1990

Master of Science in Computer Science

Nova Southeastern University

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NOVA UNIVERSITY
DEPARTMENT OF
COMPUTER SCIENCE

MASTER OF SCIENCE IN COMPUTER SCIENCE

The Department of Computer Science offers a graduate program leading to the degree of Master of Science in Computer Science. This program is designed to give the student practical experience and an in-depth knowledge of computer systems and some of their many applications. Current areas of specialization include operating systems design, compiler construction, data base and data communications design, software engineering and structured programming, application software development and computer systems performance, and operations research and numerical analysis.

MASTER OF SCIENCE DEGREE REQUIREMENTS:

Two options leading to the Master of Science degree in Computer Science are offered. The requirements for both the thesis and the non-thesis option are:

(1) The completion of 36 semester hours of graduate credit of which 24 semester hours are required courses and must include the following courses:

ICS 610 Computer systems 3 cr.
ICS 616 Theory and Principles of Programming 3 cr.
ICS 630 Programming Languages 3 cr.
ICS 634 Compiler Design Theory 3 cr.
ICS 635 Compiler Implementation 3 cr.
ICS 650 Operating Systems Theory and Design 3 cr.
ICS 660 Data Base Management 3 cr.
ICS 690 Software Engineering 3 cr.

(2) The student must maintain a grade average of 3.0 (B) or better in all graduate level courses.

The additional requirements for the thesis option are the completion of six semester hours of approved elective courses in Computer Science, and 6 semester hours for a written thesis.

The non-thesis option has the additional requirement of the completion of 12 semester hours of approved elective courses in Computer Science.

ELECTIVES

ICS 620 Graph Theory
ICS 622 Complexity Theory
ICS 624 Operations Research
ICS 625 Numerical Analysis
ICS 626 Modelling and Simulation
ICS 632 Language Theory and Automata
ICS 640 Digital Computer Design
ICS 651 Operating Systems Implementation
ICS 656 Network Design and Analysis
ICS 658 Data Communications
ICS 675 Systems Performance Evaluation
ICS 680 Microprogramming and Microprocessors
ICS 691 Software Engineering Implementation
ICS 694 Management in Data Processing
ICS 695 Management in Data Processing Practicum
ICS 696 Management of Research and Development
ADMISSION REQUIREMENTS:

The Computer Science Graduate Program has been designed for students with undergraduate training in computer science, engineering, mathematics or Physics. Applicants for the Master of Science degree in Computer Science should have an undergraduate major in one of the above areas or a related area and must meet the following requirements:

1. A baccalaureate degree, granted by an accredited institution representing completion of a course of study which fulfills prerequisites for graduate work in the area of Computer Science.

2. A 2.5 undergraduate grade point average on a grading scale of 4.0 (A).

3. The intellectual capacity and motivation to pursue graduate work as determined by credentials and an interview. The interview can be waived if the applicant does not reside in the state of Florida. The applicant's official transcript must be submitted directly from the degree-granting institution.

4. Satisfaction of undergraduate prerequisites in:
   (a.) Data Structures
   (b.) Experience with higher level programming languages such as FORTRAN, COBOL, APL or PL/I and with assembly language programming
   (c.) Computer architecture
   (d.) Mathematics - including calculus, linear algebra and some discrete mathematics.

Students not satisfying these prerequisites will be required to make up the appropriate deficiencies before being admitted with full graduate status.

TRANSFER CREDIT Up to 6 graduate credits may be transferred from a regionally accredited institution. The courses selected for transfer must have received a B or better grade and must match a course in the required program. The transfer will be evaluated upon the receipt of an official transcript from the institution originally giving the credit.

FORMAT The Master of Science in Computer Science Program operates on a semester system. Each three (3) credit course meets for three (3) hours per week for 15 weeks. All courses in the program are scheduled in the evenings.

TUITION AND FEES

Tuition fee (per credit).......................................................... $100.
Application fee, nonrefundable.............................................. $15.
Registration fee, nonrefundable (per semester).......................... $15.
Laboratory fee, where applicable............................................ $10.
Graduation fee................................................................. $10.
Late Registration Fee......................................................... $15.

The cost of books and other materials generally range from $20 to $40 per course. Additional costs include fees for proficiency examinations. These are optional and are not part of the required program.

ACCREDITATION Nova University is accredited by the Southern Association of Colleges and Schools, the official accrediting agency for institutions of higher education in the southeastern states.
All courses are 3 semester hours unless otherwise indicated.

ICS 610 COMPUTER SYSTEMS
Introduction to digital computer design, peripheral devices, storage allocation, operating systems, compilers and assemblers. An understanding of the total operating environment will be developed. Investigation of the common programming techniques and their theory. Segmentation and overlays, recursion, dynamic storage processing, (stacks, queues, trees), macros. PREREQUISITE: CONSENT OF INSTRUCTOR.

