

COMPUTER SCIENCE AND INFORMATION SYSTEMS

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PROGRAMS AVAILABLE

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

BIOINFORMATICS CONCENTRATION

COMPUTER SCIENCE MINOR

INFORMATION TECHNOLOGY MINOR

COMPUTER SCIENCE MAJOR PROGRAM

The Department of Computer Science offers a four-year program leading to a Bachelor of Science in Computer Science, with one of four concentrations. Students majoring in other departments may complete a minor in computer science or a minor in information technology.

Computer science encompasses a broad range of computing and communications technologies that are used for the development of business, commerce, robotics, entertainment, educational, medical and information system products. The dependence on modern computer systems has created a growing demand for software developers who can meet the needs of businesses and consumers. The application of these technologies now stretches from the factory floor to the office, boardroom and home. Current products range from standalone applications to fully distributed networked systems, and are made possible by the concepts of object oriented programming and design.

Career opportunities for graduates with these skills exist both in Internet companies and in more traditional companies that have a need for

distributed systems of networked computers and software systems. Recent graduates have found employment with Internet startup companies, the insurance industry, communications companies and government contractors. The major program is designed to provide students with a strong grounding in several areas. Students graduating with a degree in computer science will be able to:

- Develop and maintain professional quality software applications, products, and systems;
- Competently use major software applications found in industry;
- Communicate ideas effectively with others;
- Create and maintain hardware systems.

COMPUTER SCIENCE MAJOR

Students must select one of the following concentrations: Information Technology, Software Development, Bioinformatics, or Business Information Systems.

SOFTWARE DEVELOPMENT CONCENTRATION

Requirements

CSCI	101	Introduction to Computer Science	3 cr
CSCI	121	Programming in Java I	3 cr
CSCI	122	Programming in Java II	3 cr
CSCI	210	Networking Theory and Administration I	3 cr
CSCI	221	Programming in Java III	3 cr
CSCI	222	Programming in Java IV	3 cr
CSCI	235	Digital Circuit Design	4 cr
CSCI	236	Web Development	3 cr
CSCI	243	Database Development	3 cr
CSCI	318	Computer Organization and Assembly Language	3 cr
CSCI	328	Object Oriented Design	3 cr

CSCI	330	Programming in C++	3 cr
CSCI	343	Server-Side Software Development	3 cr
CSCI	361	Data Structures and Algorithms	3 cr
CSCI	362	Operating Systems	3 cr
CSCI	390	Junior Qualification	1 cr
CSCI	452	Software Engineering	3 cr
CSCI	461	Senior Project I	1 cr
CSCI	462	Senior Project II	1 cr
ENGL	306	Business Writing and Presentation	3 cr
MATH	250	Discrete Math	3 cr
PHYS	131	General Physics I	4 cr
OR PHYS	151	Introduction to Mechanics	

**TOTAL SOFTWARE DEVELOPMENT CONCENTRATION
REQUIREMENTS**

62 cr

**INFORMATION TECHNOLOGY CONCENTRATION
Requirements**

CSCI	101	Introduction to Computer Science	3 cr
CSCI	121	Programming in Java I	3 cr
OR CSCI	246	Programming in C# I	
CSCI	122	Programming in Java II	3 cr
OR CSCI	248	Programming in C# II	
CSCI	210	Network Administration I	3 cr
CSCI	211	Network Administration II	3 cr
CSCI	235	Digital Circuit Design	4 cr
CSCI	236	Web Development	3 cr
CSCI	243	Database Development	3 cr
CSCI	302	Computer Triage	3 cr
CSCI	330	Programming in C++	3 cr

CSCI	360	Network Security I	3 cr
CSCI	363	Network Security II	3 cr
CSCI	343	Server-Side Software Development	3 cr
CSCI	461	Senior Project I	1 cr
CSCI	462	Senior Project II	1 cr
ENGL	306	Business Writing	3 cr
MATH	200	Level	3 cr
MATH	250	Discrete Mathematics	3 cr

