

Computer Science

Students who are interested in computing and computer science may choose from one or both categories of course offerings: *Software Applications* and *Software Development*. In the Software Applications courses students learn how to use a variety of software tools (programs) for effective communication. In the Software Development courses students learn about algorithms, computer programming, concepts of traditional computer science, and software engineering principles. The two categories of courses are largely unrelated, so no course in one category is a prerequisite for any course in the other category.

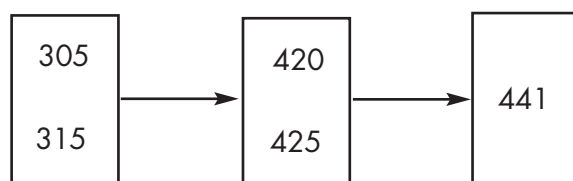
The study of Software Development begins with either CSC305 *Programming and Public Policy*, or CSC315 *Essential Programming*. Neither course has a prerequisite, and both provide the necessary core of knowledge to continue on to further Software Development courses. Both of these courses satisfy the diploma requirement (for four-year students) in Computer Science.

Paths Through Computer Science

Students can navigate their way through computer science in various ways. All four-year students must satisfy the diploma requirement in computer science by taking either CSC305 or CSC315.

Students interested in learning how to use and combine the most modern web features may study in CSC225. All students interested in creating effective Web sites may study in CSC241.

Students with a pre-existing interest in computer science should begin with CSC315. Some students, without a pre-existing interest in computer science, develop a deeper interest as they study in 305. Both groups of interested students can continue their studies for another term or two. CSC420 and CSC425 cover quite different topics as described below. Course CSC420 is a typical and traditional investigation of data structures, as an undergraduate computer science major would encounter in the second term of college. Course CSC425 pays little attention to data structures, emphasizing instead, software engineering. Both courses prepare students for further work in CSC441. Thus, students who wish to devote a year of study to computer science can choose one of CSC305 or CSC315, followed by one of CSC420 or CSC425, followed by CSC441. Students who wish to take the AP Computer Science Exam, should take CSC315, CSC420, and CSC441, although students who discover their interest in computer science in CSC305 can successfully continue preparation for the AP Exam in CSC420 and CSC441:



► Software Applications Courses

CSC225: EMERGING TECHNOLOGIES

This course will examine current and emerging web-based technologies, such as blogs, wikis, GPS and mapping applications, image galleries, video production, podcasting, shared documents and spreadsheets, data sets, aggregators, and various social networking tools. Students will collaborate to create a number of web-based projects that incorporate real data and represent that data using many of these tools in what has come to be called a “mashup.” Course work will include readings and discussion on appropriate and ethical use of Internet technologies, the experience of the digital native, and the future of Internet technologies in our educational and personal lives. *This course does not satisfy the diploma requirement for Computer Science. Offered: Spring Term.*

CSC241: WEB PAGE DESIGN

This course will focus on techniques of planning, designing, implementing and managing effective Web sites using professional web development software. Assignments for the term may include individual sites on a topic of interest to the student or a group project that creates a Web site for a campus or community organization. Tools utilized may include: HTML, and Adobe® Dreamweaver, Flash, and Fireworks, among others. *This course does not satisfy the diploma requirement for Computer Science. Offered Winter Term.*

► Software Development Courses

CSC305: PROGRAMMING AND PUBLIC POLICY

This course introduces students to algorithms, computer programming and the Object-Oriented paradigm, and also explores the impact of algorithms and software on modern societies. Students need no prior programming experience. They will simultaneously explore abstract computer science concepts and algorithmic thinking. Using the Python programming language they combine both concepts and techniques to write programs evaluated using two fundamental criteria: Does it work? Is it beautiful? Important concepts covered in this course include: classes, objects, messages, attributes, methods, and an introduction modeling using the Unified Modeling Language (UML).

Approximately 20 percent of classroom discussion and homework time are devoted to exploring contemporary, sometimes contentious matters of public policy and public good, public expenditure, privacy, and others that are informed by a basic knowledge of the nature, capabilities, and limitations of computer software. As students learn to create software, their understanding of its nature deepens, and with a deeper understanding the related social issues become more—sometimes quite—clear. *Not open to students who have completed CSC315. Five class periods per week. This course satisfies the diploma requirement for Computer Science.*

CSC315: ESSENTIAL PROGRAMMING

This is an accelerated version of CSC305. This course devotes more time to acquiring software development skills and less to examining the impact of algorithms and software on modern societies. Though no prior programming experience is required for this course, students with such experience may prefer this course to CSC305. Students without prior programming experience, but with a keen interest in creating software, may also prefer this course to CSC305.

In this course, students simultaneously explore abstract computer science concepts and algorithmic thinking. Using the Java and/or Python programming language they combine both concepts and techniques to write programs evaluated using two fundamental criteria: Does it work? Is it beautiful? Important concepts covered in this course include: classes, objects, messages, attributes, methods, inheritance, polymorphism, and an introduction to modeling using the Unified Modeling Language (UML). *Not open to students who have completed CSC305. Five class periods per week. This course satisfies the diploma requirement for Computer Science.*

CSC420: DATA STRUCTURES

This course examines classic data structures: lists, queues, stacks, binary trees and graphs, and hash tables. Standard algorithms for sorting and searching will be studied, and complexity analysis performed using big-oh notation. Students also develop a deeper understanding of software engineering principles as the course emphasizes reuse and generic programming. *Prerequisite: CSC305 or CSC 315. Offered: Winter Term.*

CSC425: SOFTWARE ENGINEERING

Principles of good software engineering are explored in depth. Decoupling is the central theme of this course, and inheritance, polymorphism, interfaces, coupling, cohesion, and design patterns are the main tools employed. This course also develops the concepts and practice of creating graphical user interfaces (GUIs). Topics include event-based programming, exception handling, multi-threading, separation of interface and domain into software layers (using the Observer pattern), and portability across platforms. *Prerequisite: CSC305 or CSC315. Offered: Winter Term.*

CSC441: ADVANCED COMPUTER SCIENCE

This course may address a variety of theoretical and/or technological issues related to computer science, and provides an opportunity for students to undertake a term-long software development or research project. Students, working individually or in small groups, must propose a project acceptable to the instructor. Students in this course are assumed to possess enough experience to work effectively, in a self-directed manner. The instructor provides necessary supervision, and acts as a knowledge resource available to students as needed. Students who wish to take the AP Computer Science Exam and have taken CSC420 will devote the first half of this course to guided preparation for the exam, and the second half of the course to software development or a research project. This course may be repeated. *Note: the AP Computer Science Exam is scheduled for an update for the 2010 exam. Course content may change to reflect changes in the exam. Prerequisite: CSC420 or CSC425 or with permission of the department. Offered: Spring Term.*