

School of Computing and Information Sciences

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Tao Li, *Assistant Professor*

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Jainendra K. Navlakha, *Professor*

Ana Pasztor, *Professor*

Alexander Pelin, *Associate Professor*

Norman Pestaina, *Instructor*

Nagarajan Prabakar, *Associate Professor*

Raju Rangaswami, *Assistant Professor*

Naphtali Rishe, *Professor*

S. Masoud Sadjadi, *Assistant Professor*

Greg Shaw, *Instructor*

Geoffrey Smith, *Associate Professor*

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Wei Sun, *Associate Professor*

Jill Weiss, *Instructor*

Mark A. Weiss, *Professor*

Chi Zhang, *Assistant Professor*

The School of Computer Science offers both a Masters of Science degree and a Doctor of Philosophy degree. The Master of Science degree provides study in state-of-the-art computer applications as well as an introduction to the theoretical foundations of computer science. The Doctor of Philosophy in Computer Science is designed to provide study in all major areas of computer science while leading to the frontiers of knowledge in a chosen field of concentration.

Master of Science in Computer Science

Admission

The following are in addition to the University's graduate admission requirements.

1. A Bachelor's Degree or equivalent in Computer Science from a regionally accredited institution. A degree in a related field is acceptable if the applicant shows evidence of computer science background suitable for entry into the master's program as judged by the Graduate Committee.

2. 'B' average or better in all course work attempted while registered as an upper-division student in the Bachelor's program, and a GRE general test score of 1000 (verbal and quantitative combined), with a minimum quantitative score of 600.

3. Three letters of recommendation from persons in a position to judge the applicant's potential success in graduate study.

4. International graduate student applicants whose native language is not English are required to submit a score for the Test of English as a Foreign Language (TOEFL) or for the International English Language Testing System (IELTS). A total score of 80 on the iBT TOEFL or 6.3 overall on the IELTS is required.

5. Approval of the Graduate Committee.

Required Courses

1. Required coursework: 15 credits

CEN 5011	Advanced Software Engineering	3
COP 5725	Principles of Database Management Systems	3
COP 5614	Operating Systems	3
COT 5420	Theory of Computation I	3
COT 5xxx	Introduction to Algorithms	3

Required courses must be completed with an average of "B" or higher, and only one course may receive a grade less than "B-".

2. Elective coursework:

a. non-thesis option: 15 credits of elective courses

b. thesis option: 9 credits of elective courses and 6 credits of master's thesis

Elective courses can be selected from Graduate Course Offerings

Thesis Option

CIS 6790	Thesis	6
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After completion of the other required courses, the student must conduct a research thesis. The topic must first be approved by the faculty member who will supervise the research and then by the Thesis Committee. The thesis will be accepted only after being read and approved by a Thesis Committee. An oral defense is required before the Thesis Committee.

Accelerated Master of Science in Computer Science

Admission Requirements

1. Current enrollment in the Bachelor's Degree program in Computer Science at FIU.
2. Completed at least 60 credits of coursework.
3. Current GPA must be 3.3 or higher.
4. GRE general test score of 1000 (verbal and quantitative combined), with as minimum quantitative score of 600.
5. International graduate student applicants whose native language is not English are required to submit a score for the Test of English as a Foreign Language (TOEFL) or for the International English Language Testing System (IELTS). A total score of 80 on the iBT TOEFL or 6.3 overall on the IELTS is required.
6. Three letters of recommendation.
7. Approval of the Graduate Committee.

General Requirements

Completed Bachelor's degree in Computer Science at FIU
Coursework:

Required Courses:

Required courses must be completed with an average of "B" or higher, and only one course may receive a grade less than "B-".

CEN 5011	Advanced Software Engineering
COP 6545	Advanced Database Management

COP 6611	Advanced Operating Systems
COT 5420	Theory of Computation I
COT 6405	Analysis of Algorithms

Elective:

5 courses selected from the SCS Graduate Course Offerings.

Overlap:

Up to 4 courses (12 credits) may be used in satisfying both the Bachelor's and Master's degree requirements.

The courses must be from the following list:

CAP 5602	Introduction to Artificial Intelligence
CEN 5011	Advanced Software Engineering
CEN 5120	Expert Systems
COP 5621	Compiler Construction
COT 5420	Theory of Computation I

Doctor of Philosophy in Computer Science

The requirements for admission to the doctoral program in Computer Science are:

1. A baccalaureate or master's degree in Computer Science, or equivalent degree in a related field as judged by the School's Graduate Committee.

