

DEPARTMENT OF COMPUTER SCIENCE

 Dr. Loretta A. Moore, Associate Professor and Chair

P. O. Box 18839
 Telephone: (601) 979-2105
 Fax: (601) 979-2478
 e-mail: loretta.a.moore@jsums.edu

Faculty

- Dr. C. Bland, Assistant Professor
- Dr. W. Brown, Associate Professor
- Dr. T. Haile, Associate Professor
- Dr. S. Hong, Assistant Professor
- Dr. H. Kettani, Assistant Professor
- Dr. H. Kim, Assistant Professor
- Dr. X. Liang, Assistant Professor
- Dr. Q. Malluhi, Professor
- Dr. T. Pei, Assistant Professor

The Department of Computer Science offers the Master of Science in Computer Science. The curriculum can be geared to 1) provide training for those preparing to enter fields where a substantial working knowledge of computing is required, 2) provide additional training to people already working in the field, and/or 3) prepare students for study at the doctoral level.

Program Objectives

1. To afford students the opportunity for in-depth study of Computer Science concepts and theories.
2. To keep abreast of, and expose students to, state-of-the-art, as well as state-of-the-practice, computer applications and technologies.
3. To engage faculty and students in meaningful computer science research, and computer science applications research and development.
4. To promote professional development and growth of students and faculty.

Admission Requirements

In addition to satisfying the university requirements to enter the graduate school, students must meet other specific requirements in order to be formally admitted to the Department of Computer Science program. Ideally, students will have a B.S. in Computer Science, or a related field, and at least the equivalent of the following courses:

- CSC 118 Programming Fundamentals
- CSCL 118 Programming Fundamentals Lab
- CSC 119 Object-Oriented Programming
- CSCL 119 Object-Oriented Programming Lab
- CSC 216 Computer Architecture and Organization
- CSC 216L Computer Architecture and Organization Lab
- CSC 225 Discrete Structures

- CSC 228 Data Structures and Algorithms
- CSC 228L Data Structures and Algorithms Lab
- CSC 312 Advanced Computer Architecture
- CSC 325 Operating Systems
- BIO 111 General Biology
- CHEM 141 General Chemistry
- MATH 231 Calculus I
- MATH 232 Calculus II
- MATH 355 Probability and Statistics
- PHY 211 General Physics I
- PHY 212 General Physics II

Students who do not have the required background may be admitted as special students. These students must take specified courses to make up deficiencies and no credit toward the degree is awarded for courses prescribed to satisfy entrance requirements.

Degree Requirements

The Department offers courses on a semester basis. Thirty-six credit hours are required for a master's degree. All students are required to pass the departmental Graduate Comprehensive Examination. A thesis or project option may be chosen.

Areas of Emphasis

- | | |
|---------------------------------|-------------------------|
| Software Engineering | Artificial Intelligence |
| Computer Architecture | Numerical Analysis |
| Parallel/Distributed Processing | Simulation |
| Database Management Systems | Operating Systems |
| Programming Languages | Information Systems |

Core Courses

Course	Title	Semester Hours
CSC 512	Computer Architecture	3
CSC 515	Data Structures and Algorithm Analysis	3
CSC 518	Operating Systems	3
CSC 519	Principles of Programming Languages	3
	<i>Total Hours</i>	12

Major Courses

(Students must choose four major courses for a total of 12 hours)

CSC 520	Database Systems	3
CSC 524	Comp. Com. Netwks and Distrib. Processing	3
CSC 529	Compiler Construction	3
CSC 530	Theory of Computation	3
CSC 532	Numerical Methods	3
CSC 535	Information Systems Analysis and Design	3
CSC 545	Artificial Intelligence	3
CSC 560	Software Engineering	3

ELECTIVES

(Students must choose two electives)	6
OPTION A: THESIS	6
OPTION B: PROJECT	3
ONE ADDITIONAL COURSE	3
TOTAL REQUIRED FOR DEGREE:	
(either option)	36

DESCRIPTION OF COURSES

CSC 505 Computer Mathematics. (3 Hours) Elements of set theory, functions and relations nondecimal numbers, data representation, boolean algebra. Review of elementary differential and integral calculus with applications to the problems in computer science.

CSC 508 Legal and Economic Issues in Computing. (3 Hours) A presentation of the interactions between users of computers and the law and a consideration of the economic impacts of computers. Includes discussion of computer crime, privacy, electronic fund transfer, and automation.

CSC 509 Computers and Society. (3 Hours) History of computing and technology; place of computers in modern society; the computer and individual; survey of computer applications, legal issues; computers in decision making processes; the computer scientist as a professional; futurist's view of computing; public perception of computers and computer scientists.

CSC 511 Object-Oriented Programming. (3 Hours) Discussion of object-oriented languages. Object-Oriented techniques using the C++ language, classes, objects, constructors, destructors, friend functions, operator overloading, inheritance, multiple inheritance, and polymorphism. Reusability is emphasized.

CSC 512 Computer Architecture. (3 Hours) An advanced introduction to computer design and architecture. Topics include instruction set architecture, RISC computers, control unit design, pipelining, vector processing, memory system architecture, and classification of computers.

CSC 514 Statistical Methods for Research Workers. (3 Hours) Estimation and tests of hypotheses; regression and correlation; analysis of variance; non-parametric statistics; chi-square. SAS programming for data analysis.

CSC 515 Data Structures and Algorithm Analysis. (3 Hours) Mathematical foundations for complexity theory, asymptotic notation, recurrence relations. Strategies for development of algorithms like divide and conquer, greedy, dynamic programming, backtracking. Exposure to some typical and important algorithms in computer science. Introduction to the theory of NP-completeness

CSC 518 Operating Systems. (3 Hours) Emphasizes the concepts of process communication and

synchronization, protection, performance measurement, and evaluation. Problems associated with mutual exclusion and synchronization, concurrent processes, information, process, device, and memory management are examined. Implementation of I/O and interrupt structure is also considered.

