

# COMPUTER SCIENCE

College of Natural and Behavioral and Sciences  
Department of Computer Science

## Program Description

The modern electronic digital computer has become the indispensable tool of government, commerce, and technology because of its enormous appetite for data and its near-instantaneous processing speed. Computer Science is the discipline of designing methods for solving problems by means of such computers. The subject involves a surprising amalgam of logic, mathematics, engineering, electronics, communications, and ergonomics.

The curriculum is designed to provide preparation for professional careers in the areas of software design and applied computer science, as well as to give the necessary theoretical background for graduate study in the field and to allow a flexible response to a dynamic and growing profession. The required courses give students a firm foundation in the basic areas of computer science and related areas of mathematics, and a wide choice of electives allows them to tailor their program to their specific interests.

The baccalaureate program (Bachelor of Science in Computer Science) is accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org> (<http://www.abet.org/>). The programs accredited by ABET are accredited as separate and distinct from any other programs or kinds of accreditation.

## Features

The University's location in the South Bay area of greater Los Angeles provides direct access to many major government contractors, manufacturers, and international centers of commerce and finance. This provides excellent opportunities for work-study and early job placement.

Our highly qualified full-time faculty are supplemented by talented and dedicated part-time faculty drawn from local firms and schools. Good teaching and easy on-campus access to professional quality computing systems enhance a degree program with a solid core curriculum and a broad range of electives.

All courses are offered alternatively day and evening so that students may complete their programs by enrolling at either time exclusively.

## Graduation with Honors

An undergraduate student may be a candidate for graduation with Honors in Computer Science provided he or she meets the following criteria:

1. A minimum of 36 units in residence at CSU Dominguez Hills at least 24 of which taken in Computer Science major;
2. A minimum GPA of 3.5 in all upper-division courses in the Computer Science major completed in residence at CSUDH;
3. Recommendation by Computer Science faculty.

Students who achieve Honors in Computer Science will have the information recorded on their transcripts and diplomas.

## Academic Advisement

Faculty guidance in the development of career goals and program planning to achieve those goals is available to all majors.

## Preparation

Students entering the computer science program should have completed high school mathematics through trigonometry. Remediation is available but will delay the student's progress toward a Computer Science Degree.

This is a demanding program that places a premium on the student's initiative and effort.

## Student Organizations

Contact the departmental office for membership information, or visit the websites:

Association for Computing Machinery (ACM) [ACM@csudh.edu](mailto:ACM@csudh.edu)  
Institute of Electrical and Electronics Engineers (IEEE) [IEEE@csudh.edu](mailto:IEEE@csudh.edu)  
Cyber Security [CyberSec@csudh.edu](mailto:CyberSec@csudh.edu)  
Computing Alliance of Hispanic-Serving Institutions (CAHSI) [CAHSI@csudh.edu](mailto:CAHSI@csudh.edu)

## Career Possibilities

Entry-level positions in the areas of systems analysis, systems programming, applications programming, data engineering, data communications, and software engineering provide typical career opportunities for computer science graduates. Such positions are available in a wide variety of software vendors, aerospace and defense-related industries, manufacturing, and commercial firms, and government and other public agencies. Many graduates have also gone on to graduate school. Job opportunities for computer science graduates continue to be excellent because of the continued long-term growth of the computer industry.

## Undergraduate Programs

### Bachelor

- Computer Science, Bachelor of Science (<https://catalog.csudh.edu/academics/computer-science/computer-science-bs/>)

### Minor

- Computer Science, Minor (<https://catalog.csudh.edu/academics/computer-science/computer-science-minor/>)

### Certificate

- Computer Science, Certificate (<https://catalog.csudh.edu/academics/computer-science/computer-science-certificate/>)

## Graduate Programs

### Master

- Computer Science, Master of Science (<https://catalog.csudh.edu/academics/computer-science/computer-science-ms/>)
- Cyber Security, Master of Science (<https://catalog.csudh.edu/academics/cyber-security/cyber-security-ms/>)

