Department of Computer Science

Richard Detmer, Chair
Kirksey Old Main 306

The Department of Computer Science offers the Master of Science with a major in Computer Science and a minor at the graduate level.

Admission to the Master’s program requires a satisfactory Graduate Record Examination score.

Requirements for the Master of Science

Candidate must
1. have completed CSCI 1170, 2170, 3080, 3110, 3130, 3160, and 3250 or equivalent;
2. have completed MATH 1910 and MATH 2050 or equivalent;
3. complete 30 semester hours including a thesis of 3 semester hours and a major of 18 semester hours of computer science, or if a thesis is not written, 36 semester hours with a major of 24 semester hours (if a minor is elected, it must include a minimum of 12 semester hours);
4. complete at least two one-year course sequences in computer science, selected with the consent of the advisor (available core sequences are CSCI 5160-6190, 5250-6260, 5300-6300, 5330-6130, 5350-6130, 5560-6560, 5700-6180, 5800-6180, 6250-6450, 6350-6550);
5. complete at least 70 percent of the program at the 6000 level;
6. complete 6 semester hours of approved research tools and with grades of C or better on the undergraduate or graduate level;
7. file a Candidacy Form with the Graduate Office prior to the completion of 24 credit hours;
8. successfully complete a written comprehensive examination over two sequences from the approved list and two additional 6000-level courses that are not from the same areas as the sequences (may be taken no more than twice);
9. present an oral defense if a thesis is elected; if a thesis is not elected, then an oral presentation on an approved computer science topic is required (Pass/Fail, may be repeated only once).

Courses in Computer Science [CSCI]

5130 (513) Microprocessor Operation and Control. Three credits. Prerequisite: CSCI 3160. Digital systems based around microcomputers, microcomputer architecture, logic replacement, memory design, timing considerations, input/output design, interfacing, robotics, and total system design.

5160 (516) Compiler Analysis and Design. Three credits. Prerequisites: CSCI 3110 and 3180. The various phases of a compiler along with grammars, finite automata, regular expressions, LR parsing, error recovery, backward and forward flow analysis, and code optimization. A term project consisting of the design and construction of a functional compiler required.

5250 (525) Computer Graphics. Three credits. Prerequisites: CSCI 3110 and 3180 or consent of instructor. Topics include vector drawing displays, raster scan displays, input devices and techniques, graphics software, transformations, projections, interpolation, and approximation.

5300 (530) Data Communication and Networks. Three credits. Prerequisite: CSCI 3250. Network architectures, protocol hierarchies, and the open systems interconnection model. Modeling, analysis, design, and management of hardware and software on a computer network.

5330 (533) Parallel Processing Concepts. Three credits. Prerequisites: CSCI 3130, 3250, and a working knowledge of either C or C++. Parallel processing and programming in a parallel environment. Topics include classification of parallel architectures, actual parallel architectures, design and implementation of parallel programs, and parallel software engineering.

5350 (535) Introduction to Artificial Intelligence. Three credits. Prerequisite: CSCI 2170 and 3080 or equivalent. Principles and applications of artificial intelligence. Principles include search strategies, knowledge representation, reasoning, and machine learning. Applications include expert systems and natural language understanding.

5560 (556) Database Management Systems. Three credits. Prerequisite: CSCI 3110. The relational and object models of database design along with relational algebra, data independence, functional dependencies, inference rules, normal forms, schema design, modeling languages, query languages, and current literature.

5600 (560) Independent Study in Computer Science. One to six credits. Prerequisite: Consent of instructor. Students wishing to enroll must submit a written course/topic proposal to the department prior to the semester in which CSCI 5600 is taken. Proposal must be approved prior to taking the course. At the conclusion of the course, each enrollee will submit a written summary of the project.

5700 (570) Software Engineering. Three credits. Prerequisite: CSCI 3110. Consists of a theoretical component and a practical component. Topics include the history of software engineering, software development paradigms and life cycles, and computer-aided software engineering (CASE). A team project will be developed in parallel with the theory.

5800 (580) Software Testing. Three credits. Prerequisite: CSCI 2170 and 3080. Integrates theory and applications of software testing techniques. Provides actual hands-on testing experience. Considers multiple testing paradigms.
**5850 (585) Neural Nets.** Three credits. Prerequisite: CSCI 3080. Various neural net architectures, theory, and applications, including models such as Perceptron, back propagation, Kohonen, ART, and associative memory. Learning and conditioning methods also studied.

