

Computer Science

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COMPUTER SCIENCE MAJOR

The Department offers courses leading to a Bachelor of Science in Computer Science with concentrations in Computer Science, and Information Systems, and a minor in Computer Science. The goal of these programs is to train graduates for successful careers in industry and to prepare students for graduate studies. Students are encouraged to do cooperative work with local companies for up to one year, receiving up to four course credits, job experience, and (normally) compensation in the process. Such experience is also beneficial in seeking postgraduate employment.

The General Education Requirement:

All students must satisfy a general education requirement consisting of twelve (12) courses. See page xx of this catalog.

Course Prerequisites

Courses may have specified conditions for enrollment, such as prior completion of less advanced courses, permission of the instructor, or appropriate placement test scores. Students should refer to course descriptions in the department listings for prerequisite requirements.

CONCENTRATION IN COMPUTER SCIENCE (UCSG)

The computer science concentration prepares students for careers in software development.

Required Computer Science courses (11):

CSCI 152 Computer Science I Using Java
CSCI 252 Computer Science II Using Java
CSCI 258 Introduction to Operating Systems Using

UNIX™

CSCI 271 Data Structures
CSCI 347 Analysis of Algorithms
CSCI 352 Computer Architecture & Assembly Language
CSCI 360 Database Management
CSCI 362 Software Engineering
CSCI 460 Theory of Computing
CSCI 465 Operating Systems Internals
CSCI 477 Computer Networking

Two (2) Computer Science electives:

Any course 300 level or above except for CSCI 490
Directed Study, CSCI 495 and CSCI 496 Cooperative
Program in Computer Science

Seven (7) Mathematics and Science Requirements:

Required Math Courses:

MATH 117 Introduction to Statistics

MATH 292 Discrete Mathematics I

Two (2) or three (3) additional math courses beyond

MATH 200 PreCalculus.

Required Science Courses:

Two (2) or three (3) Physical or Life Science Courses (One (1) must be a lab course open to science majors)

CONCENTRATION IN INFORMATION SYSTEMS (UCSI)

This concentration trains students for technical careers in information systems such as database administration, network administration, systems analysis and design, and software quality assurance.

Required Computer Science courses (9):

CSCI 108 HTML, JavaScript Programming, and Web Site Development

CSCI 120 Introduction to Information Technology

CSCI 152 Computer Science I Using Java

CSCI 252 Computer Science II Using Java

CSCI 258 Introduction to Operating Systems Using UNIX™

CSCI 345 Computer and Network Security

CSCI 360 Database Management

CSCI 373 Advanced Web Technologies

CSCI 376 Networking Technologies

Two (2) required Mathematics courses:

MATH 117 Introduction to Statistics (Goal 2)

MATH 292 Discrete Mathematics I

Five (5) required Business Courses:

ACCT 220 Introduction to Financial Accounting

BADM 280 Applied Organizational Theory and Management

BADM 385 Business Systems Analysis and Design

BADM 477 Management Issues in Information Technology

ECON 101 Principles of Macroeconomics (Goal 10) or
ECON 102 Principles of Microeconomics (Goal 9)

Three (3) courses from at least two (2) of the following categories:

Network and System Administration:

CSCI 320 Windows Server and Client Management

CSCI 340 UNIX™ System Administration

Computer Graphics and Technical Writing:

CSCI 140 Introduction to the Internet, Graphics and
Multimedia

ENGL 286 Professional Writing

ENGL 371 Business Writing

ENGL 372 Technical Writing

General Information Systems Electives:

Any computer science course at the 200-level and above
except courses listed in the Network and Systems
Administration category above and CSCI 495/496
Cooperative Program in Computer Science.

Note: Students may need to take additional mathematics courses if their math placement score does not qualify them for MATH 292 Discrete Mathematics I. These mathematics courses would be taken as free electives. CSCI 135 Information Technology and Society and other computer science course can be taken as a free elective.

MAJOR IN BUSINESS & INFORMATION TECHNOLOGY (UITB) (SEE PAGE XX)

MINOR IN COMPUTER SCIENCE (5 COURSES)

Required Courses (4):

CSCI 120 Introduction to Information Technology

CSCI 152 Computer Science I Using Java

CSCI 252 Computer Science II Using Java

CSCI 258 Introduction to Operating Systems Using
UNIX™

Elective (1):

One other course from the Computer Science Department.

MINOR IN INFORMATION SYSTEMS (5 COURSES)

Required Courses (5) – Select from any courses offered through the Computer Science Department. This includes CSCI 140 Introduction to the Internet, Graphics, and Multimedia. At least one (1) of these courses must be at the 200-level or above.

MINOR IN INFORMATION TECHNOLOGY (SEE PAGE 53)

Computer Science Courses Appropriate for General Education (Gen. Ed.)

