MU Doctor of Computing (DCS)

The mission of the Doctor of Computing degree is to develop students to be research and development leaders in computer science. The program strives to promote high-quality, high impact research, collaboratively and across disciplines. The goal of the computer science curriculum is to provide students with the knowledge and tools that will allow them to design and implement effective, economical, and creative solutions for the needs of individuals, society, and the high-tech economy.

Graduates of the program will be able to:

- Understand and respect the professional standards of ethics expected of a computer scientist and be knowledgeable concerning the history of the computing field.
- Possess the skills and knowledge to enable them to be committed to lifelong learning in computer science
- Be knowledgeable about the theoretical foundations of computing and have strong practical application experience

COURSE MODULES

CSC541: Advanced Topics In Algorithms

(4 crs.) Algorithm design techniques such as dynamic programming, greedy method, branch and bound. Linear programming; NP-completeness; graph algorithms; number theoretic algorithms; approximation algorithms for NP-complete problems; probabilistic and parallel algorithms. (Lec. 3, Project 3) Pre: CSC 440 or 445. In alternate years.

CSC542: Mathematical Analysis of Algorithms

(4 crs.) Mathematical techniques for the analysis of algorithms. Sums and products; finite difference calculus; properties of binomial coefficients; Stirling, harmonic, and Fibonacci numbers; recurrence relations; generating functions; asymptotic approximation. Case studies. (Lec. 3, Project 3) Pre: CSC 440. In alternate years.

CSC544: Theory Of Computation

(4 crs.) Finite automata, pushdown automata, formal grammars and Chomsky hierarchy, Turing machines, computability, basics of complexity theory. Advanced topics including some of the following: cryptography, interactive proofs, circuit complexity, completeness for various complexity classes, relations among complexity classes, new models of computation. (Lec. 3, Project 3) Pre: CSC 440 or 445. In alternate years.

CSC550: Computer Algebra

(4 crs.) Symbolic mathematical computation; history, use, representation of information, algorithms and heuristics. Big number arithmetic, manipulation of polynomials and rational expressions; algebraic simplification; factoring; symbolic integration. Organization and implementation of computer algebra systems. (Lec. 3, Project 3) Pre: CSC 440. In alternate years.

CSC402: Programming Language Implementation

(4 crs.) Grammars and languages; lexical analysis and parsers; interpreters, translators, and virtual machines; symbol tables and type systems; code generation for real and virtual machines. Students will implement a number of interpreters, translators, and virtual machines for various small languages. (Lec. 3, Project 3) Pre: CSC 301, and student must be admitted to a degree-granting college.

CSC501: Programming Language Semantics

(4 crs.) Design, analysis, implementation, and comparative study of major programming language families. Topics include procedural and block-structured languages, interpretive languages, concurrency, functional languages, object-oriented programming, logic programming, dataflow languages and machines. (Lec. 3, Project 3) Pre: CSC 301.

CSC502: Theory of Compilers

(4 crs.) An advanced course in compiler construction covering advanced parsing techniques, compiler-writing tools, type checking and type inference, code optimization, and compiling nonstandard language features. (Lec. 3, Project 3) Pre: CSC 402. In alternate years.

CSC511: Advanced Computer Organization

(4 crs.) Evaluation of high-performance computer systems with respect to architectures, operating systems, and algorithms. High-speed conventional machines; array processors; multiprocessors; data flow machines; RISC architectures; VLSI-based machines. (Lec. 3, Project 3) Pre: CSC 411. In alternate years.

CSC512: Topics In Distributed Systems

(4 crs.) Advanced topics in distributed systems. Networking; standard distributed computing environments. Distributed computing algorithms. Concurrency and threading. Real-time computing, scheduling, concurrency control, load allocation. (Lec. 3, Project 3) Pre: CSC 412. In alternate years.

CSC519: Computer Networks

(4 crs.) Cross-listed as (ELE 543), CSC 519.Computer network architectures, data link control and access protocols for LANs, internet protocols and applications, software and hardware issues in computer communication, delay analysis, and current research in computer networking. (Lec. 4) Pre: ELE 437 or equivalent or CSC 412 or equivalent.

CSC591: Directed Study in Computer Science

(1-4 crs.) Advanced work in computer science conducted as supervised individual projects. (Independent Study) Pre: permission of instructor. S/U credit.

CSC699: Doctoral Dissertation Research

(1-18 crs.) Number of credits is determined each semester in consultation with the major professor or program committee. (Independent Study) S/U credit.