Computer Science

(See "Computer Information Systems" section for additional computer courses.)

We are in the Computer Age. Virtually every occupation in the world today has an interface with computers. From the microprocessor under the hood of your automobile to the larger scale systems used by Congress to formulate new laws, we all are affected in our daily lives by computers. Never before in history has any single endeavor grown so fast or become so universally accepted.

At Santa Barbara City College, we are helping students meet the challenge presented by this new technology. Classes, from introductory to advanced topics, are designed to provide general education, transfer and occupational training. The A.S. Degree requirements to follow are designed to prepare students for employment or for transfer to both the CSU and UC systems.

Department Offices

Computer Center, H-245, ext. 2401/2402
Soheyla Javanbakht, *Lab Teaching Assistant*
Arnold David Gowans, Jr., *Lab Teaching Assistant*

Faculty & Offices

Dean Nevins, *Chair* (H-214, 730-5191)
Robert Dependahl (H-226, ext. 2452)
Jacqueline Kuehn (H-213, ext. 2693)
Stephen Strenn (H-226, ext. 2490)

Emeritus Faculty

Ralph Schiferl

Degrees & Certificates Awarded

Associate in Science Degree, Computer Science
Certificate of Achievement, Computer Science
Skills Competency Award, Web Programming
Skills Competency Award, Mobile Application Developer

A.S. Degree Requirements

Department Requirements (40.5-45.5 units)

CS 101 — Computer Concepts . . . 3
CS 120 — Java Programming . . . 3
CS 130 — Introduction to UNIX . . . 1.5
CS 131 — Assembly Language Programming . . . 4
CS 135 — Programming Fundamentals . . . 3
CS 137 — C Programming ***or*** . . . 3
CS 140 — Object-Oriented Programming Using C++ . . . 4
CS 143 — Discrete Math . . . 4
CS 145J — Introduction to Data Structures ***or*** CS 145P — Introduction to Data Structures . . . 3
MATH 150 — Calculus with Analytic Geometry I . . . 5
MATH 160 — Calculus with Analytic Geometry II . . . 5

Plus two courses from the following:

CS 111 — HTML Web Technologies & Webmastering . . . 3
CS 137 — C Programming . . . 3
CS 140 — Object-Oriented Programming Using C++ . . . 4
CS 180 — Software Engineering with UML . . . 3
MATH 200 — Multivariable Calculus . . . 4
MATH 210 — Linear Algebra . . . 4
MATH 220 — Differential Equations . . . 4
PHIL 205 — Introduction to Logic . . . 3
*PHYS 102 — Intro to Physics for Science Majors . . . 4
PHYS 121 — Mechanics of Solids and Fluids . . . 5
PHYS 122 — Electricity and Magnetism . . . 5

**NOTE: Physics 102 does not count toward department requirement if either Physics 121 or 122 has been taken. A course used to satisfy one requirement may not be used to satisfy another requirement (double-counting is not allowed).*

College Requirements

For complete information, see "Graduation Requirements" in the *Catalog* Index.

One-Year Certificate of Achievement: Computer Science

Department Requirements (30.5-33.5 units)

CS 101 — Computer Concepts 3
CS 120 — Java Programming 3
CS 130 — Introduction to UNIX 1.5
CS 135 —Programming Fundamentals 3
CS 137 — C Programming ***or*** 3
CS 140 — Object-Oriented Programming Using C++ 4
MATH 107 — Intermediate Algebra ***or*** 4
MATH 111 — Intermediate Algebra for Math, Science and Business Majors 5
PHIL 205 — Introduction to Logic 3
PHYS 102 — Introduction to Physics for Science Majors . . 4

Plus two courses from the following:

CIS 203 — Novell NetWare System Administration 4
CS 111 — HTML Web Technologies & Webmastering 3
CS 119 — FORTRAN Programming 3
CS 131 — Assembly Language Programming 4
CS 137 — C Programming 3
CS 140 — Object-Oriented Programming Using C++ 4
CS 145J — Introduction to Data Structures ***or*** 3
CS 145P — Introduction to Data Structures 3

NOTE: A course used to satisfy one requirement may not be used to satisfy another requirement (double-counting is not allowed).