Courses	Goal
CSCI 135 Information Technology and Society	10

COURSE DESCRIPTIONS

CSCI 108 HTML, JavaScript Programming, and Web Site Development

An introduction to various features of HTML and JavaScript languages such as tags, images, buttons, forms, and animation files. Students learn to program using these languages to create interactive Web pages. Students create a complete Web site using various tools including a browser and image editor.

CSCI 120 Introduction to Information Technology

An overview of computer concepts and Information Technology (IT). Applications of IT in various disciplines are illustrated and the role of information technology in contemporary society, including issues of intellectual property, ethics, privacy and security is discussed. Students are introduced to windowed environments, file management, problem-solving tools and a high-level programming language. Advanced concepts of word processing, spreadsheets, and presentation software required for effective communication, analysis, and design are explored. **Note:** Students cannot receive credit for both this course and 63.151 Personal Computer (PC) Fundamentals and Applications. Students in the IT minor who have taken 63.151 Personal Computer (PC) Fundamentals and Applications should take CSCI 108 HTML, JavaScript Programming and Web Site Development in lieu of CSCI 120 Introduction to Information Technology.

CSCI 135 Information Technology and Society (Gen. Ed. Goal 10)

An exploration of the impact of computing and information technology (IT) on individuals and society in the United States and the world. The course addresses the impact of IT on areas such as: digital technology at home; personal devices; rapid unregulated spread of (mis)information; political processes of dissemination and polling capabilities; empowering individuals and families with information included in medical and other databases; personal and work place communication; the networked information economy and globalization. Other topics may include the interaction of IT with intellectual property, privacy, ethics, security concerns and freedom of expression.

CSCI 140 Introduction to the Internet, Graphics, and Multimedia

An introductory course exploring fundamental concepts, vocabularies, and techniques related to graphic design, digital cameras, photo editing, scanning, web design, interactive design, animation and multimedia using a variety of software programs. Students gain a broad foundation that can be applied to more advanced concepts and skills in the Information Technology discipline. *Students cannot receive credit for both this course and either COMM 140 Introduction to the Internet, Graphics, and Multimedia or 84.140 Introduction to the Internet, Graphics, and Multimedia.*

CSCI 152 Computer Science I Using Java

An introduction to problem solving using the Java programming language. The course stresses algorithms, object-oriented programming in graphical environments, documentation, testing, and debugging. Topics include hardware basics and number systems, classes, methods, control structures, types, virtual-machine concepts, Internet and client-server computing, human-computer interaction, social, professional, and ethical issues, and general features of programming languages.

Corequisite: MATH 123 College Algebra or minimum score of 2 on the math placement examination.

CSCI 230 Principles of Information Technology Operations

A study of operations in various information technology areas used at workplaces. Areas covered include managing storage, troubleshooting, printing and faxing, small local networks, connecting to the Internet, protection against viruses, pop-ups, and malware, backup and restore, and email clients.

Prerequisite: CSCI 120 Introduction to Information Technology

CSCI 252 Computer Science II Using Java

An intermediate programming course that emphasizes debugging, documentation, and modular and object-oriented design with tools such as the Unified Modeling Language. Topics include event-driven programming, string and array manipulation, sorting and searching, file operations, dynamic memory allocation, inheritance, polymorphism, and exception handling.

Prerequisites: MATH 200 Precalculus (may be taken concurrently) and CSCI 152 Computer Science I Using Java.

CSCI 258 Introduction to Operating Systems Using UNIX™

An introduction to the basics of networking and operating systems. Topics include the evolution and overview of operating systems, operating system principles, interfaces (GUI, command line, and API), command processors and utilities, file systems, access control, processes, programming and scripting, user accounts and authentication, OSI model, Internet Protocol, networking utilities, net computing, client-server model, FTP, and network file systems. The UNIX™ operating system is used as a primary reference for illustration and hands-on experience.

Prerequisite: CSCI 120 Introduction to Information Technology or CSCI 152 Computer Science I Using Java

CSCI 261 Computer Organization and Assembly Language Programming

Introduction to computer organization and assembly language programming. Representation of data, addressing modes, CPU instructions, and pseudo-instructions. Discussion of I/O and interrupt programming.

Prerequisite: CSCI 252 Computer Science II Using Java.

CSCI 266 Digital Logic, Organization, and Assembly Language

An introduction to digital logic components and their organization in computer systems. Topics include the realization of logic components such as decoders, ALUs, registers and how they are combined to form CPUs and controllers. The course discusses the software interface, including machine instructions, the interrupt system, and sample I/O interfaces. The course also covers assembly language and the organization of low-level software to control the computer, including representation of data, addressing modes, CPU instructions, and pseudo-instructions. **Note:** Students who have taken both CSCI 261 Computer Organization and Assembly Language Programming and CSCI 321 Digital Electronics cannot receive credit for CSCI 266 Digital Logic, Organization, and Assembly Language.