CSC 519 Principles of Programming Languages. (3 Hours) Important programming language concepts including, representation of data and sequence control, data abstraction and encapsulation; procedural and non-procedural paradigms: functional, logic, and object-oriented languages; distributed and parallel programming issues.

CSC 520 Data Base Management Systems. (3 Hours) Introduction to data base concepts including data independence; relations; logical and physical organizations; schema and subschema. Hierarchical, network, and relational models with description of logical and physical data structure representation of the database system. Normalization: first, second, and third normal forms of data relations. Relational algebra and relational calculus; data structures for establishing relations; query functions.

CSC 521 Linear Algebra and Finite Mathematics. (3 Hours) Matrices and determinants; ranks of matrix; inverse of matrix; solving systems of linear equations; bases of a vector space; probability; permutations and combinations; Gaussian vector space; probability; elimination, Gauss-Seidel iteration.

CSC 523 Probability and Statistical Inference. (3 Hours) Elements of probability; combinatorial methods; discrete and continuous distributions; cumulative distribution functions; moment generating functions; distribution associated with normal distributions derived distributions.

CSC 524 Computer Networks and Distributed Processing. (3 Hours) Topologies, media selection, medium access control for local area networks (LANs) including highspeed and bridged LANs; circuit switched, ISDN wide area networks (WANs) internetworking issues and standards, 150/051, TCP/IP protocols.

CSC 526 Automata Theory. (3 Hours) Definition and representation of finite state automata and sequential machines. Equivalence of states and machines, congruence, reduced machines, and analysis and synthesis of machines. Decision problems of finite automata, partitions with the substitution property, generalized and complete machines, probabilistic automata, and other topics.

CSC 527 Real-Time Systems. (3 Hours) An introduction to the problems, concepts, and techniques involved in computer systems which must interface with external devices. These include process control systems, computer systems embedded within aircraft or automobiles, and graphics systems. The course concentrates on operating system software for these systems.

CSC 529 Compiler Construction. (3 Hours) An introduction to the major methods used in compiler implementation. The parsing methods of LL(k) and LR(k) are covered as well as finite state methods for lexical analysis, symbol table construction, internal forms for a program, run time storage management for block structured languages, and an introduction to code optimization.

CSC 530 Theory of Computation. (3 Hours) A survey of formal models for computation. Includes Turing Machines, partial recursive functions, recursive and recursively enumerable sets, abstract complexity theory, program schemes, and concrete complexity.

CSC 531 Computer Simulation Methods and Models. (3 Hours) A study and construction of discrete-system simulation models. Use of discrete-system simulation language (GPSS/H), advance programming techniques, random number generation, generation of various random variate, and statistical validation procedure.

CSC 532 Numerical Methods. (3 Hours) Applying principles and techniques for computing methods. Solution of linear and nonlinear equations. Matrix methods for systems of equations. Polynomial approximation. Numerical integration. Solution of ordinary differential equations using various methods.

CSC 533 Distributed Database System. (3 Hours) Prerequisites: CSC 520, 524. A consideration of the problems and opportunities inherent in distributed database on a networked computer system. Includes file allocation; directory systems; deadlock detection and prevention; synchronization; query optimization; and fault tolerance.

CSC 535 Information System Analysis and Design. (3 Hours) Prerequisite: 519. A practical guide to information systems programming and design. Theories relating to module design, coupling, and module strength are discussed. Techniques for reducing a system's complexity are emphasized. The topics are oriented toward the experienced programmer or systems analyst.

CSC 539 Special Topics in Computer Science. (Variable 1-9 Hours) Prerequisite: Consent of instructor. Topics and problems of information systems that are of practical importance and current interest. New developments in system concepts, techniques, and equipment.

CSC 540 Microcomputer Local Area Networks. (3 Hours) Prerequisites: 518. This course describes various criteria for selecting and implementing local area networks (LANs) consisting of microcomputers.

CSC 545 Artificial Intelligence. (3 Hours) Efficient and intelligent search techniques. Knowledge representation e.g., logic, and semantic nets. Reasoning techniques including reasoning under uncertainty, e.g., fuzzy reasoning. Exposure to different artificial intelligence systems like planning and learning (including neural networks).

CSC 549 Applied Combinatorics and Graph Theory. (3 Hours) A study of combinatorial and graphical techniques for complexity analysis including generating functions, recurrence relations, Polyal's theory of counting, planar directed graphs, and NP-complete problems. Applications of the techniques to the analysis of algorithms in graph theory, sorting, and searching.

CSC 555 Information Storage and Retrieval: (3 Hours) Advanced data structures, databases, and processing systems for access and maintenance. For explicitly structured data, interactions among these structures, access patterns and design of processing/access systems. Data administration, processing system life cycle, system security.

CSC 560 Software Engineering: (3 Hours) Formal approach to techniques and software design and development. Software cycle encompassed from initial ideas through code design and implementation with emphasis on object-oriented design techniques will be included. Software testing and maintenance will be discussed.

CSC 595 Information Systems Development Project: (Variable 1-6 Hours) Prerequisites: Pass comprehensive examination and consent of advisor. Provide the student with the experience in analyzing, designing, implementing, and evaluating information systems. Students are assigned one or more system development projects. The project involves part or all of the system development cycle.

CSC 599 Thesis Research. (Variable 1-6 Hours) Prerequisites: Pass comprehensive examination and consent of advisor. An independent study course for the preparation of a Master's thesis.