## Faculty

Mohsen Beheshti, Department Chair  
Jianchao (Jack) Han, Marek Suchenek, Bin Tang, Amlan Chatterjee,  
Liudong Zuo, Allireza Izaddoost, Brad Hollister, Khondaker Salehin, Ali (Ashkan) Jalooli, Sanaz Rahimi Moosavi, Sahar Hooshmand

## Emeriti Faculty

William B. Jones, Kazimierz Kowalski

## Staff

Violeta Diaz, Administrative Assistant

Ken Leyba, IT Consultant

Department Office: NSM A-132, (310) 243-3398

<https://www.csudh.edu/csc/>

## Courses

### **CSC 101. Intro.to Computer Education. (3 Units)**

A computer literacy course designed to familiarize the learner with a variety of computer tools and computer concepts with emphasis on utilizing packaged programs. This course provides an introduction to the use of computers, common software programs and peripherals. Students are instructed in the use of a word processor, drawing programs, spreadsheet, database, presentation tools, internet applications and statistical package in scientific applications.

Offered Fall, Spring

### **CSC 111. Introduction to Computers and Basic Programming. (3 Units)**

Introduction to computer programming with particular emphasis on small systems through programming in the BASIC language.

Offered Fall, Spring

### **CSC 112. Intro Computers And Basic. (20 Units)**

Offered All terms

### **CSC 115. Introduction to Programming Concepts. (3 Units)**

Introduces students to computer programming by teaching techniques of problem solving. Students will become acquainted with decision constructs, looping structures, and subroutine modules. Students will learn the vocabulary of object-oriented programming.

Offered Fall, Spring

### **CSC 116. Introduction to Computer Hardware and Tools. (3 Units)**

Introduction to microcomputer hardware and operating systems. Students will be required to use application software to research, generate and prepare a semester project.

Offered Fall, Spring

### **CSC 121. Introduction to Computer Science and Programming I. (4 Units)**

Prerequisite: CSC 115 or equivalent and MAT 153 or consent of instructor. Organization of sequential, digital machine: CPU, I/O, storage, communications devices. Functions of operating systems: translators, editors, peripheral control utilities. The course covers the development, description, and analysis of elementary algorithms. It includes three hours of lecture and two hours of activity per week.

Offered Fall, Spring

### **CSC 123. Introduction to Computer Science and Programming II. (4 Units)**

Prerequisites: CSC 121. Continuation of CSC 121. Fundamental programming concepts using arrays, records, pointers, linked list, trees and recursion. Good style, documentation and structure will be emphasized. Introduction to analysis of algorithms for efficiency and correctness.

Offered Fall, Spring, Summer

### **CSC 162. Assembly Language Program. (2.7 Units)**

Offered Infrequent

### **CSC 195. Selected Topics in Computer Science. (1-4 Units)**

Prerequisite: Consent of Instructor. Content varies. Topics in computer science not covered by current course offerings.

Offered As needed

### **CSC 221. Assembly Language and Introduction to Computer Organization. (3 Units)**

Prerequisite: CSC 121. Programming problems in assembly language. Writing and using macros. Features of modern computer hardware and operating systems.

Offered Fall, Spring

### **CSC 251. C Language Programming and Unix. (3 Units)**

Prerequisite: CSC 121. Introduction to programming in the C language and its use in systems programming in the UNIX operating system.

Offered Fall, Spring

### **CSC 255. Dynamic Web Programming. (3 Units)**

The goal of the course is to provide instruction to the design and implementation of dynamic web applications. Topics include origins of Internet, TCP/IP basics, Standard Generalized Markup Language SGML, XML and XSL languages, client-side and server-side languages: Perl and PHP, interactivity in website design, front-end interface to databases, website access control, confidentiality, integrity, accessibility and their applicability in developing dynamic and distributed client/server web applications.

Offered All terms, Fall, Spring

### **CSC 281. Discrete Structures. (3 Units)**

This course introduces fundamental structures and logical principles that form the foundation of computer science. Topics will be introduced with emphasis on applications in computer science. Students will be required to write programs to deepen their understanding about the topics.