TOTAL INFORMATION TECHNOLOGY CONCENTRATION REQUIREMENTS **51 cr**

BUSINESS INFORMATION SYSTEMS CONCENTRATION

Requirements

BADM	206	Math Methods for Business and Economics	3 cr
BADM	210	Information Technology for Business	3 cr
BADM	224	Financial Accounting	3 cr
BADM	310	Advanced Information Technology for Business	3 cr
BADM	340	Financial Management	3 cr
CSCI	101	Introduction to Computer Science	3 cr
CSCI	236	Web Development	3 cr
CSCI	243	Database Development	3 cr
CSCI	246	Programming in C# I	3 cr
CSCI	248	Programming in C# II	3 cr
CSCI	252	Systems Development	3 cr
CSCI	346	Programming in Visual Studio	3 cr
CSCI	352	Business Information Systems	3 cr
CSCI	461	Senior Project I	1 cr
CSCI	462	Senior Project II	1 cr
ECON	141	Macroeconomics	3 cr
ENGL	306	Business Writing	3 cr

**TOTAL BUSINESS INFORMATION SYSTEMS CONCENTRATION
REQUIREMENTS**

47 cr

BIOINFORMATICS CONCENTRATION

Requirements

BIOL	150	Introduction to Biology	4 cr
BIOL	235	Botany OR BIOL 245 Zoology	4 cr
BIOL	240	Genetics	4 cr
BIOL	390	Biometry	3 cr
BIOL	410	Biotechniques	4 cr
CSCI	101	Introduction to Computer Science	3 cr
CSCI	121	Programming in Java I	3 cr
CSCI	122	Programming in Java II	3 cr
CSCI	243	Database Development	3 cr
CSCI	330	Programming in C++	3 cr
CSCI	350	Introduction to Parallel Computing	3 cr
CSCI	362	Operating Systems	3 cr
CSCI	361	Data Structures and Algorithms	3 cr
CSCI	420	Introduction to Bioinformatics	3 cr
CSCI	461	Senior Project I*	1 cr
CSCI	462	Senior Project II*	1 cr
MATH	250	Discrete Mathematics	3 cr

TOTAL BIOINFORMATICS CONCENTRATION REQUIREMENTS

51 cr

* Senior project must be related to bioinformatics and must be co-advised by CS and Biology faculty

COMPUTER SCIENCE MINOR

Requirements

CSCI	101	Introduction to Computer Science	3 cr
CSCI	121	Programming in Java I	3 cr
CSCI	122	Programming in Java II	3 cr
CSCI	221	Programming in Java III	3 cr
CSCI	222	Programming in Java IV	3 cr
CSCI	235	Digital Circuit Design	4 cr
CSCI	330	Programming in C++	3 cr
CSCI	361	Data Structures and Algorithms	3 cr

TOTAL COMPUTER SCIENCE MINOR REQUIREMENTS **25 cr**

INFORMATION TECHNOLOGY MINOR

Requirements

CSCI	121	Programming in Java I	3 cr
CSCI	122	Programming in Java II	3 cr
CSCI	210	Networked Theory and Administration I	3 cr
CSCI	236	Web Development	3 cr
CSCI	243	Database Development I	3 cr
CSCI	343	Server-Side Software Development	3 cr
CSCI	352	Business Information Systems	3 cr

TOTAL INFORMATION TECHNOLOGY MINOR REQUIREMENTS
21 cr

COURSE DESCRIPTIONS

CSCI 101 Introduction to Computer Science 3 cr

Introduces entering computer science majors to various topics used throughout the curriculum. Topics include computer hardware, operating systems, file systems, file types, protocols and networking.

Prerequisite: None

CSCI 121 Programming in Java I 3 cr

Introduces the concepts of program development using the Java programming language. Topics include variables, control structures, arrays, string manipulation and an introduction to object oriented concepts.

Prerequisite: None

CSCI 122 Programming in Java II 3 cr

Continues the study of object oriented programming and the Java language. Topics include file manipulation, method and class definitions, graphic applications, applets, multimedia, events and interfaces.

