COMPUTER SCIENCE (CSC)

Computer Science is the systematic study of data modeling and algorithmic processes for solving problems with computers. The theoretical study of concepts and methods as well as the analysis, design, and implementation of solutions involves the creative use and development of both quantitative and logical thinking skills at an abstract level.

Today computer and information technology is found everywhere from the home to the workplace. An educated person needs an understanding of computing concepts and a perspective of the potential, limitations, and social ramifications of computers. This includes being conversant on such issues as networking technologies, interoperability, human-computer interfaces, the object-oriented paradigm, security, cryptography, and the internet.

Resources and Instruction

Wisconsin Lutheran offers a major and minor in computer science. The program aims to give students a broad understanding of both the theoretical and the applied areas of the discipline and to produce liberally educated graduates capable of solving problems and communicating effectively in diverse disciplines.

Course of Study

A. A major in computer science consists of at least 45 credits including:

1. Computer Science Core (19 credits): CSC 131, 231, 311, 321, 361, 471.

2. Electives at least 12 credits selected from the following courses: CSC 250, 340, 373, 375, x91, 410, 481, MAT 361, 371 or PHY 215, 316.

3. Senior Capstone Experience: CSC 485.

4. Collateral Courses (11 credits): MAT 117 or 352; 221, 230.

In addition to the required courses, computer science majors are encouraged to take Linear Algebra (MAT 333), Foundations of Mathematics (MAT 231), Web Design I & II (ART 242 & 342), and Electronics (PHY 315). One or more courses in Psychology, especially PSY 101 (Introduction), and PSY 211 (Experimental Psychology) would also be beneficial.

B. A minor in computer science consists of at least 30 credits including:

1. Computer Science Core (19 credits): CSC 131, 231, 311, 321, 361, 471.

2. Electives at least 3 credits selected from the following courses: CSC 250, 340, 375, x91, 410, 481, MAT 361, 371 or PHY 316, PHY 215.

3. Collateral Courses (8 credits): MAT 210 or MAT 221, MAT 230

Course Descriptions

CSC 131 Introduction to Programming. 4 cr.
Introduction to a programming language. Fundamental problem solving concepts with an object-oriented language, elementary and structured data types, sequence control, data control, human interfaces, and program debugging. Weekly programming projects.

CSC 231 Object Oriented Design and Software Dev. 3 cr.
This course develops skills based on real-world software development. Study of the object-oriented design paradigm and software development processes. The semester is spent designing and implementing a major project starting with requirements and working through implementation, final testing and delivery. There are also several short papers and a classroom presentation. Prereq: CSC 131 or consent of instructor.

CSC 250 Internet Programming. 3 cr.
This course focuses on web technologies, especially server-side programs, client-side scripts and the concept of applets. On the server-side, it covers file management and common server architectures. It also covers web protocols, internet information servers, browsers and APIs (Application Programming Interfaces), database-driven websites, security issues and firewalls. Students will implement several web-based applications. Prereq: CSC 231 or consent of instructor..

CSC 311 Data Structures. 3 cr.
Basic structures (arrays, object classes, queues, lists, stacks, etc.) in computer science, the application of these structures (sorting, searching, recursion, graph theory, etc) and algorithm efficiency. Weekly programming projects. Prereq: CSC 231 or consent of instructor.

CSC 321 Computer Organization. 3 cr.
Instruction and data representation, addressing, operations, program linkage, input/output, interrupts, traps, and basic assembly language programming for one microprocessor family. Several programming projects and a short research paper. Prereq: CSC 311 or consent of instructor.

CSC 340 Programming Languages. 3 cr.
This course surveys the history of programming languages and programming paradigms, including procedural, object-oriented, functional, declarative non-algorithmic, and scripting languages. It covers virtual machines and intermediate languages, and compares interpreters and compilers. Also covered are the topics of binding, scope, type-checking, garbage collection and security. There will be frequent programming assignments in a variety of important computer languages exemplifying each language type. Prereq: CSC 311 or consent of instructor.

CSC 361 Database Systems. 3 cr.
Organizing, processing, and administration of a database. Database models, data dictionary, file organization, query languages (SQL), security, integrity, and reliability. Hands-on use of a DBMS (DataBase Management System). Several programming projects using SQL, Java, Perl, Python and C++. There will also be a short research paper and presentation. Prereq: CSC 311 or consent of instructor.

CSC 373 Introduction to Cryptogrophy. 3 cr.
An introduction to the field of classical and mathematical cryptography. Topics include linguistic techniques and classical cryptographic methods, key exchange protocols, public key cryptography, factoring techniques and primality testing, digital signatures, hash functions, secret sharing schemes, and relevant number theoretic methods. Prereq: sophomore standing and MAT 222 or MAT 230. This course is cross-listed with MAT 373.

CSC 375 Operating Systems. 3 cr.
A study of computer operating system principles. Topics include threads, processes and protection, synchronization and deadlocks, memory management including virtual memory, file systems, distributed systems, messaging, and security. There will be several programming assignments and a short research paper. Prereq: CSC 311 or consent of instructor.

CSC 410 Computer Graphics. 3 cr.
An introduction to the techniques, concepts, algorithms, and data structures used in computer graphics and computer imaging. We will study vector tools, transformations, polygonal meshes, three-dimensional viewing, curve and surface design, color theory, hidden surface removal and ray tracing. There will be frequent programming assignments using a standard graphics API (Application Programming Interface – typically openGL). Prereq: CSC 311 or consent of instructor.

CSC 471 Data Communication. 3 cr.
The physical basis for communication, modulation techniques, synchronous and asynchronous transmission, analog and digital signaling, multiplexing, hardware and software, networks and protocols, and design considerations. Prereq: CSC 311 or consent of instructor.

CSC 481 Artificial Intelligence. 3 cr.
History and application of AI, knowledge representation, control strategies and reasoning. Techniques of search, data-driven programming, frames, production-rule systems, and logic programming. Major project required. Prereq: CSC 311 or consent of instructor.

CSC 485 Senior Capstone Experience. 3 cr.
This capstone experience is designed to survey important areas computer science not specifically covered by the curriculum. This includes ethics, human interface design, automata theory, and topical subjects as appropriate such as agile development processes, net neutrality, or internet censorship. Students will complete and present a major project in consultation with the instructor. The project could be a research paper or a programming project. There will also be several short research papers and presentations. Prereq: senior standing and consent of instructor

CSC 490 Internship. 1 - 3 cr.
By arrangement of department.

CSC x91 Special Topics. 1-3 cr.
Selected advanced topics in Computer Science. Content varies. Course may be taken for credit more than once with different topics. Possible topics include Robotics, Event Programming (Windows), Computer Games, Computational Linguistics or others. Offered as needed. Prereq: consent of instructor.

CSC 199-499 Independent Study. 1 - 3 cr.
By arrangement of department.