

## CS: Courses in Computer Science

### Department of Mathematics, Engineering, and Computer Science

The following courses in Computer Science are those that have been approved by the college curriculum committee. Other computer science courses are also offered prior to approval as a regular course or as a one-time topic of special interest. Due to the nature of this discipline, the course offerings will change on a regular basis. For the most current look at our computer science course offerings, please view the Computer Science information on our web site at <http://www.carroll.edu>.

#### CS 101 Survey of Computer Science 3 Cr

An overview of hardware, software, computers and society, and an introduction to major application packages, including a word processor, an electronic spreadsheet, graphics, slide presentation software, and others. This course does not count towards the minors or majors in the computer science program. Each semester.

#### CS 103 Instructional Media and Technology 3 Cr

This course is intended for students seeking teacher certification. Students will develop an understanding of how the microcomputer and other instructional technology can be used to enhance teaching. In addition, students will create audiovisual media and incorporate audiovisual media techniques in lesson and unit planning. No prior knowledge of computers or other technology is assumed. Each semester.

#### CS 110 Intro. to Computer Science: C++ Programming 4 Cr

An introduction to the fundamentals of programming and software development using the object oriented programming language C++. An integrated laboratory provides experience in programming and algorithmic problem-solving. Topics include computing and object-oriented design methodology, C++ fundamentals, modifying objects, control constructs, function usage basics and libraries, programmer-defined functions, parameter passing, arrays, the class construct and object-oriented design, event-based programming, and implementing abstract data types. Three (3) one-hour lectures and one two-hour laboratory per week. Fall semester.

#### CS 120 Data Structures and Program Design 4 Cr

An introduction to program design, fundamental data structures, and analysis of algorithms. Includes contiguous and linked lists (stacks, queues, and general lists), search and sort techniques, binary trees, tables, hashing, recursion, and graphs. Three (3) one-hour lectures and one two-hour laboratory per week. Prerequisite: CS 110. Spring semester.

#### CS 213 Computer Applications in Business 3 Cr

Familiarizes students with business information technology concepts and applications, analysis of business problems with potential computer-based solutions, and concepts and applications of electronic communications. Course involves the use of an electronic spreadsheet, a presentation software, and the World Wide Web. Two (2) one-hour lectures and one one-hour laboratory each week. Prerequisite: Sophomore standing, CS101 or consent of instructor. Each semester.

#### CS 230 Software Engineering 4 Cr

The first in a two-semester sequence on Software Engineering, this course addresses the development of large software systems. Problem-solving concepts are integrated with a study of the software development life cycle, including project management, require-

ments analysis, system design, testing, implementation, and maintenance issues. Three one-hour lectures and one two-hour laboratory per week. Prerequisites: CS110 and CS120. Fall semester.

#### CS 240 Software Engineering Project 4 Cr

The second in a two-semester sequence on Software Engineering, this course addresses the development of software systems. Students will analyze, design, implement, test, and present an object-oriented team project. Main objectives are to learn object-oriented principles and project management and why they are important. Prerequisites: CS 110; CS 120; CS 230. Spring semester.

#### CS 309 Computer Architecture 4 Cr

An introduction to computer design and implementation by viewing the modern computer as a hierarchy of levels. The digital logic level, the microarchitecture level, the instruction set architecture level, the operating system machine level, and the assembly language level are all discussed. An integrated laboratory applies the concepts studied through the use of an actual assembler or simulation software. Three (3) one-hour lectures and one two-hour laboratory per week. Fall semester

#### CS 310 Database and Information Retrieval 4 Cr

This course concentrates on representing, storing, and retrieving data from external storage devices. This course includes medium-scale software development using a high-level database language. Three (3) one-hour lectures and one two-hour laboratory per week. Prerequisites: CS 110; CS 120; CS 230; CS 240. Fall semester.

#### CS 330 Data Communications 4 Cr

The first of a two-semester sequence on data communications and computer networking, this course covers topics such as data communication fundamentals, transmission media, communication techniques, data link control protocols, multiplexing, circuit switching, and packet switching. Three (3) one-hour lectures and one two-hour laboratory each week.

#### CS 331 Computer Networking 4 Cr

The second in a two-semester sequence on data communications and computer networking, this course covers topics such as Local Area Network (LAN) technology and specific LAN systems, internetworking principles, and the TCP/IP protocols and applications. Three (3) one-hour lectures and one two-hour laboratory per week. Prerequisite: CS 330. Spring semester.

#### CS/MA 342 Numerical Computing and Visualization 3 Cr

An introductory survey of the basic algorithms used in numerical computing with emphasis on visual presentation of solutions through mathematical graphs, computer graphic representations, and animations. Error analysis is also considered for each algorithm. Algorithms studied include: fixed-point iteration; Newton-Raphson method; Lagrange and Hermite interpolation; Newton-Cotes integral approximation; Euler, Runge-Kutta, and finite difference methods for solving ODE's; and iterative methods for solving nonlinear systems of equations. If time permits, shooting, finite difference, and finite element methods for solving boundary value problems are introduced. Prerequisite: MA 334. Spring semester.

#### CS 410 Operating Systems 3 Cr

This course covers primary OS topics such as process management, device management, and memory management. Also included are issues associated with security and protection, networking, and distributed operating systems. Prerequisites: CS 110; CS 120; CS 309. Fall semester.

**CS 430 Senior Project 4 Cr**

This course will present students with a substantial experience in software engineering. Students will investigate, design, implement, and present a significant software project, working both as individuals and in project teams. Projects will also teach the students about project management concerns. Prerequisites: CS 410 and senior status. Spring semester.

**CS 495 Computer Science Seminar 1 Cr**

Various topics not covered in other computer science courses are researched and discussed. Students consider selected readings, and each makes a presentation and leads a discussion on a chosen topic. Normally taken in the last year of residence. Spring semester.