Prerequisite: CSCI 252 Computer Science II Using Java

CSCI 271 Data Structures

An in-depth presentation of recursion, collections and iterators, fundamental techniques in graphics, and threading. Students implement linked lists, stacks, queues, trees, heaps, graphs, hash tables and related algorithms. Students implement a significant programming project.

Prerequisites: MATH 200 Precalculus and CSCI 252 Computer Science II Using Java.

CSCI 306 Introduction to .NET using Visual Basic

An introduction to the .NET programming environment and the object oriented programming model using the Visual Basic .NET programming language. Topics include object-oriented programming, Visual Basic .NET objects such as forms and controls, code construction, functions and subroutines, parameter passing, looping and other programming structures, persistence of data using text files and database tables, error handling, and debugging of programs. **Note:** Students cannot receive credit for both CSCI 306 Introduction to .NET using Visual Basic and 63.205 Introduction to .NET using Visual Basic.

Prerequisite: CSCI 252 Computer Science II using Java.

CSCI 320 Windows Server & Client Management

Designed to teach students how to plan, set up, and configure Windows server and client workstations with TCP/IP enterprise protocol; monitor and control security within the systems network; administer user accounts, system disks, file system, mail, print and remote access services; and recover from server failures.

Prerequisite: CSCI 252 Computer Science II Using Java.

CSCI 321 Digital Electronics

An introduction to the techniques of designing and constructing digital circuits with emphasis on understanding the logic circuits of a digital computer. Topics discussed include: application of Boolean algebra to logic design; operation of diodes and transistors; construction of IC logic gates; characteristics of TTL, ECL and CMOS logic families; using Karnaugh Maps to design combinatorial circuits; decoders; priority encoders; multiplexers; parity circuits; adders, subtractors and ALU's; latches and flipflops; counters; shift registers, and the design and analysis of synchronous state machines. Includes a weekly three-hour laboratory period.

Prerequisite: CSCI 152 Computer Science I Using Java.

CSCI 333 Object-Oriented Programming Using C++

A presentation of advanced features of programming with an emphasis on class construction and object-oriented design and programming. Topics covered include namespaces, encapsulation, function and operator overloading, templates, collection classes, containers, iterators, inheritance, polymorphism, and exception handling. Course touches on Standard Template Libraries (STL). NOTE: Students may not receive credit for both CSCI 333 Object-Oriented Programming Using C++ and 63.259 Object-Oriented Programming Using C++.

Prerequisite: CSCI 252 Computer Science II Using Java.

CSCI 340 UNIX™ System Administration

A comprehensive coverage of UNIX™ system administration and management. Topics include system setup, booting and shutdown, management of user accounts, file systems, disk management and serial device management, backup and restore, print and network configuration, security, system logs, performance monitoring, and maintenance.

Prerequisite: CSCI 258 Introduction to Operating Systems Using UNIX™.

CSCI 345 Computer & Network Security

A detailed study of the concepts and principles of computer and network security. Topics may include: physical and organizational security, cryptography, public key infrastructure, system and services security, networking fundamentals and protocols, worms and viruses, attacks, prevention, detection and recovery, law, ethics, and privacy. The Windows and UNIX operating systems are used for illustrations.

Prerequisite: CSCI 258 Introduction to Operating Systems Using UNIX.

CSCI 347 Analysis of Algorithms

A presentation of asymptotic time and space complexity of sequential and parallel algorithms, using big-O and related notation. Complexity classes P and NP (tractable and intractable problems) and verification of algorithms by formal methods are also discussed.

Prerequisites: CSCI 271 Data Structures and MATH 292 Discrete Mathematics I.

CSCI 352 Computer Architecture and Assembly Language

An introduction to digital logic components, their organization in computer systems, and assembly language programming. Topics include gates and flip-flops, register transfer, and CPU design; memory organization, I/O interfaces, and the interrupt system; representation of data, addressing modes, CPU instructions and pseudo-instructions, assembly language, and the organization of low-level software to control the computer.

Note: Students cannot receive credit for this course if they have taken 63.355 Computer Architecture.

Prerequisite: CSCI 271 Data Structures

CSCI 360 Database Management

A comprehensive coverage of database concepts, design, and implementation. Topics include systems analysis, data modeling, relational databases, logical design, normalization, user interfaces, query processing including SQL, database administration, security, backup and restore, and performance evaluation. Popular databases are referenced. **Note:** Students cannot receive credit for both CSCI 360 Database Management and CSCI 467 Data Base Management Systems.

Prerequisite: CSCI 258 Introduction to Operating Systems Using UNIX™.

