

COMPUTER SCIENCE

Natural and Applied Sciences Division

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<http://www.cabrillo.edu/programs>

Information for Computer Science Majors

The Computer Science program is intended to meet the needs of students majoring in computer science, and students from other science disciplines where computer programming is required. These disciplines include computer engineering, networking and system administration, business, bioinformatics, information systems management, economics, business and information systems, engineering, and engineering technology.

The Computer Science Program offers two degree programs, four certificates of achievement, and two skills certificates. Both the A.S./A.A. Degree programs transfer to four-year colleges and universities. Note: UC will accept a total of 6 courses from Computer Science.

One of the following courses is recommended for all potential computer science/computer engineering majors early in their academic career to help determine their interest in pursuing the major: CS 1 or CS 2 or CS 11 (C++), or CS 12J (Java).

MODEL PROGRAM FOR COMPUTER SCIENCE

The following model program fulfills requirements for the A.A/A.S. Degree in Computer Science at Cabrillo College. Specific lower division major preparation at four-year public institutions in California can be found at www.assist.org. Please see a counselor for advisement for transfer to any four-year institution.

Computer Science Majors

Core courses for all transfer students

CS 19 C++ Programming 4

OR

CS 20J Java Programming 4

*CS 21 Introduction to Data Structures and Algorithms 4

*CS 23/MATH 23 Discrete Mathematics 4

MATH 5AB Analytical Geometry and Calculus I, II 8

The following core courses are required for transfer for most computer science majors and transfer universities.

**CS 24 Elementary Computer Organization 4

MATH 5C Analytic Geometry and Calculus III 4

*MATH 6 Introduction to Linear Algebra 3

MATH 7 Introduction to Differential Equations 3

CHEM 1AB General Chemistry 10

OR

PHYS 4A, **PHYS 4B, *PHYS 4C
Physics for Scientists and Engineers 15

OR

BIO 1A Cell and Molecular Biology 5

AND

BIO 1B Animal Diversity and Evolutionary Principles . . 5

*Spring only; **Fall only

Associate in Arts Degree in Computer Science

General Education 30

Core Courses 30

Total for A.A. Degree in Computer Science 60

Associate in Science Degree in Computer Science

General Education 21

Core Courses 39

Total for A.S. Degree in Computer Science 60

Computer Engineering Majors

Core courses for all transfer students

CS 19 C++ Programming 4

OR

CS 20J Java Programming 4

MATH 5ABC Analytic Geometry and Calculus I, II, III 12

*MATH 6 Introduction to Linear Algebra 3

MATH 7 Introduction to Differential Equations 3

CHEM 1A General Chemistry 5

PHYS 4A

AND

**PHYS 4B Physics for Scientists and Engineers 10

The following core courses are required for transfer for most computer engineering majors and transfer universities:

*CS 21 Introduction to Data Structures and Algorithms 4

*CS 23/MATH 23 Discrete Mathematics 4

**CS 24 Elementary Computer Organization 4

*PHYS 4C Physics for Scientists and Engineers 5

OR

CHEM 1B General Chemistry 5

OR

BIO 1A Cell and Molecular Biology 5

AND

BIO 1B Animal Diversity and Evolutionary Principles . . 5

*Spring only; **Fall only

Certificate of Achievement: C++ Programming

CS 1	Introduction to Computers and Computer Technology	3
AND		
CS 1L	Lab: Introduction to Computers and Computer Technology	2
OR		
CS 2	Foundations of Computer Science	4
CS 11	Introduction to Programming Concepts and Methodology, C++	4
OR		
CIS 132	Introduction to Internet Programming	4
CS 19	C++ Programming	4
MATH 154	Elementary Algebra	4
OR		
MATH 4	Pre-Calculus and Trigonometry	5
COMM 2	Group Discussion.	3
OR		
COMM 10	Communication Process	3
ENGL 1A/1AH/1AMC/1AMCH	College Composition	3
Total for Certificate of Achievement		<u>22-24</u>

Certificate of Achievement: Java Programming

CS 1	Introduction to Computers and Computer Technology	3
AND		
CS 1L	Lab: Introduction to Computers and Computer Technology	2
OR		
CS 2	Foundations of Computer Science	4
CS 12J	Introduction to Programming Concepts and Methodology, Java	4
OR		
CIS 132	Introduction to Internet Programming	4
CS 20J	Java Programming	4
MATH 154	Elementary Algebra	4
OR		
MATH 4	Pre-Calculus and Trigonometry	5
COMM 2	Group Discussion.	3
OR		
COMM 10	Communication Process	3
ENGL 1A/1AH/1AMC/1AMCH	College Composition	3
Total for Certificate of Achievement		<u>22-24</u>

Certificate of Achievement: Programming

CS 19	C++ Programming	4
OR		
CS 20J	Java Programming	4
*CS 21	Introduction to Data Structures and Algorithms	4
*CS 23/MATH 23	Discrete Mathematics.	4
**CS 24	Elementary Computer Organization	4