2. A minimum of a 'B' average on all upper division work and acceptable courses in Calculus and Statistics.

3. GRE (general test), score of 1120 (verbal and quantitative combined), with a minimum quantitative score of 650. International graduate student applicants whose native language is not English are required to submit a score for the Test of English as a Foreign Language (TOEFL) or for the International English Language Testing System (IELTS). A total score of 80 on the iBT TOEFL or 6.3 overall on the IELTS is required. GRE must have been taken within the past five years and TOEFL within the past two years.

4. Three letters of recommendation from persons in a position to judge the applicant's potential for advanced graduate study in computer science.

5. Approval of the School of Computer Science Graduate Committee.

A maximum of 36 computer science related graduate semester hours earned elsewhere as part of an earned graduate degree may be transferred to FIU.

Required Courses

All students must complete the following courses and receive a grade of 'B' or higher in each.

CEN 5011	Software Engineering	3
CEN 6501	Distributed Processing	3
COP 5621	Compiler Construction	3
COP 6611	Advanced Operating Systems	3
COP 6727	Advanced Database Systems	3
COT 5420	Theory of Computation I	3
COT 6405	Analysis of Algorithms	3
COT 6421	Theory of Computation II	3

In addition, all students:

1. The student must pass at least six elective courses. In addition, the student must earn at least 24 dissertation credits. In total, 90 credits beyond the bachelor's degree are required.

2. The student must pass the Candidacy Examination, which is an oral examination of the student's knowledge in a broad research area.

3. The student must pass the Preliminary Examination, which is an oral examination of his or her dissertation proposal.

4. The student must write a dissertation on his or her research and successfully defend it orally in the Dissertation Defense.

5. The student must spend at least one academic year in full-time residence. Normally, this will be after passing the Candidacy Examination.

For additional information and for specific rules and regulations relating to the graduate program, please refer to the web site,

(<http://www.cs.fiu.edu/grad>) or write to:

Graduate Program Director
School of Computer Science
Florida International University
University Park
Miami, Florida 33199

Course Descriptions**Definition of Prefixes**

CAP-Computer Applications; CDA-Computer Design/Architecture; CIS-Computer Information Systems; CGS-Computer General Studies; COC-Computer Concepts; COP-Computer Programming; COT-Computing Theory;

CAP 5510C Introduction to Bioinformatics (3).

Introduction to bioinformatics; algorithmic, analytical and predictive tools and techniques; programming and visualization tools; machine learning; pattern discovery; analysis of sequence alignments, phylogeny data, gene expression data, and protein structure. Prerequisites: COP 3530, or equivalent and STA 3033 or equivalent.

CAP 5602 Introduction to Artificial Intelligence (3).

Presents the basic concepts of AI and their applications to game playing, problem solving, automated reasoning, natural language processing and expert systems. Prerequisite: COP 3530.

CDA 6939 Special Topics: Advanced Topics in Computer Architecture (3).

This course deals with selected special topics in computer architecture. Prerequisite: Permission of the instructor.

CEN 5011 Software Engineering (3).

This course deals with the design of large scale computer programs. Included are topics dealing with planning design, implementation, validation, metrics, and the management of such software projects. Prerequisite: CEN 4010.

CEN 5064 Software Design (3).

Study of object-oriented analysis and design of software systems based on the standard design language UML; case studies. Prerequisite: CEN 5011 – Software Engineering.

CEN 5076 Software Testing (3).

Tools and techniques to validate software process artifacts: model validation, software metrics, implementation-based testing, specification-based testing, integration and systems testing. Prerequisites: CEN 4010 or CEN 5011.

CEN 5120 Expert Systems (3).

Introduction to expert systems, knowledge representation techniques and construction of expert systems. A project such as the implementation of an expert system in a high level AI-language is required. Prerequisites: COP 3530 or permission of the instructor.

CEN 6070 Software Verification (3).

Study of formal verification of software systems; verification methods;

verification of sequential and concurrent software systems. Prerequisite: CEN 5011 – Software Engineering.

CEN 6075 Software Specification (3). Study of formal specification in the software development process; specification methods; specification of sequential and concurrent systems. Prerequisite: CEN 5011 – Software Engineering.

CEN 6501 Distributed Processing (3). Study of distributed processing using networking and distributed computing techniques. Investigation of distributed algorithms and models of distributed computing. Prerequisite: Graduate Standing.

CEN 6502 Advanced Topics in Concurrent and Distributed Systems (3). Study of the major aspects of concurrent and distributed systems. Topics include foundations of concurrent computation, languages and tools for concurrent systems, distributed real-time systems, distributed multimedia systems, and concurrent object-oriented systems.

CGS 5166 Introduction to Bioinformatics Tools (2). Introduction to bioinformatics; analytical and predictive tools; practical use of tools for sequence alignments, phylogeny, visualizations, patterns discovery, gene expression analysis, and protein structure. Prerequisites: PCB 6025 or equivalent.