CSCI 362 Software Engineering

Principles of systematic program design and implementation. Structured programming and top-down segmented program development. Stepwise program development. Chief Programmer Team, HIPO, and other programming techniques. Decision tables. Program correctness and verification. Software reliability.

Prerequisite: CSCI 271 Data Structures.

CSCI 373 Advanced Web Technologies

An introduction to dynamic database-driven Web site development. Students learn about client- and-server-side scripting, maintaining persistent information on the Web, and user-interface design concepts.

Prerequisites: CSCI 108 HTML, Java-Script Programming, and Web Site Development, CSCI 152 Computer Science I Using Java and CSCI 360 Database Management.

CSCI 376 Networking Technologies

An introduction to net-centric computing, communication and networking, network security, network management, client-server computing, wireless and mobile computing, and network applications. Various LAN and WAN networking technologies such as Ethernet, Token Ring, wireless network, virtual private network, personal area network, Storage Area Network, Internet, ATM, telecommunication networks, multimedia data technologies, and internetworking are covered. Business aspects of computer networks are also covered. **Note:** Students cannot receive credit for both CSCI 376 Networking Technologies and 63.476 Networking Technologies.

Prerequisite: CSCI 258 Introduction to Operating Systems Using UNIX™

CSCI 400 Special Topics in Computer Science

A study of a selected topic in computer science to be given from time to time at the discretion of the Department. Topics presented here are on a one-time-only basis and will not be a permanent part of the curriculum.

Prerequisite: Computer Science major, Junior standing, or permission of the instructor.

CSCI 404 Seminar in Computer Science

An exploration of an advanced topic in computer science. The particular topic is announced at least one semester in advance.

Prerequisite: Permission of the instructor.

CSCI 428 Software Quality Assurance

A study of software quality assurance processes and test tools. Topics include requirements analysis, test specifications, test schedule development, installation and test tools, standalone product testing, systems integration testing, interoperability, problem reporting and tracking, product development and quality assurance processes, QA management, product life cycle, software metrics for quality, and product release.

Prerequisite: CSCI 258 Introduction to Operating Systems Using UNIX.

CSCI 455 Human-Computer Interaction

A survey of the field of Human-Computer Interaction (HCI). Emphasis is placed on design strategies for creating and refining an effective user interface throughout the software product life cycle. Task analysis, approaches to user interface design, modeling, and user interface standards are covered as student groups develop a user interface for a software product.

Prerequisites: CSCI 152 Computer Science I Using Java and CSCI 360 Database Management.

CSCI 460 Theory of Computing

An introduction to theoretical computer science and some key applications. Course examines models of computation, including finite automata, transducers, pushdown automata, and Turing machines. Concepts of formal language theory are applied to lexical analyzer and compiler construction in programming-language translation. The course will include an introduction to the notions of computability and computational complexity, concepts used in parallel computation, and some aspects of artificial intelligence.

Prerequisites: MATH 292 Discrete Mathematics I and CSCI 271 Data Structures.

CSCI 465 Operating Systems Internals

An in-depth coverage of operating system principles and internals such as processes, threads, CPU scheduling, concurrency and process synchronization, deadlock, inter-process communication, memory management, virtual memory, file systems, I/O systems, distributed systems, and protection and security. Several of the concepts are implemented through a programming project.

Prerequisites: CSCI 258 Introduction to Operating Systems Using UNIXTM, and CSCI 352 Computer Architecture and Assembly Language

CSCI 477 Computer Networking

An introduction to the seven layers of the OSI model. General topics include network topologies; introduction to Local Area Networks, such as Ethernet, Token Ring, and FDDI; and internet-working. Special topics include TCP/IP and FTP protocols, socket interface, Remote Procedure Call (RPC), and client-server architecture.

Prerequisite: CSCI 271 Data Structures or equivalent computer industry experience including strong programming skills in C or C++.

CSCI 490 Directed Study in Computer Science

Under the direction of a faculty member, the student researches a topic or topics in computer science. Students should make arrangements with the faculty member who is to direct their work one semester in advance of the work.

CSCI 495 Cooperative Program in Computer Science (credit-two courses)

A cooperative program in which students are placed in computer positions in corporate or government settings. Students are expected to work a minimum of 25 hours per week. These positions are normally compensated. Upon completion of the course, students will provide written documentation concerning their work projects.

Prerequisite: Upperclass standing in computer science with at least a 3.0 average in computer courses or permission of instructor.

CSCI 496 Cooperative Program in Computer Science (credit-two courses)

A cooperative program in which students are placed in computer positions in corporate or government settings. Students are expected to work a minimum of 25 hours per week. These positions are normally compensated. Upon completion of the course, students will provide written documentation concerning their work projects.

Prerequisite: Upperclass standing in Computer Science with at least a 3.0 average in computer courses or permission of instructor.

Note: This course may not be taken concurrently with CSCI 495.