

## Computer science

**COMPUTER SCIENCE – COMSC**

Charlie Shi, Dean

Business, Computer Sciences, and Culinary Arts Division

The computer science department offers courses in three general areas, each targeted to serve students with specific needs:

1. General education students seeking a computer literacy course that will transfer to both CSU and UC campuses and/or provide hands-on instruction in the use of personal computer for classroom and research needs (COMSC-101)
2. Computer science transfer students planning to major in computer science or computer engineering at a four-year school (COMSC-110, 165, 200, 210, 255, 260)
3. Information systems (programming) professionals who are seeking to update their skills, (COMSC-120, 171, 172, 255, 256, 257, 275, 276)

**Possible career opportunities**

Study in computer science prepares students for careers in programming, computer operations, systems analysis and engineering, and web design, as well as artificial intelligence, robotics, and software engineering and development. Some career options require more than two years of college study.

Besides offering courses designed to meet lower-division requirements for a major in computer science, there is also a wide variety of courses covering current popular topics and new software development tools and languages. Such courses provide a path for working professionals to upgrade their skill-set and keep abreast with current technology.

**Associate in science degree  
Computer science**

Students completing the program will be able to...

- A. create computer programming solutions using either the C++ or Java programming language.
- B. read and write programs written in x86 assembly language, and interface them with C++ programs.
- C. effectively use either the C++ Standard Template Library or the Java util package to manage data structures in programs.
- D. make the right choices of language, platform, data structures, and databases for a computer programming solution based on their knowledge of the elements of program design.

The associate in science in computer science is designed as a two-year curricular pathway that offers students a broad general education while integrating an in-depth study of computer science. Students will be prepared to assume entry-level positions in business and industry. Many of the courses are also applicable toward advanced levels of study. To earn a degree, students must complete each course used to meet a major requirement with a "C" grade or higher and complete all general education requirements as listed in the catalog. Certain courses may satisfy both major and general education requirements; however, the units are only counted once.

<i>major requirements:</i>	<i>units</i>
COMSC-110 Introduction to Programming.....	4
COMSC-165 Advanced Programming with C and C++.....	4
COMSC-210 Program Design and Data Structures .....	4
COMSC-260 Assembly Language Programming/ Computer Organization.....	4

*plus at least 4 units from:*

COMSC-200 Object Oriented Programming C++.....	4
COMSC-256 Advanced Java Programming.....	4

**total minimum units for the major 20**

Students who intend to transfer to a four-year program in computer science should consult with a counselor regarding mathematics and science requirements listed below.

*plus at 0-5 units from:*

MATH-192 Analytic Geometry and Calculus I.....	5
MATH-193 Analytic Geometry and Calculus II .....	5
MATH-195 Discrete Mathematics .....	4

*plus 0-8 units from:*

PHYS-130 Physics for Engineers and Scientists A: Mechanics and Wave Motion.....	4
PHYS-230 Physics for Engineers and Scientists B: Heat and Electro-Magnetism.....	4

**Certificate of achievement****Computer science -****Advanced C++ programming**

Students completing the program will be able to...

- A. create computer programming solutions using C++ and OOP.
- B. effectively apply inheritance and polymorphism in C++ class design.
- C. "overload" common C++ operators for objects.

This program prepares students for a variety of programming positions and is especially suitable for students who have four-year degrees. To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher.

<i>required courses:</i>	<i>units</i>
COMSC-110 Introduction to Programming .....	4
COMSC-165 Advanced Programming with C and C++ .....	4
COMSC-200 Object Oriented Programming C++.....	4

**total minimum required units 12**

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### Certificate of achievement

#### Computer science -

#### Advanced Java programming

Students completing the program will be able to...

- create computer programming solutions using Java and GUI.
- write multithreaded Java programs.

This program prepares students for a variety of programming positions and is especially suitable for students who have four-year degrees. To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher.

required courses:	units
COMSC-110 Introduction to Programming .....	4
COMSC-255 Programming with Java .....	4
COMSC-256 Advanced Java Programming .....	4
<b>total minimum required units</b>	<b>12</b>

### Certificate of achievement

#### Computer science -

#### Computer architecture

Students completing the program will be able to...

- create computer programming solutions using C++.
- read and write programs written in x86 assembly language, and interface them with C++ programs.

This program prepares students for a variety of programming positions and is especially suitable for students who have four-year degrees. To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher.

required courses:	units
COMSC-110 Introduction to Programming.....	4
COMSC-165 Advanced Programming with C and C++ .....	4
COMSC-260 Assembly Language Programming/ Computer Organization .....	4
<b>total minimum required units</b>	<b>12</b>

### Certificate of achievement

#### Computer science -

#### Mobile and enterprise Java programming

Students completing the program will be able to...

- create networked computer programming solutions using Java.
- write Java programs involving sockets for TCP/IP network communications.
- write Java programs involving Enterprise Java Beans.

