Courses

**CS 5101 Computer Science Principles: 3 semester hours.**
Introduction to central ideas, practices and impact of computer science, and computational thinking. Covers the big ideas in computer science: creativity, abstraction, data and information, algorithms, programming, the Internet, and global impact. Computational thinking practices: connecting computing, creating computational artifacts, abstracting, analyzing problems and artifacts, communicating, and collaborating. In-depth projects using at least one visual aid and one text-based programming language. Adapting content to high school courses.

**CS 5102 Teaching and Learning Computer Science I: 3 semester hours.**
Problem solving and object-oriented programming. Software development process. Data and expressions, conditionals and loops, arrays and lists, and classes and interfaces. Introduction to graphical user interfaces and UML diagrams. Approaches and techniques to teach CS I material in 6-12 grades.

**CS 5103 Teaching and Learning Computer Science II: 3 semester hours.**
Program correctness, testing and analysis of time and space complexity. Graphical user interfaces. Object-oriented programming and design, including hierarchy and inheritance. Basic data structures: lists, collections, stacks and queues. Basic searching and sorting. Approaches and techniques to teach CS II material in 6-12 grades.

**CS 5520 Computer Security and Cryptography: 3 semester hours.**
Public key and private key cryptography, key distribution, cryptographic protocols, requisite mathematics and selected topics in the development of security and cryptography. PREREQ: CS 3385.

**CS 5542 GUI Development: 3 semester hours.**
Planning and construction of Graphical User Interfaces and essential software engineering concepts. Includes the use of a modern toolkit language. COREQ: CS 3385.

**CS 5544 Image and Audio Processing: 3 semester hours.**
Image/audio acquisition, quantization, spatial and spectral filters, sharpening, smoothing, restoration, compression, segmentation, Fourier and Wavelet transforms. PREREQ: CS MATH 3352 and MATH 3360.

**CS 5545 Data Compression: 3 semester hours.**
A survey of modern techniques of data compression, both lossy and loss-less, and encryption. COREQ: CS 3386.

**CS 5551 Database Theory Design and Programming: 3 semester hours.**
Data models, relational algebra and calculus, SQL and stored procedures, database design, ER diagrams, normalization theory, data storage, index structures, performance analysis, concurrency control. Database programming language access. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus.

**CS 5558 Computer Graphics: 3 semester hours.**
Graphics, transformation matrices, lighting models, object hierarchies, visible surface determination, ray tracing. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus.

**CS 5560 Comparative Programming Languages: 3 semester hours.**
Design of historical and contemporary programming languages, concentrating on promoting understanding of structural organization, data structures and typing, name structures, and control structures. COREQ: CS 5575. PREREQ: CS 3385.

**CS 5570 Parallel Processing: 3 semester hours.**
Topics in high performance computing: parallel architectures, SIMD, MIMD, SMP, NUMA models, message passing, cache coherency issues, MPI, PVM, parallel programming languages, cluster and grid approaches, applications and experience programming on a cluster. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus.

**CS 5577 Operating Systems: 3 semester hours.**
Processes description and control, threads, concurrency, memory management scheduling, I/O and files, distributed systems, security, networking. PREREQ: CS 2263 and CS 5575.

**CS 5580 Theory of Computation: 3 semester hours.**
Finite representations of languages, deterministic and non-deterministic finite automata, context free languages, regular languages, parsing. Turing Machines, Church's Thesis, uncomputability, computational complexity classes. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus.

**CS 5581 Compilers and Lexical Analysis: 3 semester hours.**
Covers lexical analysis, syntax analysis, top-down, bottom-up, and LR parsing, syntax directed translation, type checking, code generation and optimization, and writing a compiler. PREREQ or COREQ: CS 3386.

**CS 5587 Topics in Computer Science: 3 semester hours.**
Selected topics in Computer Science will be chosen depending on the instructor's interests. PREREQ: CS 3386.

**CS 5588 Advanced Software Engineering and Project: 3 semester hours.**
Analysis, specification, design, implementation, and testing of a large software project. Formal approach and tools. Software life-cycle. Human computer interaction. Project and team management. Uses a different programming language. Specific, evaluated graduate-level activities and/or performances are identified in the course syllabus.

**CS 5591 Ethical and Societal Issues in Computer Science: 3 semester hours.**
Investigates various ethical issues arising in the profession, ranging from research to commercial settings. The societal impacts of computing and its prevalence in all aspects of the modern world are investigated. Seminar format: students will read papers, make oral presentations, conduct class discussion, and submit written reports.

**CS 5599 Experimental Course: 1-6 semester hours.**
This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

**CS 6101 Inclusive Strategies for Teaching Computer Science: 3 semester hours.**
Readings and discussion on methodologies of teaching computer science.

**CS 6650 Thesis: 1-6 semester hours.**
Thesis class for MSCS students.

**CS 6660 Computer Science Project: 1-3 semester hours.**
A significant project involving computer science toward the completion of the M.S. program with non-thesis option. Includes a report and oral examination.
CS 6671 Advanced Operating Systems: 3 semester hours.
Operating system kernels: process management, memory management, file systems, security and protection. Advanced concurrent programming techniques. Operating system design and construction techniques. Modifying operating system code to observe behavior, add new functionality and run experiments. Support for soft and hard real-time systems, big data, cyber-security, virtual machines and other domains.

CS 6672 Human Computer Interaction: 3 semester hours.
Science-based theories and models of user interface design and development. Graphical user interfaces for desktop, web, and mobile devices. Usability assessment by quantitative and qualitative methods. Task analysis, usability tests, expert reviews, and continuing assessments of working products by interviews, surveys, and logging. Building of low-fidelity paper mock-ups, and a high-fidelity prototype using contemporary tools and programming environments.

CS 6673 Advanced Topics in Compilation: 3 semester hours.
Code generation, analysis, and optimization. Projects will use a simple framework for performing analysis and optimizations at the assembly level.

CS 6692 Special Problems in Computer Science: 1-3 semester hours.
Research and reports on problems or topics in computer science. May be repeated for up to 9 credits with different content.

CS 6699 Experimental Course: 1-6 semester hours.
This is an experimental course. The course title and number of credits are announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times with the same title and content.

CS 8850 Doctoral Dissertation: 1-24 semester hours.