

# CS. COMPUTER SCIENCE

## CS-198, CS-298, CS-398. TOPICS IN COMPUTER SCIENCE

**Credits:** Variable

Study of one or more special topics in computer science. May be repeated for credit if different topics are emphasized. Offered when demand warrants.

### Pre-Requisites

Varies with topic

## CS-115. COMPUTERS AND APPLICATIONS

**Credits:** 3

An introduction to computers and computing, with emphasis on personal computing in both the Windows and OS X operating systems. Extensive hands-on experience will involve the application of current commercial software (including word processing, database, and spreadsheet). Not open to students who have received credit in any 200-level CS course. Students majoring in either Computer Science or Computer Information Systems will not receive credit for this course.

## CS-125. COMPUTER SCIENCE I

**Credits:** 4

Introduction to information technology and programming (history of computing, text editors, word processing, spreadsheets, introduction to programming), basic data types, functions, decision structures, loops, one- and two-dimensional list structures, testing, debugging, and an introduction to computer graphics. Three hours of lecture and two hours of lab per week. Offered every fall and spring.

[Click here for course fee.](#)

### Pre-Requisites

Secondary mathematics, including geometry and algebra II.

## CS-126. COMPUTER SCIENCE II

**Credits:** 4

A study of advanced programming concepts, structures, and techniques (professional and ethical issues, testing and debugging, fundamentals of programming, basic data structures—strings, lists, multidimensional arrays, objects, hashes, inheritance, polymorphism, recursion, divide and conquer, machine representation of data, hardware components, machine instructions). Three hours of lecture and two hours of lab per week. Offered every fall and spring.

[Click here for course fee.](#)

### Pre-Requisites

[[CS-125]] with grade of 2.0 or better OR equivalent programming experience.

## CS-225. COMPUTER SCIENCE III

**Credits:** 3

A study of the use of a high-level language to implement basic data structures such as strings, lists, arrays, objects, and hashes, and their application to searching, sorting, and hashing. Representation of numbers and strings at the machine level. The course will also include an introduction to the concepts of algorithm design and problem solving with an emphasis on algorithm development, analysis, and refinement. Offered every fall.

[Click here for course fee.](#)

### Pre-Requisites

[[CS-126]] with grade of 2.0 or better

## CS-226. COMPUTER SCIENCE IV

**Credits:** 3

A continuation of [[CS-225]]. Topics include programming language paradigms, advanced use of word processors and spreadsheets, including macros, linked data structures, and an introduction to discrete mathematics, including counting, probability, and graphs. Offered every spring.

[Click here for course fee.](#)

### Pre-Requisites

[[CS-225]] with grade of 2.0 or better

## CS-246. C AND UNIX

**Credits:** 3

An introduction to using Unix operating systems, including shells, file manipulation, text editors, filters, and regular expressions. Fundamentals of C programming, including loops, arrays, functions, recursion, pointers, structures, unions, input/output, and system calls.

[Click here for course fee.](#)

### Pre-Requisites

[[CS-125]] with grade of 2.0 or better

## CS-265. MEDICAL INFORMATICS

**Credits:** 3

This course will cover basic principles of computer use and information management in health care (including general medicine, dentistry, optometry, and pharmacy). Topics will include basic computing concepts, the characteristics of medical data, and the use of computers in the administrative, diagnostic, and research oriented medical tasks. The course is primarily directed towards students who intend to pursue careers in health-related fields. Offered every spring.

[Click here for course fee.](#)

## CS-283. WEB DEVELOPMENT I

**Credits:** 3

An introduction to the development of interactive web sites, including HTML, JavaScript, forms and CGI programs; server side includes cookies, web server configuration and maintenance. Offered in the fall semester of odd-numbered years when demand warrants.

[Click here for course fee.](#)

### Pre-Requisites

[[CS-126]].

## Computer Science

### CS-285. MOBILE APPLICATIONS

**Credits:** 3

An introduction to programming mobile application development. Topics will include cross-platform development; user interface design; touchscreen, GPS, and motion sensing input; memory management; cloud services and network utilization; security and trust considerations; data privacy and ethics.