*Spring only; **Fall only

AND any two of the following four CS/CIS courses:

CS 29	Object Oriented Programming	4
CIS 130	UNIX/Linux Shell Programming	4
CIS 131	Perl Programming in a Unix Environment	4
CIS 132	Introduction to Internet Programming	4
PLUS		
MATH 5A	Analytic Geometry and Calculus I	4
COMM 2	Group Discussion.	3
OR		
COMM 10	Communication Process	3
ENGL 1A/1AH/1AMC/1AMCH	College Composition	3
Total for Certificate of Achievement		<u>34</u>

Certificate of Achievement: Web Programming

CS 12J	Introduction to Programming Concepts and Methodology, Java	4
OR		
CS 20J	Java Programming	4
CIS 131	Perl Programming in a Unix Environment	4
CIS 132	Introduction to Internet Programming	4
CIS 165	Introduction to Programming Database-Driven Web Sites with ASP	4
OR		
CIS 165PH	Introduction to Programming Database-Driven Web Sites with PHP	4
OR		
CIS 165J	Introduction to Programming Database-Driven Web Sites with Java	4
MATH 154	Elementary Algebra	4
OR		
MATH 4	Pre-Calculus and Trigonometry	5
COMM 2	Group Discussion.	3
OR		
COMM 10	Communication Process	3
ENGL 1A/1AH/1AMC/1AMCH	College Composition	3
Total for Certificate of Achievement		<u>26-27</u>

Skills Certificate: Game Programming

Prepares the student to program at an intermediate level with an emphasis on video game programming techniques.

CS 11	Introduction to Programming Concepts and Methodology, C++	4
OR		
CS 12J	Introduction to Programming Concepts and Methodology, Java	4
CS 20J	Java Programming	4
CS 12GP	Game Programming in Java.	4
Total for Skills Certificate		<u>12</u>

Skills Certificate: Web Programming Fundamentals

Prepares the student to create interactive and dynamic web pages using client-side and server-side programming languages.

CS 12J	Introduction to Programming Concepts and Methodology, Java	4
OR		
CS 20J	Java Programming	4
CIS 132	Introduction to Internet Programming	4
CIS 165	Introduction to Programming Database-Driven Web Sites with ASP	4
OR		
CIS 165PH	Introduction to Programming Database-Driven Web Sites with PHP	4
OR		
CIS 165J	Introduction to Programming Database-Driven Web Sites with Java	4
DM 173B	Interactive Programming using Flash	3
Total for Skills Certificate		15

Computer Science Courses

CS 1

Introduction to Computers and Computer Technology

3 units; 3 hours Lecture, 3 hours Laboratory

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Surveys the fields of study within computer science and computer technology with a focus on computer literacy in the 21st century. Topics covered include: hardware, software, development systems, the Internet, and networks, including PC and Macintosh. Students interested in a hands-on lab course to coincide with this class may enroll in CS 1L.

Transfer Credit: Transfers to CSU; UC: Students are advised to take CS 1 + CS 1L to receive credit in the Computer Science major at some UC campuses CAN CSCI2.

CS 1L

Lab: Introduction to Computers and Computer Technology

2 units; 2 hours Lecture, 2 hours Laboratory

Recommended Preparation: CS 1 (may be taken concurrently) and CABT 106, or previous Cabrillo computer course or equivalent; Eligibility for ENGL 100 and READ 100.

Covers the fundamentals of information literacy and computer proficiency including the computer aided research process and essential skills in using operating systems, word processing, spreadsheets, e-mail, image manipulation, and presentation software. Instruction is conducted in a computer demonstration lab. Students may complete lab assignments in the Cabrillo Technology Center, or at home if necessary software is available.

Transfer Credit: Transfers to CSU; UC. CAN CAN CSCI2.

CS 2

Foundations of Computer Science

4 units; 3 hours Lecture, 6 hours Laboratory

Recommended Preparation: MATH 154; Eligibility for ENGL 100 and READ 100.

Presents introductory computer architecture for computer science, engineering, networking or programming majors. Topics include successful innovations and limitations of computers, binary and hexadecimal number systems, high-precision arithmetic, digital logic gates and structures, opcodes, addressing modes, instruction set architectures, microarchitectures, devices, and beginning programming. Portions of this course may be offered in a Distance-Learning Format.

Transfer Credit: Transfers to CSU.

CS 11

Introduction to Programming Concepts and Methodology, C++

4 units; 3 hours Lecture, 6 hours Laboratory

Recommended Preparation: CS 1 or CS 2; MATH 154; Eligibility for ENGL 100 and READ 100.