This program prepares students for a variety of programming positions and is especially suitable for students who have four-year degrees. To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher.

required courses:	units
COMSC-110 Introduction to Programming.....	4
COMSC-255 Programming with Java .....	4
COMSC-257 Mobile Programming for Android Using Java ....	4
<b>total minimum required units</b>	<b>12</b>

### Certificate of achievement

#### Computer science -

#### Program design

Students completing the program will be able to...

- create computer programming solutions using C++ and the STL.
- write custom C++ template classes to create and manage data structures.
- evaluate algorithmic efficiency and express in "big oh".

This program prepares students for a variety of programming positions and is especially suitable for students who have four-year degrees. To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher.

required courses:	units
COMSC-110 Introduction to Programming.....	4
COMSC-165 Advanced Programming with C and C++ .....	4
COMSC-210 Program Design and Data Structures .....	4
<b>total minimum required units</b>	<b>12</b>

### COMSC-101 Computer Literacy

4 units SC

- DVC GE: IB
- 54 hours lecture/54 hours laboratory per term

This introductory course in computer literacy covers the basics of computer hardware, software, and networking. Topics include local and cloud-based file management, productivity software for word processing, spreadsheets, databases, presentations, and home networks. An introduction to computer programming is also presented. CSU, UC

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**COMSC-110 Introduction to Programming**

4 units SC

- DVC GE: IB
- 54 hours lecture/54 hours laboratory per term
- Prerequisite: Placement into MATH-121; or MATH-085 or MATH-085SP; or MATH-090 or MATH-090E or MATH-090SP; or assessment process; or equivalent
- Recommended: COMSC-101 or equivalent
- Note: See schedule of classes for programming language presented. Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course introduces students to programming concepts emphasizing modular design and development of programs, coding style, documentation, debugging and testing. All control structures and data types of a commonly used language are covered. C-ID COMP-112. CSU, UC

**COMSC-120 SQL Programming**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-110 or ENGIN-135 or equivalent
- Note: Refer to class schedule for specific Oracle and SQLServer versions. Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course presents the creation and maintenance of databases and tables as well as the storage, retrieval and manipulation of data. Topics include both Oracle and Microsoft SQLServer. Structured Query Language (SQL) script that is common to both and product-specific variations are also covered. CSU

**COMSC-140 Python Programming**

3 units SC

- 45 hours lecture/27 hours laboratory per term
- Note: See schedule of classes for programming language presented. Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course presents an introduction to the Python language. Topics covered include: primitive and collection data types, operators and statements, loops and branching, functions and variable scoping, modules and packages, object-oriented programming, file handling and exceptions, and an introduction to Graphical User Interface (GUI) programming. CSU, UC C-ID

**COMSC-150 Topics in Computer Science**

.3-4 units SC

- Variable hours
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

A supplemental course in computer science to provide a study of current concepts and problems. Specific topics will be announced in the schedule of classes. CSU

**COMSC-165 Advanced Programming with C and C++**

4 units SC

- DVC GE: IB
- 54 hours lecture/54 hours laboratory per term
- Prerequisite: COMSC-110 or ENGIN-135 or equivalent

The course emphasizes programming techniques using C and C++ languages. The syntax of C will be reviewed, then advanced topics such as string processing, pointers, links lists, queues, stacks, and dynamic memory allocation will be covered. C-ID COMP 122. CSU, UC

**COMSC-171 Introduction to UNIX and Linux**

2 units SC

- 27 hours lecture/27 hours laboratory per term

This is an introductory course in UNIX and Linux operating systems. This course covers scripting and the shell, access control, controlling processes, booting and shutting down, permissions, file systems, utility programs, editors, usage of network services, storage, AWK scripting, and X Window graphics. CSU, UC

**COMSC-172 UNIX and Linux Administration**

2 units SC

- 27 hours lecture/27 hours laboratory per term
- Recommended: COMSC-171 or equivalent

This course presents the installation, configuration, and maintenance of UNIX or Linux systems. Topics include installation, booting, user management, hardware configuration, backup, package management, Transmission Control Protocol/Internet Protocol (TCP/IP) configuration, Dynamic Host Control Protocol (DHCP) servers configuration, Domain Name Server (DNS) server configuration, file server configuration, web server configuration, routing, packet filtering, and security. Course content will apply to all UNIX and Linux flavors. CSU

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### **COMSC-200 Object Oriented Programming C++**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Prerequisite: COMSC-165 or equivalent

This course presents the concepts and syntax of the C++ Language. Topics include inheritance, overloaded operators, overloaded default operators, virtual functions, memory management, and templates. CSU, UC

### **COMSC-210 Program Design and Data Structures**

4 units LR

- 54 hours lecture/54 hours laboratory per term
- Prerequisite: COMSC-165 or equivalent
- Recommended: COMSC-200 or equivalent