Skills Competency Award: Web Programming

Department Requirements (15-16)

CIS 230 — Active Server Pages & VB Script ***or*** 4
CS 125 — C# Programming ***and*** 1.5
CS 127 — ASP.NET Using C# 1.5
CS 111 — HTML, Web Technologies & Webmastering 3
CS 115 — JavaScript and Dynamic HTML 3
CS 116 — Web Server Programming 3
CS 120 — Java Programming 3

Students must complete the above courses with a grade of "C" or higher or credit in all courses.

Skills Competency Award: Mobile Application Developer

Department Requirements (10.5-13.5)

CS 111 — HTML, Web Technologies & Webmastering 3
CS 120 — Java Programming ***or*** 3
CS 125 — C# Programming 1.5
CS 122 — Java Mobile Device Programming 1.5
CS 126 — Microsoft Mobile Device Programming 1.5
CS 128 — Flash Programming 1.5
CS 129 — J2EE Server Programming ***or*** 1.5
CS 127 — ASP.net Using C# ***or*** 1.5
CS 116 — Web Server Programming 3

Students must complete the above courses with a grade of "C" or higher or credit in all courses.

Sample Program

To satisfy the course requirements of the Computer Science major, the student is encouraged to meet with a member of the Computer Science faculty for individualized guidance. A suggested course sequence for Computer Science courses follows:

First Year	Second Year
First Semester	*Third Semester*
CS 101	CS 120
	CS 131
Second Semester	*Fourth Semester*
CS 130	CS 140
CS 135	CS 145J ***or***
	CS 145P

Preparation for Transfer

Course requirements for transfer vary depending upon the college or university a student wishes to attend. Because Computer Science is such a competitive major at many four-year schools, it is *most important* for a student to consult with his/her counselor and departmental adviser before planning an academic program for transfer. Information sheets for majors, outlining transfer requirements, are available in the Counseling Center.

Course Descriptions

CS 101 — Computer Concepts
(3) F, S — CSU, UC*
Skills Advisories: MATH 100 and eligibility for ENG 103

Survey of the concepts of computer hardware and software, with emphasis on the latest technologies and programming. Topics include, but are not limited to, the Internet, productivity applications, databases, programming and numbering systems. Suitable for all majors and is a recommended first course for Computer Science majors.. *(*UC transfer limit: 101 combined with CIS 101: maximum credit, one course.)*

CS 102 — Introduction to BASIC Programming
(1) F, S — CSU
Skills Advisories: Eligibility for ENG 103

Programming in the language BASIC. Fundamental BASIC programming commands, plus the study of functions, arrays, subscripts and output formatting. Students prepare and check programs on a variety of assignments.

CS 110 — Information Superhighways
(1.3) F, S — CSU
Skills Advisories: Eligibility for ENG 103

Introduction to data highways using the Internet. Students learn about electronic mail, teleconferencing, researching techniques, data and information retrieval from remote computer sites, subscribing to news groups, and networking ethics. Students use the department's computer center to access the Internet and complete assigned exercises.

CS 111 — HTML, Web Technologies and Webmastering
(3) F, S — CSU
Skills Advisories: Eligibility for ENG 103

Webmastering is studied and Web technologies are used to create pages that are posted to an Internet-accessible server. Technologies studied include Hypertext Markup Language (HTML), Frames, Virtual Reality Modeling Language (VRML), Forms, Common Gateway Interface (CGI), Cascading Style Sheets (CSS), Extensible Markup Language (XML), Extensible Stylesheet Language (XSL), Wireless Application Protocol (WAP), and Wireless Markup Language (WML).

CS 115 — JavaScript and Dynamic HTML
(3) F, S — CSU
Skills Advisories: Eligibility for ENG 110 or ENG 110H
Course Advisories: CS 111

Project-oriented introduction to JavaScript programming and using JavaScript with Cascading Style Sheets to implement cutting-edge Web page effects with Dynamic HTML.

