COMPUTER SCIENCE (CSC)

CSC 101. Introduction 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(s): CSC 115 or equivalent and MAT 151 or 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 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)
Prerequisite(s): CSC 121 and MAT 151 or MAT 153. 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)
Prerequisite: CSC 101 or CSC 111 or CSC 115 or CSC 121 or CSC 272 Students must complete Areas 1 & 2 before enrolling in upper division GE courses. 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

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, Spring

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)
Prerequisite(s): CSC 123. 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)
Prerequisite(s): CSC 371. 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)
Prerequisite(s): CSC 301, CSC 321 and CSC 481. This capstone course guides students through the design, development, and communication of a substantial project in computer science. Emphasis is placed on engaging with the conventions of professional and academic discourse in the discipline. Students will produce various reports that reflect the norms of technical precision, clarity, and documentation in computer science writing. Through drafting, revising, and incorporating feedback, students will develop rhetorical flexibility and reflect on their roles as both technical communicators and independent thinkers within the broader context of the field.
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, Spring

CSC 512. Fundamentals of Data Science. (3 Units)
Prerequisite(s): CSC 311. Recommended prerequisite(s): CSC 401. The data science process is introduced and examined and the mathematical fundamental of data science are discussed, including probability and data statistics, Bayesian analysis, linear algebra, gradient descent, principal component analysis, and data visualization. A-B/NC grading.
Offered Fall

CSC 513. Machine Learning and Data Mining. (3 Units)
Prerequisite(s): CSC 401, CSC 512. Concepts and techniques of machine learning and data mining will be introduced. The course will be focusing on the approaches and algorithms of association/frequent pattern mining, supervised machine learning, unsupervised machine learning, as well as neural networks and deep learning.
Offered Fall

CSC 514. Big Data Analytics and Cloud Computing. (3 Units)
Prerequisite(s): CSC311, MAT321. Recommended prerequisite(s): CSC401, CSC512. Concepts and techniques of big data analytics and cloud computing will be introduced. The course will focus on approaches and algorithms for analyzing substantial amounts of data in a cloud platform using Hadoop and Spark frameworks. A-B/NC grading.
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 Fall, 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