**5900 (590) Selected Topics in Computer Science.** Three credits. Prerequisite: CSCI 2170. Advanced topics in computer science to be selected and announced at time of class scheduling. May be repeated for up to six credits total.

**6100 (610) Analysis of Algorithms.** Three credits. Prerequisites: CSCI 3110 and 3080 or consent of instructor. Topics include the analysis and design of algorithms; efficiency of algorithms; design approaches including divide and conquer, dynamic programming, the greedy approach and backtracking; P and NP; and algorithms in many areas of computing.

**6130 (613) Selected Topics in Parallel Processing.** Three credits. Prerequisites: Solid foundation in architecture and operating systems equivalent to CSCI 3130 and 3250. An in-depth investigation of one or more topics in parallel processing. Topic(s) to be selected by the professor. Possible topics include parallel algorithms, parallel programming languages, parallel programming tools, parallel software engineering, parallel architectures, parallel applications, and parallel VLSI. Repeatable up to 6 hours.

**6180 (618) Software Design and Development.** Three credits. Prerequisite: CSCI 2170. State-of-the-art techniques in software design and development; provides a means for students to apply the techniques.

**6190 (619) Theory of Compilers.** Three credits. Prerequisite: CSCI 4160/5160. Theory of parsing methods as well as symbol table construction, code optimization, run time storage management, and implementation of recursion.

**6250 (625) Advanced Operating Systems.** Three credits. Prerequisite: CSCI 3250. Topics include concurrent processes, name management, resource allocation, protection, advanced computer architecture, and operating systems implementation.

**6260 (626) Advanced Computer Graphics.** Three credits. Prerequisite: CSCI 4250/5250. Topics include three-dimensional curves and surfaces, projections, hidden line and surface elimination, raster graphics systems, and shading techniques.

**6300 (630) Networks.** Three credits. Prerequisite: CSCI 3250 or consent of instructor. Computer communications, network architectures, protocol hierarchies, and the open systems interconnection model. Modeling, analysis, and specification of hardware and software on a computer network. Wide area networks and local area networks including rings, buses, and contention networks.

**6350 (635) Selected Topics in Artificial Intelligence.** Three credits. Prerequisite: CSCI 3110 or equivalent. In-depth study of the principal areas of the field: artificial intelligence programming, problem-solving methods, knowledge representation methods, deduction and reasoning, and applications such as natural language processing and expert systems. Repeatable up to 6 hours.

**6450 (645) Operating System Design.** Three credits. Prerequisite: CSCI 6250. Definition, design, and implementation of a significant operating system proven from such areas as file systems, process management, memory management, time sharing, input/output device management, and user interface.

**6550 (655) Introduction to Symbolic and Algebraic Manipulation.** Three credits. Prerequisite: CSCI 3110. Techniques for algebraic manipulation on the computer. Includes symbolic differentiation and integration, extended precision arithmetic, polynomial manipulation; introduces one or more symbolic manipulation systems. Automatic theorem provers considered.

**6560 (656) Selected Topics in Database.** Three credits. Prerequisite: CSCI 5560. An in-depth investigation of one or more topics in database. Topic(s) to be selected by the professor. Possible topics include object-oriented database systems, distributed database systems, client-server database systems, deductive databases, multimedia databases, and database theory (concurrency, query optimization, recovery, security). May be taken twice for credit.

**6600 (660) Selected Topics in Computer Science.** Three credits. May be repeated for up to six credits total. Prerequisites: A solid foundation in undergraduate computer science and any prerequisites determined by the instructor. An in-depth investigation of one or more topics in computer science. Topic(s) to be selected by the professor. Possible topics include search techniques, e.g. genetic algorithms, soft computing, object-oriented software engineering, expert systems, program verification, software quality, knowledge discovery in data bases, and design of embedded software systems.

**6620 (662) Research Methods in Computer Science.** Three credits. Prerequisite: Nine hours of graduate work in computer science. Research tools used in computer science examined. Student will select a research problem with approval of the instructor, review pertinent literature, and produce a report using the manual of thesis writing currently approved by the College of Graduate Studies.

**6640 (664) Thesis Research.** One to six credits. Selection of a research problem, review of pertinent literature, collection and analysis of data, and composition of thesis. Once enrolled, student should register for at least one credit hour of master's research each semester until completion. S/U grading.