

M.S.I.S. - Computer Science

36-Hour Program

The Master of Science in Interdisciplinary Studies (MSIS) with concentration in Computer Science (CS) requires a total of 36 semester hours of graduate credit. A total of 18 graduate semester credit hours must be taken in Computer Science. Additional 18 hours must be taken in two or more supporting fields outside the area of concentration which must include ISCI 7300 and ISCI 7301.

Admission Requirements

Evidence of academic achievement and potential for advanced study and research is required for graduate admission. Specific criteria for Unconditional Admission for Master's degree seeking students in Biology are:

- Undergraduate GPA of 3.0
- GRE Verbal score of 400
- GRE Quantitative score of 500
- A personal statement from the applicant explaining why he/she wishes to pursue graduate study in computer science including professional and personal goals, this letter should include the area of interest, and a short list of preferred faculty research supervisors
- Each entering graduate student will take a diagnostic evaluation conducted by the Computer Science Graduate Coordinator. The evaluation will serve to identify areas that must be strengthened by the student with remedial courses and to identify the possible tracks of specialization that may be of interested to the student.

Applicants with an undergraduate GPA of at least 2.5 and/or GRE scores lower than those specified are also encouraged to apply.

Notification of decisions on graduate admission is made by the office of Graduate Studies based on the admission criteria and recommendation of the academic department. Information related to application procedures and deadlines is available through the Office of Graduate Studies.

Required Courses: 36 hours

Area of Concentration	Credit Hours
Computer Science	18
Two or more supporting fields..... (must include ISCI 7300 and ISCI 7301)	18
Total Graduate Hours for degree	36

Thesis

As part of their graduate curriculum, students must take ISCI 7300 and ISCI 7301 leading to the completion of the thesis. At the appropriate time in their graduate study, students will select a thesis committee in order to approve a topic and to assist in the preparation of the thesis. The thesis committee will be composed of at least three graduate faculty, one of them will be appointed as the chairperson. Co-chairs are possible in case of co-supervision of an interdisciplinary project. Students must pass an oral defense of the completed thesis. The thesis needs not consist solely of a written research paper; software, analytical, practical performance, or other appropriate projects may also be considered. It is expected that the student will choose a topic that appropriately integrates aspects of the discipline of Computer Science and the supporting fields.

Supporting Fields

Arts, Business Administration*, Criminal Justice, Education*, English, Environmental Sciences, Geography, Geology, Government, History, Interdisciplinary Science, Interpreting, Mathematics, Physics, Psychology, Sociology, and Spanish. A total of 18 graduate semester hours in addition to ISCI 7300 and ISCI 7301 must be taken from two or more supporting fields outside Computer Science. The selection of supporting fields must be determined through consultation with the Faculty Advisor. The use of Mathematics as supporting area is strongly encouraged; however, because of the broad application nature of Computer Science, any approved MSIS field can be a supporting field for the MSIS with concentration in Computer Science.

*No more than 12 semester hours total may be taken from the professional schools.

Curriculum of Study

Graduate Computer Science Courses

Students are required to take 18 hours of graduate course in Computer Science (above 5000) that may be chosen from the following:

COSC 5313	Computer Networks
COSC 5315	Advanced Computer Networks
COSC 5333	Digital Image Processing
COSC 5335	Computer Vision
COSC 5342	Database Management Systems
COSC 5343	Data Mining
COSC 5349	Computer Architecture
COSC 5350	Artificial Intelligence
COSC 5345	Advanced Algorithm Analysis
COSC 5347	Advanced Software Engineering
COSC 5355	Expert Systems
COSC 5361	Computability Theory
COSC 5362	Complexity Theory



ADVISOR

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Tracks of Specialization

M.S.I.S. in Computer Science - Computer Networking

Students may declare this track of specialization by choosing 9 semester credit hours (out of the 18 total hours in Computer Science) from the following:

COSC 5313	Computer Networks
COSC 5315	Advanced Computer Networks
COSC 5349	Computer Architecture
COSC 5342	Database Management Systems

M.S.I.S. in Computer Science - Intelligent Systems

Students may declare this track of specialization by choosing 9 semester credit hours (out of the 18 total hours in Computer Science) from the following:

COSC 5333	Digital Image Processing
COSC 5342	Database Management Systems
COSC 5335	Computer Vision
COSC 5343	Data Mining
COSC 5350	Artificial Intelligence
COSC 5355	Expert Systems

M.S.I.S. in Computer Science-Computer Information Systems

Students may take 9 semester credit hours from the following courses (out of the 18 CS required total hours) to declare this specialization track:

COSC 5316	E-Commerce
COSC 5332	Human Computer Interfaces
COSC 5342	Database Management Systems
COSC 5343	Data Mining
COSC 5350	Artificial Intelligence
COSC 5355	Expert Systems

with. Students are given relevant projects to support the theoretical aspects learned in class. Prerequisites: Admission to MSIS or MS Program. Lec. 3, Cr. 3.

COSC 5313 Computer Networks

Computer networks are presented via seven distinct layers: physical, data link, network, transport, session, presentation, and application layer. Hardware and protocols used at different layers and in different networks are studied in detail. Different existing networks are studied as examples in every layer. Prerequisite: COSC 3330 or departmental consent. Lec 3, Cr. 3

COSC 5315 Advanced Computer Networks

The design of networks and their performance will be covered in this course. Modern Networks such as ATM and Gigabit Ethernet network will also be studied. Other topics that will be studied are cryptology, network programming, and secure channels. Prerequisite: COSC 3330, COSCU 2317. Lec. 3, Cr. 3.

COSC 5321 E-Commerce

This course introduces the technologies used in building e-commerce applications including e-commerce scalable architecture design, Internet infrastructure, administration, electronic payment systems, e-business relationships, mobile commerce (mCommerce), and business-to-business (B2B) marketplace design, strategies and models. Prerequisite: COSC 2316 and COSC 330 or consent of the instructor. Lec. 3, Cr. 3.

COSC 5330 Computer Graphics

The student is familiarized with structured graphical objects. The algorithms for transforming, clipping, and projecting objects are put into practice through several projects. Hidden line/surface removal, shading/lighting models, and the problem of aliasing are studied. Prerequisite: COSC 3345 or consent of instructor. Lec. 3, Cr3.

COSC 5332 Human Computer Interfaces

Simple and compound classes, page and page selector classes, animation and pop up classes, configuration and deriving of new objects, application interface, overall design, and machine dependencies are studied. Application-oriented graphical user interfaces are built. Prerequisite: COSC 2336 or consent of the instructor. Lec.3, Cr. 3

COSC 5333 Digital Imaging Processing

This course covers the basic techniques used in acquiring, processing, and displaying of digital images and video. Topics include image acquisition, spatial and frequency domain representation, image filtering, image compression, image analysis, morphological image processing and image understanding. Efficient implementation of image processing algorithms in a structured computer language is emphasized. Prerequisite: MATH 2314 and COSC 2336 or departmental consent. Lec. 3, Cr. 3

COSC 5335 Computer Vision

This course covers the fundamental and advanced ideas of

Careers:

- Software/Applications Engineers
- Computer Science/Technology Teachers
- Project Managers

Course Descriptions

COSC 5300 Compiler Construction

Different phases of compiler construction are studied: lexical, syntax, semantics and code generation. Projects leading to the complete construction of a compiler for a mini-set of a language are given. Prerequisite: COSC 3345, COSC 3355 and COSC 2325 or consent of instructor.

COSC 5310 Operating Systems

The student is familiarized with the services common to most operating systems. Issues in CPU scheduling, concurrent processes, deadlocks, memory management, file management, and distributed systems are dealt

developing computerized procedures to extract numeric and symbolic information from images. Key ideas include image formation, acquisition, calibration, object recognition, video understanding, stereo imaging, optical flow and classification methods. System implementation and applications in communications, medicine, robotics and manufacturing are introduced. Prerequisite: COSC 4333; MATH 2313. Lec. 3, Cr. 3

COSC 5342 Database Management Systems

Data abstraction and models, entity-relationship model, relational model, formal and commercial query languages, network and hierarchical data models, relational database design, file and system structure; indexing and hashing, query processing, and concurrency control are studied. Prerequisite: At least a C in both COSC 3345 and COSC 3330 or departmental consent. Lec. 3, Cr. 3.