CGS 6834 Programming for the Web (3). Installation and maintenance of servers. Techniques for building secure multimedia interactive web pages. A hands-on project to develop an educational interactive multimedia web site is required. This course is not an elective for Computer Science programs.

CIS 5900 Independent Study (1-10). Individual conferences, assigned readings, and reports on independent investigations. Prerequisite: Permission of the department.

CIS 5910 Project Research (1-6). Advanced undergraduate or master's level research for particular projects. Repeatable. Prerequisite: Permission of the department.

CIS 5931 Special Topics (VAR). A course designed to give groups of students an opportunity to pursue special studies not otherwise offered.

CIS 6612 Special Topics: Advanced Topics in Software Engineering (3). This course deals with selected topics in software engineering. Prerequisite: Permission of the instructor.

CIS 6900 Independent Study (1-10). Individual conferences, assigned readings, and reports on independent investigations. Prerequisite: Permission of department.

CIS 6931 Special Topics: Advanced Topics in Information Processing (3). This course deals with selected special topics in information processing. Prerequisite: Permission of the instructor.

CIS 6970 Thesis (1-10). Prerequisite: Completion of all other requirements for the M.S. Degree in Computer Science.

CIS 7910 Graduate Research (1-25). Doctoral research prior to candidacy. Repeatable. Prerequisite: Permission of the department.

CIS 7980 Ph.D. Dissertation (1-10). Prerequisite: Permission of Major Professor and Doctoral Candidacy.

COP 5577 Principles of Data Mining (3). Introduction to data mining concepts, knowledge representation, and algorithms and techniques including decision trees, association rules, classification rules, clustering, etc. Prerequisite: COP 4540.

COP 5614 Operating Systems (3). Operating systems design principles, algorithms and implementation techniques: process and memory management, disk and I/O systems, communications and security.

COP 5621 Compiler Construction (3). Basic techniques of compilation; scanning; grammars and LL and LR parsing, code generation; symbol table management; optimization. Prerequisites: MAD 3512 and CEN 4010.

COP 5725 Principles of Database Management Systems (3). Overview of Database Systems, Relational Model, Relational Algebra and Relational Calculus; SQL; Database Applications; Storage and Indexing; Query Evaluation; Transaction Management. Selected database topics will also be discussed.

COP 5949 Cooperative Education in Computer Science (1-3). One semester of full-time work, or equivalent, in an outside organization, limited to students admitted to the CO-OP program. A written report and supervision evaluation is required of each student.

COP 6007 Computer Programming Concepts (3). For non-computer science graduate students. Concepts of object oriented programming, introduction to an object oriented programming language; internet programming; applications of programming to learning technologies. Prerequisite: Permission of the instructor.

COP 6556 Semantics of Programming Languages (3). This course provides an overview of systematic and effective approaches to programming. Abstraction; formal specification techniques; program verification and; semantics of programming languages. Prerequisite: COT 5420.

COP 6611 Advanced Operating Systems (3). Advanced topics in operating system design; microkernel; memory architecture; multi-processor issues; multimedia operating systems; case studies. Prerequisite: Graduate standing.

COP 6727 Advanced Database Systems (3). Design, architecture and implementation aspects of DBMS, distributed databases, and advanced aspects of databases selected by the instructor. Prerequisite: Graduate standing.

COT 5407 Introduction to Algorithms (3). Design of efficient data structures and algorithms; analysis of algorithms and asymptotic time complexity; graph, string, and geometric algorithms; NP-completeness.

COT 5420 Theory of Computation I (3). Abstract models of computation; including finite automata, regular expressions, context-free grammars, pushdown automata, Turing machines. Decidability and undecidability of computational problems. Prerequisite: MAD 3512.

COT 6405 Analysis of Algorithms (3). Design of advanced data structures and algorithms; advanced analysis techniques; lower bound proofs; advanced algorithms for graph, string, geometric, and numerical problems; approximation algorithms; randomized and on-line algorithms. Prerequisite: Graduate standing.

COT 6421 Theory of Computation II (3). Verification of program correctness; program schemes; fixed-point theory of programs; resolution and theorem proving. Prerequisite: COT 5420.

COT 6930 Special Topics: Advanced Topics in Theory (3). This course deals with selected special topics in computing theory. Prerequisite: Permission of the instructor.

COT 6931 Topics in Cognitive Science (3). A “top-down” view of Computer Science, in particular artificial intelligence, by studying the computational aspects of human cognition. Prerequisite: Permission of the instructor.

COT 6936 Topics in Algorithms (3). Advanced data structures, pattern matching algorithms, file compression, cryptography, computational geometry, numerical algorithms, combinatorial optimization algorithms and additional topics. Prerequisite: COP 3530.