Offered Fall, Spring

### **CSC 295. Sel. Topics in Computer Sci. (1-4 Units)**

Prerequisite: Consent of Instructor. Content varies. Topics in computer science not covered by current course offerings. May be used for elective credit in departmental programs. Subject to approval.

Offered As needed

### **CSC 300. Software Development. (3 Units)**

Prerequisites: CSC 123 is required. This is an advanced Java programming course. Students are expected to have a much deeper understanding about major aspects of Java and OOP, and significantly enhance their programming and problem-solving ability. Several data structure and algorithms will be introduced.

Offered Fall, Spring

### **CSC 301. Computers And Society. (3 Units)**

Prerequisites: CSC 101 or CSC 111 or CSC 115 or CSC 121 or CSC 272 or consent of instructor. Ethical, legal, psychological, economic, and theoretical implications and limitations of the uses of digital computers. Oral and written presentations required.

Offered Fall, Spring

### **CSC 311. Data Structures. (3 Units)**

Prerequisites: CSC 123 and CSC 281 or MAT 281. More advanced and detailed treatment of concepts of data organization introduced in CSC 123. Includes lists, trees, graphs and storage allocation and collection. Applications to such areas as symbol tables, string search and optimization.

Offered Fall, Spring, Summer

**CSC 321. Programming Languages. (3 Units)**

Prerequisite: CSC 123. A comparative study of programming languages. Characteristics of languages and formal description of languages. Assignments in several languages. Offered Fall, Spring

**CSC 331. Computer Organization. (3 Units)**

Prerequisites: CSC 221 and MAT 281. Structure of the modern digital computer. Introduction to Boolean algebra and design of digital circuits. Arithmetic, control, storage and input/output systems. Offered Fall, Spring, Summer

**CSC 337. Microcomputers. (3 Units)**

Prerequisite: CSC 221, CSC 331, and MAT 281. The architecture, programming and interfacing of microcomputers. Topics include input/output, instruction sets, subroutines, interrupts and control. In-class use of microcomputer hardware. Repeatable course. Two hours of lecture and three hours of laboratory per week. Offered Infrequent

**CSC 341. Operating Systems. (3 Units)**

Prerequisites: CSC 311, CSC 331, and MAT 321. Overall structure of batch and time-shared operating systems. Scheduling of jobs, CPU and I/O devices. Paged and segmented memory management. I/O programming and file handling. Synchronization of concurrent processes. Offered Fall, Spring

**CSC 353. File Processing. (3 Units)**

Prerequisite: CSC 123 and CSC 251 are required; CSC 311 is recommended. Characteristics of secondary storage media. Logical vs. physical organization. Sequential, direct, and indexed access methods. Tree structure of indices; hashing. Offered Infrequent

**CSC 361. Systems Programming. (3 Units)**

Prerequisite: CSC 311, CSC 331, and CSC 341. Design and construction of systems programs such as assemblers, macro processors and linking loaders. Introduction to software engineering. Offered As needed

**CSC 371. Finite Automata. (3 Units)**

Prerequisite(s): CSC 311 is required. Introduces the formal foundations of computer science, the limits of computation, and the limits of efficient computation. The goal is to provide computer science students with a broad understanding of various models of computation and their power. Offered Fall, Spring, Summer

**CSC 395. Sel Topics in Computer Science. (1-4 Units)**

Prerequisite: Consent of Instructor and upper division standing in major. Content varies. Advanced topics in computer science not covered by current course offerings. May be used for elective credit in departmental programs. Subject to approval. Offered As needed

**CSC 401. Analysis Of Algorithms. (3 Units)**

Prerequisite: CSC 311. Mathematical study of non-numeric computer algorithms. Topics include combinatorial techniques, algorithm proof, and program complexity. Offered Fall, Spring

**CSC 411. Artificial Intelligence. (3 Units)**

Prerequisites: CSC 311 and CSC 321. Introduction to the use of computers to simulate intelligent behavior; includes game playing, problem solving, use of natural languages and pattern recognition. Offered Fall

