

distributed systems; distributed and parallel systems and services; resolution in simulation; modeling and abstraction in multilevel simulation; distributed simulation consideration; implementation of actual network simulation and modeling project.

CPE 673 Wireless Internet Applications Development. (3 Hours) Course focuses on the Wireless Application Protocol (WAP) and the Wireless Markup Language (WML), Microsoft Mobile .Net framework, Java Server Pages, Active Server Pages, CGI, and related protocols; attention is directed to development of applications using both thin and thick client models; course is composed of development of applications using both simulators and actual application servers and wireless devices such as WAP enabled Telephones, PDAs, and personal communication devices.

CPE 693 Advanced Topics in Engineering. (Variable 1 to 4 Hours) Graduate standing in engineering. Lectures on advanced topics of special interest to students in various areas of computer engineering are introduced. This course number is used to offer and test new courses.

CPE 695 Scientific Writing Seminar. (1 Hour) Exercises in scientific writing format and style, with particular emphasis on writing abstracts and manuscripts for publication in referred archival journals.

CPE 696 Seminar. (1 Hour) Presentation of papers, projects and reports by visiting lecturers, graduate students, engineers, and community leaders.

CPE 697 Internship. (Variable 1-3 Hours) Supervised graduate internship or externship in selected areas. Prerequisite: permission of Department.

CPE 698 Independent Study. (Variable 1-4 Hours) Intensive study of a special engineering project including research and literature review selected in accordance with the student's interests and arranged in consultations with the advisor. Topics will vary. Student will make periodic reports as well as a paper at the end of the semester. Prerequisite: permission of Department.

CPE 699 Thesis Research. (Variable 1-6 hrs) Master's thesis representing independent and original research. Prerequisite: permission of advisor.

DEPARTMENT OF COMPUTER SCIENCE

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Faculty

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Dr. S. Hong, Assistant Professor
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Dr. X. Liang, Associate Professor
Dr. N. Meghanathan, Assistant Professor
Dr. T. Pei, Associate Professor
Dr. M. Watts, 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 325	Operating Systems
EN 212	Digital Logic
ENL 212	Digital Logic Laboratory
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	Semester
Course Title	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
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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.

SCHOOL OF SCIENCE AND TECHNOLOGY

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Departments

- ◆ Biology
- ◆ Chemistry and Biochemistry
- ◆ Mathematics
- ◆ Physics, Atmospheric Sciences and Geoscience
- ◆ Technology

The School of Science and Technology resulted from the merger of the School of Industrial and Technical Studies and the Division of Natural Sciences, previously in the School of Liberal Studies. This reorganization was authorized July 1, 1983 for the purpose of consolidating the scientific and technical resources of the University into an efficiently focused endeavor capable of meeting the demands of new technology.

The departments comprising the School of Science and Technology are: (1) Department of Biology, (2) Department of Chemistry and Biochemistry, (3) Department of Mathematics, 4) Department of Physics, Atmospheric Science and General Science, and (5) Department of Technology. The school offers graduate programs in various areas leading to the M.S., M.S.T., and Ph. D. degrees.

Active research programs in all departments are consistently maintained. The School of Science and Technology is also actively involved in a number of cooperative external programs with national and international institutions designed to enhance student and faculty development. The cooperative programs serve to broaden faculty and student exposure as well as give national and international visibility to Jackson State University.