

# CS. COMPUTER SCIENCE

## CS-419. 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 the features of programming languages through their implementation in interpreters.

### Pre-Requisites

[[CS-226]] or equivalent

## CS-421. 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, SLAM, GPSS, and/or SIMSCRIPT.

### Pre-Requisites

[[CS-125]] (or the equivalent programming experience) and one semester of calculus.

## CS-423. 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.

### Pre-Requisites

[[MTH-232]] (Discrete Mathematics II) and [[CS-126]] (or the equivalent programming experience).

## CS-424. SYSTEMS ANALYSIS

**Credits:** 3

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.

### Pre-Requisites

[[CS-226]] or equivalent

## CS-425. DATABASE MANAGEMENT

**Credits:** 3

Practical experience in solving a large-scale computer problem including determination of data requirements, appropriate data organization, data manipulation procedures, implementation, testing and documentation.

### Pre-Requisites

[[CS-126]] or permission of the instructor.

## CS-426. 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.

### Pre-Requisites

[[CS-226]] or equivalent

## CS-427. 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.

### Pre-Requisites

[[CS-226]] or equivalent

## CS-428. ALGORITHMS

**Credits:** 3

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

### Pre-Requisites

[[CS-226]] or equivalent and [[MTH-232]] (Discrete Mathematics II).

## CS-430. COMPUTER ARCHITECTURE

**Credits:** 3

A study of the design, organization, and structure of computers, ranging from the microprocessors to the latest 'supercomputers.'

### Pre-Requisites

[[CS-226]] or equivalent

## CS-434. 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. Prerequisite [[CS-226]] or equivalent

## CS-435. ADVANCED DATABASE CONCEPTS

**Credits:** 3

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

### Pre-Requisites

[[CS-325]] (Database Management) or CS340 Artificial Intelligence

## Computer Science

### CS-440. 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.

#### Pre-Requisites

[[CS-126]] (Unix) and equivalent programming experience in a high-level language.

### CS-450. 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 object-oriented languages.

#### Pre-Requisites

[[CS-226]] or equivalent

### CS-455. 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, medium access sublayer and LAN; various routing protocols; Transmission Control Protocol (TCP) and Internet Protocol (IP) for internetworking.

#### Pre-Requisites

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

### CS-463. OPERATIONS RESEARCH

**Credits:** 3

A survey of operations research topics such as decision analysis, inventory models, queueing models, dynamic programming, network models, and linear programming. (Cross-listed with [[MTH-463]])

#### Pre-Requisites

Programming experience in a high-level language and completion of one semester of calculus.

### CS-464. 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-464]])

#### Pre-Requisites

Programming experience in a high-level language and completion of a one-year calculus sequence.

### CS-467. COMPUTER GRAPHICS

**Credits:** 3

Introduction to equipment and techniques used to generate graphical representations 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.

#### Pre-Requisites

[[CS-226]] or equivalent

### CS-483. WEB DEVELOPMENT

**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.

#### Pre-Requisites

[[CS-283]] (Web Development I) and [[CS-325]] (Database Management).

### CS-498. TOPICS IN COMPUTER SCIENCE

**Credits:** variable

Variable creditStudy of one or more special topics in computer science. May be repeated for credit provided a different topic is selected.