This course presents techniques relevant to program design and selection of data structures for larger programs. Topics include design techniques, effective use of recursion, algorithmic efficiency and O-notation, linked lists, binary trees, B-trees, graphs, sorting and searching techniques. Extensive programming of a variety of data structures is practiced. C-ID COMP 132, CSU, UC

### **COMSC-240 Advanced Python Programming**

3 units SC

- 45 hours lecture/27 hours laboratory per term
- Prerequisite: COMSC-140 or equivalent
- Note: See schedule of classes for programming language presented. Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This advanced Python programming course is a continuation of COMSC-140, Python Programming, and is designed to prepare students for jobs as Python programmers. Regular expressions and classes are covered extensively along with elements of network programming such as File Transfer Protocol (FTP), web client, and web server. The course also covers graphics, database access, and Python extensions. CSU

### **COMSC-255 Programming with Java**

4 units SC

- DVC GE: IB
- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-110 or equivalent

This course emphasizes programming techniques using the Java programming language. The syntax and deployment of Java applications are reviewed. Advanced topics such as objects, classes, methods, Object Oriented Programming (OOP) principles, Graphical User Interface (GUI), Input/Output (I/O), data structures, applets, networking, and threads are covered. CSU, UC

### **COMSC-256 Advanced Java Programming**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-255 or equivalent

This course covers advanced topics in Java programming including multi-threading, exception handling, serialization, reflection, model view controller architecture, java beans, servlets and database connectivity. CSU, UC

### **COMSC-257 Mobile Programming for Android Using Java**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-255 or equivalent

The course introduces Mobile programming concepts for the Android operating system using Java programming language. The Mobile programming topics covered include activities, services, broadcast receivers, content providers, telephony, text messaging, location services, fragments, user interface file, SQLite database, and Restful web services. CSU

### **COMSC-260 Assembly Language Programming/Computer Organization**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Prerequisite: COMSC-165 or equivalent

This course covers the basics of machine architecture, machine language, assembly language, operating system interface, and interfacing with high level languages. Topics include data representation, instruction representation and execution, addressing, indexing, macros, subroutine linkages, storage and time efficiency issues, interrupt descriptor tables, virtual memory, cache memory, and dynamic address translation. C-ID COMP 142. CSU, UC

### **COMSC-275 Introduction to Web Programming Using PHP and JavaScript**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-110 or equivalent

This is an introductory course that presents the basic concepts and applications of web programming. The course uses the JavaScript on the client side and PHP (Hypertext Preprocessor) on the server side and introduces the PHP language and covers the basics of the JavaScript language. HTML (Hyper Text Markup Language) and CSS (Cascading Style Sheets) are also reviewed. CSU



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### COMSC-276 Intermediate Web Programming Using PHP and MySQL

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-275 or equivalent

This course presents the basic concepts and applications of server side web programming. PHP (Hypertext Preprocessor) is used as the server side programming language and MySQL as the database language. PHP language constructs are used to interface with the database. CSU

### COMSC-277 Advanced Web Programming Using PHP

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-275 or equivalent

This is an advanced web programming course that presents advanced concepts and application of both client and server side programming. The JavaScript language as the client side and PHP (Hypertext Preprocessor) as the server side programming language and MySQL as the database will be used. CSU

### COMSC-295 Occupational Work Experience Education in COMSC

2-4 units SC

- May be repeated eight times
- Variable hours
- Note: In order to enroll in COMSC-295, students must be employed, register for the course, complete an online Employment Form, and participate in an orientation. Incomplete grades are not awarded for this course.

COMSC-295 is supervised employment that extends classroom learning to the job site and relates to the student's chosen field of study or area of career interest. Under the supervision of a college instructor, students will engage in on-the-job and other learning experiences that contribute to their employability skills and occupational or educational goals. Each unit represents five hours of work per week or 75 hours work per term. Students may earn up to a total of 16 in any combination of WRKX courses. Repetition allowed per Title 5, Section 55253. CSU

### COMSC-296 Internship in Occupational Work Experience Education in COMSC

2-4 units SC

- May be repeated eight times
- Variable hours
- Note: In order to enroll in the COMSC-296 course, students must be interning or volunteering, register for the course, complete an online Employment Form, and participate in an orientation. Incomplete grades are not awarded for this course.

COMSC-296 is a supervised internship in a skilled or professional level assignment in the student's major field of study or area of career interest. Under the supervision of a college instructor, students will engage in on-the-job and other learning experiences that contribute to their employability skills and occupational or educational goals. Internships may be paid, non-paid, or some partial compensation provided. Each unit represents five hours of paid work or four hours of unpaid work per week or 75 hours of paid work or 60 hours of unpaid work per term. Students may earn up to a total of 16 units in any combination of WRKX courses. Repetition allowed per Title 5, Section 55253. CSU