Prerequisite: CSCI 121

CSCI 208 Graphics I 3 cr

Provides a broad overview of computer graphics. Students will use proprietary and open source software to integrate images and text. The course includes demonstrations, lectures, presentations and hands-on projects. It is expected that students will have access to a digital camera and that students will work with their own images.

Prerequisite: None

CSCI 210 Networking Theory and Administration I 3 cr

Introduces students to topics in networking theory such as protocols, protocol stacks, encryption and security. Basic network troubleshooting and administration will also be covered.

Prerequisite: None

CSCI 211 Networking Theory and Administration II 3 cr

Introduces students to advanced topics in networking theory such as flow control and congestion control algorithms, routing algorithms, multiple access algorithms, and error detection and correction algorithms. Advanced troubleshooting and network administration will be covered.

Prerequisite: CSCI 210

CSCI 221 Programming in Java III 3 cr

Continues the study of object oriented programming and the Java language. This course focuses on the development of graphical user interfaces and animated simulations and games using object oriented programming techniques.

Prerequisite: CSCI 122

CSCI 222 Programming in Java IV 3 cr

Continues the study of object-oriented programming and the Java language. Topics include advanced data structures, input and output streams and serialization, multithreading, networking and object-oriented design methodology.

Prerequisite: CSCI 221

CSCI 235 Digital Circuit Design 4 cr

Introduces the fundamental concepts involved in the analysis and design of digital logic circuits. Topics include number systems, Boolean algebra, logic

and technical perspectives of effective web page design. Upon completion, students will be able to employ design techniques to create beautiful and highly functional web pages.

Prerequisite: None

CSCI 302 Computer Triage 3 cr

Intended for computer science majors. Topics include: troubleshooting, problem solving and maintaining network hardware and software.

Prerequisite: CSCI 101

CSCI 308 Graphics II 3 cr

Builds on CSCI 208 and provides a broad overview of 3-D computer graphics. Students will use proprietary and open source software to create and render three-dimensional objects and scenes. The course includes demonstrations, lectures, presentations and many "hands-on" projects.

Prerequisite: CSCI 208

CSCI 318 Computer Organization and Assembly Language 3 cr

Introduces students to the major hardware components of a computer system and to the organization of computers as a hierarchy of hardware and software. Considers the basic functional units of a computer system and then examines the following levels: digital logic, microprogramming, conventional machine language, operating system and assembly languages.

Prerequisite: CSCI 235

CSCI 328 Object Oriented Design 3 cr

Investigates system design using the standard object oriented design methodology. The Unified Modeling Language (UML) is covered extensively, as are the tools and diagrams associated with it. The course incorporates the use of software design tools and applications used in industry.

CSCI 346 Programming in Visual Studio 3 cr

Applies programming concepts to the language found in the Visual Studio programming environment. This course is intended for students who have studied another programming language for at least two semesters. Topics include syntax, data structures, graphics and GUI application in a Windows environment.

Prerequisite: CSCI 122 or CSCI 248

CSCI 347 Intermediate Topics in Computing 3 cr

Provides in-depth study of a topic introduced in an earlier course. Depending on the specific topic, students will demonstrate mastery of course content through programs, papers and/or portfolio development.

Prerequisite: Department approval

CSCI 350 Introduction to Parallel Computing 3 cr

Introduces parallel computing methods for both distributed memory and shared memory architectures. In this course, students will learn how to design and implement parallel algorithms for solving classic computer science problems, and analyze their performance. This course covers several parallel programming techniques such as Open MPI, POSIX Threads, Open MP, and Java Threads.

Prerequisite: CSCI 122

CSCI 352 Business Information Systems 3 cr

Provides an examination of business information systems that apply to all strata of organizations. The course will view organizations as information systems and demonstrate how computers are integrated in these organizations. Students will engage in service learning projects and gain practical experience off-campus, solving real problems for various companies.

Prerequisite: CSCI 252

CSCI 360 Network Security I**3 cr**

Examines client based/end user security. This course is intended for computer science majors. Topics include: identification, prevention and recovery from security vulnerabilities and threats to PCs, tablets and mobile devices.

