MASTER’S EXAMINATION

The comprehensive examination is normally taken in the last semester of a student’s program. The purpose of the Master’s Examination is to ensure that students awarded an Alabama A&M M.S. degree in computer science possesses a working knowledge of the subject matter of the core courses in the curriculum. Selected members of the Computer Science Department faculty are responsible for the content of the Master’s Examination.

PROGRAM OF STUDY

The program of study for the Master of Science degree is designed in consultation with the student’s advisor. The 36 credits of required course work divide into the following components listed below.

GRADUATE COURSES

**Foundation courses:**
- CMP 501 – Organization of Digital Computers
- CMP 503 – UNIX and ‘C’ Programming
- CMP 505 – Applications of Discrete Structures
- CMP 507 – Data Structures and Algorithms using ‘C’
- CMP 509 – Theory of Programming Languages

**Core Courses:**
- CMP 511 – Design and Analysis of Algorithms
- CMP 521 – Object Oriented Programming and Design
- CMP 531 – Computer Architecture
- CMP 541 – Operating System Principles
- CMP 551 – Database Management Systems
- CMP 561 – Software Engineering Methodology

**Elective Courses:**
- CMP 513 – Management Information Systems
- CMP 515 – Numerical Analysis
- CMP 517 – Applications of Statistical Methods
- CMP 523 – Compiler Design
- CMP 525 – Advanced Data Structures
- CMP 543 – Computer Communications
- CMP 550 – Artificial Intelligence
- CMP 554 – Neural Networks
- CMP 555 – Advanced Database Systems
- CMP 562 – Image Processing
- CMP 570 – Computer Graphics and Animation
- CMP 577 – Fuzzy and Expert Systems
- CMP 591 – Cooperative Educational Work Experience
- CMP 593 – Advanced Topics in Computer Science
- CMP 597 – Independent Study
- CMP 599 – Graduate Thesis

Course Descriptions: Master’s Degree

**Foundation Courses:**
- **CMP 501 – Organization of Digital Computers:** Credits 3, Prereq: Completion of all the assigned undergraduate prerequisites with a grade of ‘B’ or higher. Organization of computer systems, logical basis of computer structures, machine representation of instructions, flow of control, basic machine instructions, assembly language programming.
- **CMP 503 – UNIX and ‘C’ Programming:** Credits 3, Prereq: Completion of all the assigned undergraduate prerequisites with a grade of ‘B’ or higher. ‘C’ programming language in its entirety with emphasis on pointers and structures; ‘C’ to ‘C++’ transition; UNIX file systems; shell programming; UNIX system security, communication and administration.
- **CMP 505 – Application of Discrete Structures:** Credits 3, Prereq: Completion of all the assigned undergraduate prerequisites with a grade of ‘B’ or higher. Sets, relations, functions, concepts of cardinality, prepositional logic and applications, predicate logic, induction and recursion, graphs and trees, elements of groups, and Boolean algebra.

**The Thesis Option**

Successful completion of a master’s degree thesis requires adequate preparation, sufficient time, original research, and a high degree of independence. The faculty grants approval for the most qualified and well-prepared students to pursue the thesis option. An approved thesis program consists of 30 credits of course work and six credits for the thesis work. The student must pass a final oral examination, which includes a defense of the thesis.

The UNIVERSITY

Alabama A&M University is a coeducational, comprehensive public university with highly diverse curricula for undergraduate and selected graduate fields. The University provides baccalaureate and graduate studies that are compatible with the times to all qualified, capable individuals who are interested in further developing their technical, professional, and scholastic skills and competencies. The University is located in Huntsville in the northern part of the State of Alabama. The university atmosphere is residential.

Admission

Applicants for admission should hold a bachelor’s degree in computer science or related areas such as mathematics, physics, or electrical engineering. All applicants must pass the GRE with a minimum of 500 in the quantitative part. International students must submit evidence of a minimum score of 550 on TOEFL with their application. All the application material should be sent to:

School of Graduate Studies
Alabama A&M University
Normal, AL 35762
Core Courses:

CMP 511 – Design and Analysis of Algorithms: Credits 3, Prereq: CMP 507. Introduction and illustration of basic techniques for designing efficient algorithms and analyzing algorithm complexity. Topics will be chosen from graph algorithms, sorting and searching, NP-complete problems, pattern matching, parallel algorithms, and dynamic programming.

CMP 521 – Object Oriented Programming and Design: Credits 3, Prereq: CMP 507, CMP 509. Concepts include object modeling, dynamic modeling, functional modeling, analysis, system design, and object design methodologies. Introduction to various object-oriented design methodologies including the Unified Modeling Language.