CS 116 — Web Server Programming
(3) F, S — CSU
Skills Advisories: eligibility for ENG 110 or ENG 110H
Course Advisories: CS 111 or CS 120

Project-oriented class that explores programming a Web server using PERL, Active Server Pages (ASP), Personal Home Pages (PHP), Tool Control Language (TCL) and Python, with an emphasis on PERL and PHP. Class develops Common Gateway Interface (CGI) scripts and Internet applications using these common tools. Includes such topics as e-commerce, security, browser independence and database integration.

CS 119 — FORTRAN Programming
(3) F, S — CSU, UC
Skills Advisories: MATH 107 and eligibility for ENG 103
Course Advisories: CS 101

Emphasis on structured programming for scientific engineering and mathematical applications. Topics include IF-block and DO-loop structures, arrays, sub-programs, character string operations and other features. (CAN CSCI 4)

CS 120 — Java Programming
(3) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 101 or CIS 101

Study of the object-oriented programming using the Java programming language. Topics include classes, encapsulation, inheritance, packages and methods. Students implement applets that incorporate graphics, sound and animation for use on the World Wide Web and in the engineering of larger systems. The department's Pentium computer lab used.

CS 122 — Java Mobile Device Programming
(1.5) F, S — CSU
Skills Advisories: Eligibility for ENG 110 or ENG 110H
Course Advisories: CS 120 or CS 125

The use of Java in developing applications for wireless devices, such as mobile phones and personal digital assistants. Students use mobile device frameworks to create user interfaces and access data from databases, XML documents and web services.

CS 125 — C# Programming
(1.5) F, S — CSU
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 120 or CS 140

Study of the programming language C# (C sharp). Definition of data types, loop control structures, functions, parameter passing, pointers, recursion, records, data structures, object-oriented techniques, the .NET framework, exception handling, interfaces, scoping rules and supplied system objects.

CS 126 — Microsoft Mobile Device Programming
(1.5) F, S — CSU
Skills Advisories: Eligibility for ENG 110 or ENG 110H
Course Advisories: CS 120 or CS 125

The use of C# in developing applications for wireless devices such as mobile phones and personal digital assistants. Students use mobile device frameworks to create user interfaces and access data from databases, XML documents and web services.

CS 127 — ASP.NET Using C#
(1.5) S — CSU
Course Advisories: CS 125

Study of the use of C# in developing Active Server Page (ASP)-based dynamic websites. The use of the .NET framework, working with data and XML, error handling, ASP.NET server controls, custom controls and optimizing applications.

CS 128 — Flash Programming
(1.5) F — CSU
Skills Advisories: Eligibility for ENG 110 or ENG 110H
Course Advisories: CS 120 or CS 125

The use of Flash in developing applicatioins for the Internet and mobile devices. Students use the Flash development environment to create applications with animated user interfaces that can access information from web services and XML documents.

CS 129 — J2EE Server Programming
(1.5) F, S — CSU
Skills Advisories: Eligibility for ENG 100
Course Advisories: CS 120

Project-oriented introduction to Java 2 Enterprise Edition (J2EE) Web application development. Students learn to design, build and deploy Web applications. Servlets, Java Server Pages, Java DataBase Connectivity, JavaMail, eXtensible Markup Language processing and Enterprise JavaBeans are investigated.

CS 130 — Introduction to UNIX
(1.5) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 101

Survey of the UNIX/Linux operating system and related subject matter. Topics include UNIX/Linux architecture, commands, file system, processes, and bash shell environment. Lectures and computer laboratory exercises provide a moderate-depth understanding of UNIX/Linux architecture and commands from a computer science perspective.