**CSC 421. Advanced Programming Languages. (3 Units)**

Prerequisites: CSC CORE. Continuation of CSC 321. Methods of formal specification of syntax and semantics of programming languages and special purpose language features for such areas as simulation and systems programming. Offered Infrequent

**CSC 431. Advanced Computer Organization. (3 Units)**

Prerequisites: CSC 221, CSC 331, CSC 341, MAT 271, and MAT 281. Alternate computer architectures and features of large scale systems. Microprogramming, parallel processing, memory organization, input/output systems, interprocessor communications and multiprocessing. Offered Infrequent

**CSC 441. Advanced Operating Systems. (3 Units)**

Prerequisite: CSC CORE. Theoretical study of important topics in operating system design. Substantial individual and group programming projects. Offered Infrequent

**CSC 451. Computer Networks. (3 Units)**

Prerequisite: CSC 311 and MAT 281. An introduction to computer networks including both long haul and local area networks. Topics include network topology, network access methodology, transmission media, protocols and applications. Offered Fall, Spring

**CSC 453. Data Management. (3 Units)**

Prerequisite: CSC 311. Fundamental concepts in design, analysis and implementation of computerized database systems. Database models, user and program interfaces and database control. Offered Fall, Spring

**CSC 455. WWW Design and Management. (3 Units)**

Prerequisites: CSC 251, CSC 311 and CSC 321. An introduction to the design, implementation and management of World Wide Web over the Internet and Intranet networks. Topics include Internet overview, web authoring, web programming, server setting and maintenance. Offered Infrequent

**CSC 459. Security Engineering. (3 Units)**

The goal of the course is to provide introduction to the design, implementation and management of systems that remain dependable in the face of malice, error or mischance. Topics include the tools, processes and methods needed to design, implement and test complete systems and to adapt existing systems as their environment evolves. Specifically, it includes cryptography, privacy, hardware tamper resistance, firewalls, intrusion detection and prevention and security policies. Offered Fall, Spring

**CSC 461. Computer Graphics I. (3 Units)**

Prerequisite: CSC 311. Fundamental concepts of programming for computer graphics. Graphics devices, languages and algorithms. Substantial graphics programming projects. Offered Spring

**CSC 463. Computer Graphics II. (3 Units)**

Prerequisite: CSC 461. Advanced topics in computer graphics. Interactive graphics, animation, color and three dimensional modeling. Offered Infrequent

**CSC 471. Compiler Construction I. (3 Units)**

Prerequisites: CSC 221, CSC 311 and MAT 361. Introduction to the theory and practice of compiler construction. Overall structure of compilers. Lexical and syntactic analysis, code generation for block structured languages and code optimization. Offered Infrequent

**CSC 481. Software Engineering. (3 Units)**

Prerequisites: CSC 301, CSC 311 and CSC 321. Introduction to software engineering, with emphasis on software design and specification. Oral and written presentations required.

Offered Fall, Spring

**CSC 490. Senior Seminar. (3 Units)**

Prerequisite: CSC 301, CSC 311 and CSC 321. Intense, structured seminar. Exposure to current areas of research in Computer Science. Students will attend department colloquia; conduct research; present individual and group projects; and, prepare a written proposal for a senior project.

Offered Infrequent

**CSC 492. Senior Design. (3 Units)**

Prerequisites: CSC 301, CSC 321 and CSC 481. Intensive study under the guidance of a member of the Computer Science faculty which continues and expands the research carried out in Senior Seminar. Students will study system design and total project planning and management. A formal written report and oral presentation are required.

Offered Fall, Spring, Summer

**CSC 495. Selected Topics. (3 Units)**

Prerequisite: CSC 311 is required. Content varies. Advanced topics in computer science not covered by current course offerings. May be used for elective credit in departmental programs. Subject to approval.

Offered Fall, Spring

**CSC 497. Directed Study In Computer Science. (1-3 Units)**

Prerequisite: CSC CORE or consent of instructor. A project in computer science carried out on an independent study basis. Repeatable course.

Offered Infrequent

**CSC 498. Directed Research. (1-3 Units)**

Offered Infrequent

**CSC 500. Research Methods. (3 Units)**

Prerequisite: Graduate standing and consent of instructor. Series of lectures given by faculty and visiting computer scientists.