CMP 531 – Computer Architecture: Credits 3, Prereq: CMP 501, CMP 505. Introduction to computer architecture and system organization including virtual memory supports, cache, pipeline, vector processing, multiprocessor, and RISC architecture. Study and compare typical architectures to the extent that time permits.

CMP 541 – Operating System Principles: Credits 3, Prereq: CMP 501, CMP 507. Examines process synchronization, I/O techniques, buffering, file systems, processor scheduling, deadlocks, memory management, virtual memory, job scheduling, resource allocation, system modeling, operating system security, performance measurement and evaluation.


Core Courses (Cont’d.):

CMP 561 – Software Engineering Methodology: Credits 3, Prereq: CMP 507. Explores the traditional approach to software construction, software crisis, and software characteristics. Covers various software engineering paradigms, and the fundamental concepts of analysis, design, coding, testing and maintenance. Introduces various CASE tools.

Elective Courses:

CMP 513 – Management Information Systems: Credits 3, Prereq: CMP 501. Analysis of information requirements, design approaches, processing methods, data management, and the role of computers in management information systems. Topics include models of an integrated system, and organization and social implications of information technology.


CMP 517 – Applications of Statistical Methods: Credits 3, Prereq: MTH 203. Treatment of data, probability distributions, sampling techniques, normal distribution, hypothesis testing, linear and multiple regression, correlation, analysis of variance, time series, index numbers, and parametric tests.

CMP 523 – Compiler Design: Credits 3, Prereq: CMP 507. Covers the basic mathematical theory underlying the design of compilers and other language processors and provides instruction on how to use that theory in practical design situations. Topics include: lexical analysis, parsing, syntax-directed translation, code optimization, and code generation.

CMP 525 – Advanced Data Structures: Credits 3, Prereq: CMP 521. Development of the efficient data structures used to produce more efficient solutions to classical problems, such as those based on the graph theoretical model, as well as to problems that arise in application areas of contemporary interest.


CMP 550 – Artificial Intelligence: Credits 3, Prereq: CMP 503, CMP 505. Covers the formal concepts of artificial intelligence. Heuristic versus algorithmic methods, cognitive processes and simulation, artificial application programming techniques, and surveying the areas of game playing, vision, learning and natural language understanding. Students are provided direction for research using Internet and open literature resources.

Elective Courses (Cont’d.):

CMP 554 – Neural Networks: Credits 3, Prereq: CMP 503. Covers topics including introduction to natural networks, supervised and unsupervised learning, neural network architectures, training algorithms, black board architecture, and other general concepts.

CMP 554 – Advanced Database Systems: Credits 3, Prereq: CMP 535, CMP 553. Advanced database systems including the areas of distributed and object oriented database design, resource allocation, access plan selection, security measures, transaction management, and query optimization.

CMP 562 – Image Processing: Credits 3, Prereq: CMP 503, 505, MTH 203. General concept of image processing, sensing, sampling and quantization, image segmentation and edge detection, image sequence analysis, image enhancement and restoration, image understanding systems, applications of mathematical morphology.

CMP 576 – Computer Graphics and Animation: Credits 3, Prereq: CMP 503, CMP 505. Provides introduction to the basic concepts of computer science. Topics include: display device characteristics, system considerations, raster vs. vector technology, line patterns, line drawing algorithms, image rendering, 2-D and 3-D modeling, and symmetry groups.

CMP 577 – Fuzzy and Expert Systems: Credits 3, Prereq: CMP 500. This course is designed to familiarize the students with the theoretical and applications of fuzzy systems. Topics may include: fuzzy set theory, approximate theory, fuzzy control, decision making under fuzzy environment, fuzzy operations research.

CMP 591 - Cooperative Educational Work Experience: Credits 3, Prereq: Completion of all the core courses. This course is designed to provide students with applied hands-on experience in an industry (computer related) environment. The student should have the advisor’s approval prior to taking this course and should submit a report and defend before a departmental committee. Submission of a copy of the three-credit-hour equivalent certificate to the graduate office upon completion of the course is required.

CMP 593 - Advanced Topics in Computer Science: Credits 3, Prereq: Varies depending upon topic and consent of instructor. Topics of mutual interest to faculty and students and not currently available in the graduate program.

CMP 597 - Independent Study: Credits 3, Prereq: Completion of core courses and approval of a faculty supervisor. This course is designed to provide opportunity for the student to participate in the ongoing research in the department. The student will work in close interaction with the professor of mutual research interest. The student is required to present at least one research paper in a reputed conference and should be evaluated by a departmental committee of three members formed by the chairperson.

CMP 599 - Graduate Thesis: Credits 1, 2, or 3. Individual research towards completing the thesis requirement for M.S. degree in Computer Science. Prereq: Graduate school requirements.