CS 131 — Assembly Language Programming
(4) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 135

Introduction to basic computer organization using Assembly language. Topics include computer hardware, machine language, data representation, binary manipulations, Boolean algebra, digital logic circuits, computer architecture and design. Assembly language programs developed on the college's computer. (CAN CSCI 10)

CS 135 — Programming Fundamentals
(3) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 101

Study of fundamental programming concepts. Topics include structured and OOP programming, definition of data types, nested IFs, looping techniques, CASE statements, procedures, functions, value and address parameters, file structures, dynamic list structures and recursion. (CAN CSCI 12)

CS 137 — C Programming
(3) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 131 or CS 135

Study of the programming language C. Definition of data types, loop controls structures, functions, parameter passing, pointers, recursion, records data structures, object-oriented techniques and the UNIX operating system. (CAN CSCI 16)

CS 140 — Object-Oriented Programming Using C++
(4) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 120 or CS 137

Study of the object-oriented programming paradigm, including objects, messages, encapsulation, classes, inheritance and implementation issues. Implementations written in the object-oriented language C++. (CAN CSCI 18)

CS 142 — Windows Programming with C++.NET
(3) F, S — CSU
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 140

Study of Microsoft Windows programming with Visual C++.NET. This course also explores the difference between legacy windows programming using the Windows Software Developer's Kit (SDK) and Microsoft foundation classes (MFC) with state-of-the-art Windows.NET programming tools.

CS 143 — Discrete Math
(4) F, S — CSU, UC
Prerequisites: MATH 150
Skills Advisories: Eligibility for ENG 103

Introduction to the study of discrete objects, with a focus on applications in computer science. Topics include logic and proofs, sets, functions, sequences, sums, algorithms, integers, induction, recursion, counting, relations, graphs and trees.

CS 145J — Introduction to Data Structures
(3) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 120 or CS 135

Study of data structures and algorithms. Design, coding and testing of linked lists, trees, queues, stacks, hash tables, and other dynamic data structures, as well as searching and sorting algorithms. Time and space analysis of data structures and algorithms. Programs are written in the Java language.

CS 145P — Introduction to Data Structures
(3) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 135

Study of data structures and algorithms. Design, coding and testing of linked lists, trees, queues, stacks, hash tables, and other dynamic data structures, as well as searching and sorting algorithms. Time and space analysis of data structures and algorithms. Programs are written in the Pascal language.

CS 160 — BASIC Programming
(3) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 101 or CS 102

Study of BASIC language. Topics include table look-ups, file processing, array manipulation, sorting, sequential and random access processing, and report writing.

CS 165 — Software Design Patterns
(1.5) F, S — CSU
Skills Advisories: Eligibility for ENG 110 or ENG 110H
Course Advisories: CS 120 or CS 140

Introduction to software design patterns and their use in object-oriented systems. Creational, structural and behavioral patterns are investigated. Real world examples by acknowledged experts are studied. Students strengthen their software design skills by applying patterns in course projects. State of the art development tools are used throughout the course.

CS 170 — Ada Programming
(3) F, S — CSU
Skills Advisories: Eligibility for ENG 103
Course Advisories: CS 101

Study of structured programming concepts as implemented in the language Ada. Topics include objects, types, essential statements (IFs, WHILE, CASE and FOR), arrays, records, packages, pointers, recursion and parallel computations. Emphasizes structured programming with a focus on program modularity using functions, procedures and sub-programs. (CAN CSCI 14)

CS 180 — Software Engineering with UML
(3) F, S — CSU, UC
Skills Advisories: Eligibility for ENG 110 or ENG 110H
Course Advisories: CS 120

Study of software engineering and component-based design using the Unified Modeling Language (UML). Students employ a standard software engineering process that includes requirements analysis, design, implementation and testing. Students learn about various UML diagrams and use them to express software requirements and designs. The course investigates rapid application development using state-of-the-art tools and component libraries.

CS 190 — Video Game Programming
(3) F, S
Course Advisories: CS 137

Introduces students to programming video games for personal computers. The main platforms examined are DirectX and OpenGL on personal computers. Issues include responsiveness (latency), graphics compatibility, sound, event synchronization and I/O devices.

CS 191 — DS Programming
(3) F, S — CSU
Skills Advisories: Math 120

Introduces students to programming video games for the Nintendo Dual Screen (DS) using a hobbyist-created tool chain and ndslib. Examines the DS hardware in detail, and students learn how handheld games are developed and deployed.