Offered Summer

**CSC 501. Design and Analysis of Algorithms. (3 Units)**

Prerequisite: CSC 401. Methods for the design of efficient algorithms: divide and conquer, greedy method, dynamic programming, backtracking, brand and bound, problem in string matching, polynomials and matrices, graph theory, NP-problems.

Offered Fall, Spring, Summer

**CSC 511. Artificial Intelligence and Expert Systems. (3 Units)**

Prerequisite: CSC 411. Introduction to in-depth engineering approach to the field of artificial neural networks. Topics include different types of network architectures and applications, and their properties and behavior.

Offered Fall

**CSC 521. Fundamentals and Concepts of Programming Languages. (3 Units)**

Prerequisite: CSC 321. Study of the principles that form the basis of programming language design. Research topics in high-level languages including : data abstraction, parameterization, scooping, generics, exception handling, parallelism and concurrency; alternative language designs; imperative, functional, descriptive, object-oriented and data flow; overview of interface with support environments.

Offered Spring

**CSC 531. Advanced Computer Architecture. (3 Units)**

Prerequisite: CSC 331. Covering new technological developments, including details of multiprocessor systems and specialized machines. The main focus is on the quantitative analysis and cost-performance tradeoffs in instruction-set, pipeline, and memory design. Description of real systems and performance data are also presented. Topics covered: quantitative performance measures, instruction set design, pipeline, vector processing, memory organization, input/output, and an introduction to parallel processing.

Offered Fall even

**CSC 541. Advanced Operating Systems. (3 Units)**

Prerequisite: CSC 341. Theoretical and practical aspects of operating systems: overview of system software, time-sharing and multiprogramming operating systems, network operating systems and the Internet, virtual memory management, inter-process communication and synchronization, file organization, and case studies. Giving advanced topics and examples, and simulation techniques used in performance evaluation.

Offered Fall

**CSC 546. Human Computer Interaction and Interface Design. (3 Units)**

Prerequisite: CSC 481. Research-oriented course; in-depth analyses of selected current topics with emphasis on problems related to computer systems, artificial intelligence, and human computer information interaction and interface design.

Offered Spring

**CSC 551. Data Communications and Computer Networks. (3 Units)**

Prerequisite: CSC 451. Topics related to the development of client-server based application, including two-tiers and multi-tiers Client-Server concepts and programming. Concurrency issues in the design of client and server programs. Trade-off of different architectures and usage of remote procedure calls. Broadcasting and multicasting.

Offered Fall odd

**CSC 552. Distributed Computing and Parallel Processing. (3 Units)**

Prerequisites: CSC 451, CSC 401. Comprehensive introduction to the field of parallel and distributed computing systems: Algorithms, architectures, networks, systems, theory and applications. The distributed parallel computation models, design and analysis of parallel algorithms will be discussed.

Offered Infrequent

**CSC 553. Advanced Database Management Systems. (3 Units)**

Prerequisite: CSC 453. Provides an in-depth treatment of one or more advanced topics in the management of information systems. The field of information systems consists of three major components: information systems technology, information systems development and information systems management. Deals with the latter area. Because of the many advances in information technology and the corresponding development techniques, new business opportunities are constantly emerging and with them the need to manage these applications effectively. Explores these new application areas and the management approaches needed to make them successful.

Offered Spring odd



**CSC 555. Information Assurance and Network Security. (3 Units)**

Prerequisites: CSC 451, CSC 401 and/or consent of instructor. Topics related to communications and IT infrastructures, their vulnerabilities as well as the size and complexity of security threats faced by enterprises, development of security practices, policies, awareness and compliance programs, and legal and regulatory issues will be examined. Fundamental encryption algorithms and systems supported in today's IT and secure communications networks Virtual Private Networks, Tunneling, Secure Socket Layer, SSH, and PGP will also be examined.

