory: *Eligibility for MATH 128.*
Prerequisite: *Completion of CIS 111.*
The students will learn the fundamentals of Microsoft Windows programming using the C# programming language. The course will include designing, implementing and testing C# programs, which will provide useful Windows applications to solve representative problems for business, science, mathematics, and engineering. Before enrolling, students should understand object oriented programming concepts. This course is intended for students majoring in Business or CIS or those desiring to increase their programming skills. (CSU, UC, AVC)

CIS 175 *ADVANCED JAVA PROGRAMMING
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
Advisory: *Eligibility for MATH 128.*
Prerequisite: *Completion of CIS 111.*
This course teaches the Advanced Java programming concepts, the extensive Java class library, and Object Oriented design and programming. The students will learn advanced techniques for using exceptions, file input/output, utility classes, multi-threading, network/Internet programming, streams, developing Web applications and Graphical User Interface (GUI) programming. BEFORE ENROLLING, students should be able to solve programming problems using step-wise development of Java algorithms. Using the high-level programming language, students should be able to plan, create, test and run their own programs using proper syntax, code and logic. This course is intended for students majoring in Business or Computer Information Science or those desiring-to increase their programming skills. (CSU, UC, AVC)

CIS 177 INTRODUCTION TO PYTHON PROGRAMMING
(formerly CIS 250)
3 units
4 hours weekly [2.5 lecture, 1.5 lab]
Prerequisite: *Completion of CIS 101.*
This course is designed to give the student an introduction to the Python object-oriented programming language. Students will learn the basic elements of the Python language, and a disciplined approach to program development using Object-Oriented programming techniques for readability, maintainability, and rapid application development. Problem solving is accomplished through a methodical development of algorithms and the mechanics of running, testing, and debugging programs. Students will plan, create, test, and run their own programs to solve typical business problems. (Engineering and Science majors consult counselors.) (CSU, UC, AVC)

CIS 199 *OCCUPATIONAL WORK EXPERIENCE
1–8 units
hours vary
Prerequisite: *To participate in work experience, students must have a job or internship which is either paid or voluntary and have the approval of the supervisor and instructor supervising work experience in the specific subject area. PRIOR TO ENROLLING, students must attend a scheduled orientation or meet individually with the supervising instructor for an individual orientation.*
Occupational Work Experience Education is supervised employment designed to provide students a realistic learning experience through work. The ultimate goal is to teach students those skills and attitudes that will equip them to function and adapt as an employee in a variety of situations and jobs. Occupational Work Experience Education is supervised employment extending classroom-based occupational learning at an on-the-job learning station related to the students' educational major or occupational goal. Credit may be accrued at the rate of one to eight units per semester. For the satisfactory completion of all types of Cooperative Work Experience Education (WE 197 and WE 199), students may earn up to a total of sixteen semester credit hours. (CSU, AVC) **(R3)**