COSC 5343 Data mining

This course gives the fundamentals of applying artificial intelligence techniques for analysis, learning and prediction of information using data extracted from databases. Topics include data mining system architecture, data preprocessing, pattern recognition, attribute relevance analysis, class discrimination, rule association, correlation analysis, classification, prediction, cluster analysis and query languages. Prerequisite: At least a C in the following courses COSC 3330, MATH 2342 and MATH 3373. Lec. 3, Cr. 3.

COSC 5345 Advanced Algorithm Analysis

Both basic and advanced techniques of algorithm design and analysis are introduced. Algorithms with real applications are thoroughly studied. The notion of NP-complete problems and design and analysis techniques for approximation and randomized algorithms are also introduced. Prerequisite: At least a C in COSC 3345 or consent of the instructor.

COSC 5346 Software Engineering

The scope of systems analysis, systems investigation and analysis, input and output design, storage devices, file organization, sorting and merging, factors affecting file design, system design, the program specifications, design strategy, and financial applications are studied. Prerequisites: Admission to MSIS or MS Program. Lec. 3, Cr. 3.

COSC 5347 Advanced Software Engineering

This course is an in-depth study of advanced software engineering principles. Key areas include project management, team building, team organization, cost estimation, scheduling, description and evaluation of software architecture design, object-oriented design methodologies, and refactoring. Practical aspects of software are also discussed including testing, maintenance, safety, security, quality assurance, and reliability. Students must participate in group projects and case studies. Prerequisite: COSC 4346 or consent of instructor.

COSC 5349 Computer Architecture

Classical and modern computer architectures will be studied in this course. Techniques such as microprogramming and counter-decoder methods will be included. Other topics that will be studied include parallel computing

architectures, their performance and programming. Prerequisite: COSC 3325. Lec. 3, Cr. 3.

COSC 5350 Artificial Intelligence

This course discussed the theoretical and practical foundations of artificial intelligence. Principles in reasoning, perception, deduction, planning, learning, knowledge representation and problem resolution are some of the areas covered. Prerequisite: At least a C in COSC 3345 or departmental approval. Lec. 3, Cr. 3.

COSC 5355 Expert Systems

This course covers the theoretical and practical principles of modern expert systems construction. Topics include logic and reasoning, knowledge representation, rule-based reasoning, inexact reasoning, ontologies, and knowledge acquisition. Prerequisite: At least a C in COSC 5350. or departmental approval Lec. 3, Cr. 3

COSC 5360 Numerical Methods

The topics include root finding, interpolation and numerical differentiation, polynomial interpolation, estimating derivatives, numerical integration, systems of linear equations, approximation by spline functions, and smoothing of data. Prerequisite: COSC 2336 and MATH 2414 or consent of the instructor. Lec. 3, Cr. 3.

COSC 5361 Computability Theory

This course introduces elements in mathematical foundations of computer science, formal language theory and computability theory. Mathematical foundations of computer science include topics such as set theory, relations and functions, and proof methods. Prerequisite: At least a C in COSC 5345 or consent of instructor.

COSC 5362 Complexity Theory

This course introduces basic concepts, results and techniques in computational complexity theory, and provides a deeper insight of the power of computing using the Turing-machine model. Prerequisite: At least a C in COSC 5361.

COSC 6300 Thesis I

This course constitutes the first part of a student's course work requirement in completing his master thesis; students must take COSC 6300 and COSC 6301 leading to the completion of their thesis. Students must successfully pass an oral defense of the thesis proposal or the software project plan. Prerequisite: Approval of graduate advisor. Lec. 3, Cr. 3.

COSC 6301 Thesis II

This course constitutes the second part of a student's course work requirement in completing his master thesis; students must take COSC 6300 and COSC 6301 leading to the completion of their thesis. Students must successfully pass an oral defense of the thesis proposal or the software project plan. Prerequisite: Approval of graduate advisor. Lec. 3, Cr. 3.