Offered Spring even

**CSC 561. Advanced Computer Graphics. (3 Units)**

Prerequisite: CSC 461. Solid modeling Euler operators, finite element methods. Rendering: filling, shading, ray tracing. Natural modeling: L-systems, fractals. Image processing: filtering anti-aliasing, enhancement. Color: physics, graphics, physiology.

Offered Spring

**CSC 564. Numerical Analysis. (3 Units)**

Prerequisite: MAT 361. Topics include numerical solution of partial differential equations by finite difference and finite element algorithms. Focus on direct and iterative methods for solving large, sparse linear systems and related eigenvalue and vector problems. Emphasis is placed on robust mathematical software and its interaction with computer hardware and languages.

Offered Infrequent

**CSC 565. Theory of Computation. (3 Units)**

Prerequisites: CSC 401 and MAT 361. Models of computation, complexity theory, intractable problems, complete problems, recursive function theory, incompleteness, formal theory of program semantics and correctness, logics of programs.

Offered Infrequent

**CSC 581. Advanced Software Engineering. (3 Units)**

Prerequisite: CSC 481. This course focuses on defining software requirements and provides an overview of advanced analysis and design techniques that can be used to structure applications. Topics of software requirements include interacting with end-users to determine needs and expectations, identifying functional requirements and identifying performance requirements. Analysis techniques include prototyping, modeling and simulation. Design topics include design in the system lifecycle, hardware vs. software trade-offs, subsystem definition and design, abstraction, information hiding, modularity and reuse.

Offered Spring

**CSC 582. Object-Oriented Analysis and Design. (3 Units)**

Prerequisite: CSC 481. Object-oriented analysis and design is essential in developing high-quality object-oriented systems. Topics will include object-oriented classes, attributes, methods and relations to other classes, objects, classifications and inheritance, encapsulation, polymorphism, object-oriented analysis, design and programming.

Offered Fall

**CSC 583. Software Engineering Processes. (3 Units)**

Prerequisite: CSC 581. The course focuses on the engineering of complex systems that have a strong software component. Topics include deriving and allocating requirements, system and software architectures, system analysis and design, integration, interface management, configuration management, quality, verification and validation, reliability, and risk.

Offered Fall

**CSC 584. Software Project. (3 Units)**

Prerequisite: CSC 581. The main topics of this course address the successful management of a software development project. This includes planning, scheduling, tracking, cost and size estimating, risk management, quality engineering, and process improvement. The course is centered on the concept of a software engineering process and includes discussion of life cycle models for software development.

Offered Spring

**CSC 585. Advanced Software Quality Assurance. (3 Units)**

Prerequisite: CSC 581. The relationship of software testing to quality is examined with an emphasis on testing techniques and the role of testing in the validation of system requirements. Topics include module and unit testing, integration, code inspection, peer reviews, verification and validation, statistical testing methods, preventing and detecting errors, selecting and implementing project metrics and defining test plans and strategies that map to system requirements. Testing principles, formal models of testing, performance monitoring and measurement also are examined.

Offered Fall odd

**CSC 590. Master's Project. (3 Units)**

Prerequisite: Graduate standing and consent of the graduate adviser. Offered on the letter-grade basis only. The equivalent of three lecture hours a week.

Offered Fall, Spring

**CSC 594. Independent Study. (3 Units)**

Prerequisites: Graduate standing and consent of instructor. Individual studies in advanced computer science and technology.

Offered Infrequent

**CSC 595. Special Topics in Computer Science. (3 Units)**

Prerequisite: Graduate standing and consent of instructor. Exposes students to new and emerging concepts and technologies

Offered Infrequent

**CSC 597. Directed Reading. (3 Units)**

Offered As needed

**CSC 599. Master's Thesis. (3 Units)**

Prerequisite: Graduate standing and consent of the graduate adviser. Computer research writing of thesis for a master's degree. CR/NC grading.

Offered Fall, Spring

**CSC 600. Graduate Continuation Course. (1 Units)**

Prerequisite: Signature of graduate program coordinator required. Graduate students, who have completed their course work but not their thesis, project, or comprehensive examination, or who have other requirements remaining for the completion for their degree, may attain continuous enrollment by enrolling in this course.

Offered Fall, Spring