[Click here for course fee.](#)

#### Pre-Requisites

[[CS-126]] and [[CS-246]].

### CS-317. SOFTWARE INTEGRATION

**Credits:** 3

An introduction to the integration of application programs, including email clients, word processors, spreadsheets, and database systems using Microsoft Office and Visual Basic.

[Click here for course fee.](#)

#### Pre-Requisites

[[CS-126]].

### CS-319. PRINCIPLES OF PROGRAMMING LANGUAGES

**Credits:** 3

A study of the principles that govern the design and implementation of programming languages. Topics include language structure, data types, and control structures. Programming projects will familiarize students with features of programming languages through their implementation in interpreters.

[Click here for course fee.](#)

#### Pre-Requisites

[[CS-226]].

### CS-321. SIMULATION AND DATA ANALYSIS

**Credits:** 3

Methods of handling large databases, including statistical analysis and computer simulations. The emphasis will be upon discrete simulation models with a discussion of relevant computer languages: ARENA, GPSS, and SIMSCRIPT.

[Click here for course fee.](#)

#### Pre-Requisites

[[CS-125]] and [[MTH-111]].

### CS-323. THEORY OF COMPUTATION

**Credits:** 3

This course formalizes many topics encountered in previous computing courses. Topics include languages, grammars, finite automata, regular expressions and grammars, context-free languages, push-down automata, Turing machines, and computability.

[Click here for course fee.](#)

#### Pre-Requisites

[[CS-126]] and [[MTH-231]].

### CS-324. SYSTEMS ANALYSIS

**Credits:** 3

**Fees:**

A study of the design and implementation of large computer projects. Special emphasis is placed on applications to business systems. Students will use a CASE tool for automated systems analysis and design.

[Click here for course fee.](#)

#### Pre-Requisites

[[CS-225]].

### CS-325. DATABASE MANAGEMENT

**Credits:** 3

**Terms Offered:** Winter

Practical experience involving the fundamental concepts of database systems including data modeling; query languages; database management system implementation; management of semi-structured and multimedia data; distributed and noSQL databases

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#### Pre-Requisites

[[CS-126]].

### CS-326. OPERATING SYSTEM PRINCIPLES

**Credits:** 3

Analysis of the computer operating systems, including Batch, Timesharing, and Realtime systems. Topics include sequential and concurrent processes, processor and storage management, resource protection, processor multiplexing, and handling of interrupts from peripheral devices.

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#### Pre-Requisites

[[CS-226]].

### CS-327. COMPILER DESIGN

**Credits:** 3

A study of compiler design, including language definition, syntactic analysis, lexical analysis, storage allocation, error detection and recovery, code generation, and optimization problems.

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#### Pre-Requisites

[[CS-226]].

### CS-328. ALGORITHMS

**Credits:** 3

Theoretical analysis of various algorithms. Topics are chosen from sorting, searching, selection, matrix multiplication of real numbers, and various combinatorial algorithms.

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#### Pre-Requisites

[[CS-226]] and [[MTH-232]].

**CS-330. COMPUTER ARCHITECTURE****Credits:** 3

A study of the design, organization, and structure of computers, ranging from the microprocessors to the latest 'supercomputers.' An emphasis will be placed on machine language, instruction formats, addressing modes, and machine representation of numbers.

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**Pre-Requisites**

[[CS-226]].

**CS-334. SOFTWARE ENGINEERING****Credits:** 3

A course in 'programming in the large.' Topics include software design, implementation, validation, maintenance, and documentation. There will be one or more team projects.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-226]].

**CS-335. DATA SCIENCE AND INFORMATION RETRIEVAL****Credits:** 3

Practical experience involving unstructured data collections. Topics cover big data, data mining, predictive modeling, decision analysis and indexing and retrieval including probabilistics, clustering, thesauri and passage based retrieval strategies.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-325]] or [[CS-340]]

**CS-340. ARTIFICIAL INTELLIGENCE****Credits:** 3

This course will provide an overview of artificial intelligence (AI) application areas and hands-on experience with some common AI computational tools. Topics include search, natural language processing, theorem proving, planning, machine learning, robotics, vision, knowledge-based systems (expert systems), and neural networks.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-126]].