Presents an introduction to computer programming using the C++ language including procedural and object-oriented design methodology along with computer mathematics. Topics include algorithmic and object-oriented decomposition, declarations, expressions, functions, selection and looping statements, recursion, simple data types, elementary sorting and searching algorithms, libraries, arrays, pointers, classes, objects, and templates. This course prepares students for CS 19.

Transfer Credit: Transfers to CSU; UC. CAN CSCI22.

CS 12GP

Game Programming in Java

4 units; 3 hours Lecture, 6 hours Laboratory

Prerequisite: CS 11 or CS 12J or equivalent knowledge.

Recommended Preparation: CS 20J or equivalent knowledge; pEligibility for ENGL 100 and READ 100.

Introduces game programming using the Java programming language. Explores the algorithms, data structures and techniques for producing 2D interactive computer games. Topics include: 2D graphics, animation, sprites, sound, rule systems, and artificial intelligence in the creation of interactive games.

Transfer Credit: Transfers to CSU, UC.

CS 12J

Introduction to Programming Concepts and Methodology, Java

4 units; 3 hours Lecture, 6 hours Laboratory

Recommended Preparation: CS 1 or CS 2; MATH 154; Eligibility for ENGL 100 and READ 100.

Presents an introduction to computer programming using the Java programming language beginning with basic principles and progressing to object-oriented programs, including visual programming. Topics include: algorithms, data types, declarations, expressions, selection, repetition, methods, recursion, libraries, arrays, classes, objects, components, events, files and streams. May be offered in a Distance-Learning Format.

Transfer Credit: Transfers to CSU, UC.

CS 19

C++ Programming

4 units; 3 hours Lecture, 6 hours Laboratory

Prerequisite: MATH 4.

Recommended Preparation: CS 11 or equivalent; Eligibility for ENGL 100 and READ 100.

Programming, documentation, and software design methodologies using C++. It is assumed that students have been introduced to classes and objects, control structures, repetition, functions, and logical operators. There will be a brief review of functions, arrays, pointers and strings. New topics include classes, operator overloading, and inheritance. Previous programming experience strongly recommended. Students will be required to show that they meet the course prerequisites. This course prepares students for CS 21 and CS 23.

Transfer Credit: Transfers to CSU; UC. CAN CSCI16.

CS 20J

Java Programming

4 units; 3 hours Lecture, 6 hours Laboratory

Prerequisite: MATH 4.

Recommended Preparation: CS 12J or equivalent; Eligibility for ENGL 100 and READ 100.

Learn programming, documentation, and software-design methodologies using Java. Starting with a brief review of control structures, methods and arrays, students rapidly progress to object-oriented programs of moderate complexity. The more advanced topics include: inheritance, polymorphism, exceptions, graphics, graphical-user interfaces, files, streams, threads and dynamic data structures. This course prepares students for CS 21 and CS 24. May be offered in a Distance-Learning Format.

Transfer Credit: Transfers to CSU, UC.

CS 21

Introduction to Data Structures and Algorithms

4 units; 3 hours Lecture, 6 hours Laboratory

Prerequisite: CS 19 or CS 20J; MATH 5A.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Provides an introduction to data structures, algorithms, and software engineering techniques using the C++ or Java language. Presents the development of large programs including definition, implementation, analysis, use and reuse of abstract data types and associated algorithms. Reviews and elaborates arrays, lists, queues, stacks, sets, trees, priority queues, heaps, tables, hashing, balanced trees, graphs, recursion, searching and sorting. Offered spring only.

Transfer Credit: Transfers to CSU; UC. CAN CSC124.

CS 23

Discrete Mathematics

4 units; 3 hours Lecture, 3 hours Laboratory

Prerequisite: MATH 5A or equivalent.

Recommended Preparation: CS 19 or CS 20J or equivalent; Eligibility for ENGL 100 and READ 100.

Presents discrete mathematical systems including methods of proof that shape the foundations of computer science. Includes set and number theory, Boolean Algebra, deductive and inductive proof, logic, equivalence, order, and recurrence relations, combinatorics, graph and network models, circuits and circuit minimization techniques, automata, and grammars. Math majors should enroll in MATH 23 (identical to CS 23). Offered spring only.

Transfer Credit: Transfers to CSU; UC. CAN CSC126.

CS 24

Elementary Computer Organization

4 units; 3 hours Lecture, 6 hours Laboratory

Prerequisite: CS 19 or CS 20J or equivalent; MATH 5A.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Introduces organization of computer systems, machine level programming and systems software. Includes processor organization, introduction to operating systems and assembly language programming on microprocessors. Offered fall only.

Transfer Credit: Transfers to CSU, UC.

CS 29

Object Oriented Programming

4 units; 3 hours Lecture, 6 hours Laboratory

Prerequisite: CS 21 or equivalent.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Effective object oriented programming using the Java or C++ programming language. Presents additional material on types, classes, methods, constructors, objects, inheritance, templates, data streams, error management, and design.

Transfer Credit: Transfers to CSU, UC.