Prerequisite: CSCI 211**CSCI 361 Data Structures and Algorithms****3 cr**

Introduces fundamental data structures such as stacks, queues, dictionaries, trees, and graphs. This course also covers the development and analysis of algorithms that sort, search, traverse, and divide and conquer. Algorithm analysis techniques covered include the RAM model of computation, best-case, worst-case, and average-case complexity. Students will implement data structures and algorithms using a contemporary programming language and serial and parallel programming techniques.

Prerequisite: CSCI 122**CSCI 362 Operating Systems****3 cr**

Students learn about and implement the fundamental principles used by operating systems to manage processes, memory, storage, and security. In addition, case studies will be introduced to explore the implementation of at least two modern operating systems.

Prerequisite: CSCI 361**CSCI 363 Network Security II****3 cr**

Continues CSCI 360, Network Security I and examines networked systems security. This course is intended for computer science majors. Topics include: identification, prevention and recovery for security vulnerabilities and threats to network data and networked resources.

Prerequisite: CSCI 360

CSCI 390 Junior Qualification Symposium 1 cr

Ensures that students are prepared for their senior year of study in the Computer Sciences Software Development Program. Students attend class for one hour each week to review material from the lower level courses in the program, (100 and 200 level). Near the end of the semester, each student will take a multi-part exam, which must be passed to continue on.

Prerequisite: CSCI 222, 235, 236, 243

CSCI 408 Graphics III 3 cr

Explores the history of CG animation and produces an animation short using a 3-D graphics program. Students will build on their skills developed in CSCI 208 and CSCI 308 and, working in teams, develop, refine and build a computer generated short animation.

Prerequisite: CSCI 308

CSCI 420 Bioinformatics 3 cr

Introduces the fundamental algorithms used in bioinformatics and how these algorithms can be used to solve biological problems. In this class, students will learn how bioinformatics algorithms work, as well as how to obtain sequence data from scientific databases and analyze these data using tools available on the MCLA high-performance cluster.

Prerequisite: CSCI 243, BIOL 240

CSCI 441 Teaching Assistant in Computer Science 3 cr

Assigns students to assist a member of the computer science faculty. Students will be involved in developing materials for class, giving workshops and help sessions, and evaluating computer science projects. A member of the computer science faculty will coordinate, counsel and evaluate students enrolled in the course.

Prerequisite: Department approval

CSCI 447 Advanced Topics in Computing

3 cr

Provides advanced study of a topic introduced in an earlier course.

Depending on the specific topic, students will demonstrate mastery of course content through programs, papers and/or portfolio development.

Prerequisite: Department approval

CSCI 452 Software Engineering

3 cr

Prepares students for work in industry. This course introduces students to modern tools and approaches that will allow them to design professional quality software.

Prerequisite: CSCI 343, CSCI 390

CSCI 461 Senior Project I

1 cr

Prepares senior computer science majors for their final projects and life beyond graduation. In addition to writing and presenting proposals for senior projects, students prepare portfolios and resumes. Course topics include various writing styles, presentation techniques and networking and communication skills. Students choose a faculty advisor and begin work on the senior project during this semester.

Prerequisite: CSCI 328, CSCI 343

CSCI 462 Senior Project II

1 cr

Provides students with a final and substantial project. Students work with a faculty advisor to complete the senior project started in senior seminar.

Projects are presented during a public senior project day at the end of the semester.

Prerequisite: CSCI 461

CSCI 500 Independent Study

1 to 3 cr

Designed for students who wish to undertake an in-depth examination of some topic of interest. The project will be carried out under the direction of a computer science faculty sponsor.

Prerequisite: Junior/senior status, department approval

CSCI 540 Internship in Computer Science

3 to 12 cr

Open to juniors and seniors who would like to gain practical field experience in the computer industry. The intern will work under close supervision of both industry and department personnel.

Prerequisite: CSCI 222, or junior/senior status, or department approval