**CS-350. OBJECT-ORIENTED PROGRAMMING****Credits:** 3

Object-oriented concepts and their application to human-computer interaction. Concepts to be covered include objects, classes, inheritance, polymorphism, design patterns, GUI interface guidelines, and design of interfaces. There will be programming projects in one or more object-oriented languages using one or more GUI interface guidelines.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-226]].

**CS-355. COMPUTER NETWORKS****Credits:** 3

This course introduces basic concepts, architecture, and widely used protocols of computer networks. Topics include the Open System Interconnection (OSI) model consisting of physical link layer, data layer, network layer, transport layer, session layer, presentation layer, and application layer, the medium access sublayer and LAN, various routing protocols, Transmission Control Protocol (TCP), and Internet Protocol (IP) for internetworking.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-225]] and [[CS-246]]

**CS-363. OPERATIONS RESEARCH****Credits:** 3

A survey of operations research topics such as decision analysis, inventory models, queuing models, dynamic programming, network models and linear programming. Cross-listed with [[MTH-363]].

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-125]], and [[MTH-111]].

**CS-364. NUMERICAL ANALYSIS****Credits:** 3

An introduction to numerical algorithms as tools to providing solutions to common problems formulated in mathematics, science, and engineering. Focus is given to developing the basic understanding of the construction of numerical algorithms, their applicability, and their limitations. Cross-listed with [[MTH-364]]. Offered Spring odd years.

**Pre-Requisites**

[[MTH-211]] and [[CS-125]] (or equivalent programming experience).

**CS-366. 3 DIMENSIONAL ENVIRONMENTS AND ANIMATION****Credits:** 3

This course will explore the foundations of 3-dimensional animation processes as they apply to multiple mediums. Students will build computer-based models and environments, texture, light, animate, and render content for Integrative Media projects or as stand-alone pieces. Cross-listed with [[IM-350]].

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-126]] or [[IM-201]].

## Computer Science

### **CS-367. COMPUTER GRAPHICS**

**Credits:** 3

**Fees:**

Introduction to equipment and techniques used to generate graphical representation by computer. Discussion of the mathematical techniques necessary to draw objects in two- and three-dimensional space. Emphasis on application programming and the use of a high-resolution color raster display.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-226]].

### **CS-368. 3 DIMENSIONAL GAME DEVELOPMENT**

**Credits:** 3

An overview of simulation, engine-based, and real-time game systems with a focus on theory, creation, and animation of three-dimensional models used within a game context. Cross-listed with [[IM-368]].

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-366]]/IM 350 or [[CS-367]].

### **CS-370. SPECIAL PROJECTS**

**Credits:** variable

Requirements: Senior standing and approval of the department chairperson.

### **CS-383. WEB DEVELOPMENT II**

**Credits:** 3

An introduction to the development of dynamic, database-driven sites, including active server pages, PHP, authentication, session tracking and security, and the development of shopping cart and portal systems.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-283]]. [[CS-325]].

### **CS-391. SENIOR PROJECTS I**

**Credits:** 1

Design and implementation of a software project under the direction of a faculty member. Students will normally work in teams. Detailed requirements and design documents are required and will be presented at the end of the semester. Offered every fall.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-334]] or [[CS-324]].

### **CS-392. SENIOR PROJECTS II**

**Credits:** 2

Design and implementation of a software project under the direction of a faculty member. Students will normally work in teams. Production of a finished product, including software and documentation, is required. There will be an open forum presentation of the project at the end of the semester. Offered every spring.

[Click here for course fee.](#)

**Pre-Requisites**

[[CS-391]].

### **CS-399. COOPERATIVE EDUCATION**

**Credits:** 1-6

Professional cooperative education placement in a private or public organization related to the student's academic objectives and career goals. In addition to their work experiences, students are required to submit weekly reaction papers and an academic project to a Faculty Coordinator in the student's discipline. See the Cooperative Education section of this bulletin for placement procedures. Requirements: Sophomore standing; minimum 2.0 cumulative GPA; consent of the academic advisor; and approval of placement by the department chairperson.