ICS 616 THEORY AND PRINCIPLES OF PROGRAMMING

ICS 620 GRAPH THEORY
Finite Linear graphs. Applications to modelling optimization, networks, operating systems design, digital design. PREREQUISITES: ICS 610, ICS 630.

ICS 622 COMPLEXITY THEORY

ICS 624 OPERATIONS RESEARCH
Analytic formulation and solution of decision problems using mathematical techniques. Linear and dynamic programming. Queuing, searching, maximizing/minimizing techniques. Scheduling and Inventory models, forecasting and time series analysis. PREREQUISITES: ICS 610, ICS 630

ICS 625 NUMERICAL ANALYSIS
Introduction to error analysis, iterative methods, eigenvalue problems; integration and differentiation by computer, interpolation, ill conditioned problems. Nonlinear systems. Boundary value problems. PREREQUISITES: ICS 610, ICS 630

ICS 626 MODELLING AND SIMULATION
Introduction to modelling techniques. Discrete events systems. Development of models (e.g. mathematical) of physical processes. Use of simulation programs such as SIMULA, GPSS, and SIMSCRIPT. PREREQUISITE: ICS 624

ICS 630 PROGRAMMING LANGUAGES
Introduction to data structures and data types, and understanding of the modern approach to structured programming will be developed. A comparative study of several high-level programming languages. Emphasis will be placed on how concepts are expressed in each of the major languages, such as FORTRAN, COBOL, PL/1, PASCAL, and ALGOL. PREREQUISITE: CONSENT OF INSTRUCTOR.

ICS 632 LANGUAGE THEORY AND AUTOMATA
Introduction to formal grammars, Backus-Naur notation. The formal theory behind the design of a computer language is studied. The corresponding types of automata which may serve as recognizers and generators for a language will be described. PREREQUISITES: ICS 610, ICS 630

ICS 634 COMPILER DESIGN THEORY
Language theory will be applied to the design of a compiler for a high-level language. Parsing, syntax analysis, interpretation phase and code generation. Other areas of the compilation process will be covered, such as storage allocation, symbol table management, searching and sorting, and recursion. PREREQUISITES: ICS 610, ICS 630

ICS 635 COMPILER IMPLEMENTATION
Design, implementation, and testing of a compiler for a high-level language. PREREQUISITE: ICS 634

ICS 640 DIGITAL COMPUTER DESIGN
Principles and techniques of digital computer design. Integrated circuits, logic
design, LSI and MSI design, sequential circuit analysis. Processor logic design, arithmetic unit, memory systems, input-output structures, micro-programming.

PREREQUISITES: ICS 610, ICS 630

ICS 650 OPERATING SYSTEMS THEORY AND DESIGN
Analysis of computer operating systems with emphasis on structured design. Multiprogramming and multiprocessing, real-time, time-sharing, networks, job control. Scheduling, synchronization and other forms of resource management: I/O programming, memory and file system management. PREREQUISITES: ICS 610, ICS 630

ICS 651 OPERATING SYSTEMS IMPLEMENTATION
Implementation and testing of operating system design on actual hardware. PREREQUISITE: ICS 650

ICS 656 NETWORK DESIGN AND ANALYSIS
Distributed processing and other forms of network systems. PREREQUISITES: ICS 610, ICS 630

ICS 658 DATA COMMUNICATIONS
An introduction to basic data communication concepts, coding modes and types of transmissions, multiplexing, line protocols, switching techniques and communication satellite technology. PREREQUISITE: ICS 656

ICS 660 DATA BASE MANAGEMENT
Computer-oriented techniques for information storage and retrieval with emphasis on on-line capability. File structures, including data definition and manipulation languages. PREREQUISITES: ICS 610, ICS 630

ICS 675 SYSTEMS PERFORMANCE EVALUATION
An analysis of the computer resources in a monitoring environment. CPU, I/O Channel, memory and mix utilization statistics. Hardware monitors and software monitors. Determining the overloaded computer system. Capacity analysis. PREREQUISITES: ICS 610, ICS 630

ICS 680 MICROPROGRAMMING AND MICROPROCESSORS
The past, present and future of Microprogramming will be discussed in detail with particular attention given to Processor Technology. An in-depth survey of commercially available microprogrammable microprocessors will be presented as well as monolithic microprogrammed devices. The students will implement a processor instruction set in both vertical and horizontal microcode utilizing a Simulator, Microassembler, and Register Transfer language. Advanced topics in special-purpose processor design and architecture redefinition (dynamic) will be presented. PREREQUISITE: CONSENT OF INSTRUCTOR.

ICS 690 SOFTWARE ENGINEERING
This course offers a thorough analysis of the problems related to the design, development and implementation of Software Projects. First, the fundamentals of Software project management are presented, followed by a discussion of the techniques of Software development. A comprehensive, modern approach to structured programming, program modularization and program correctness is offered. Software Verification and Validation, Software security and Software protection will also be analyzed in detail. PREREQUISITE: CONSENT OF INSTRUCTOR

ICS 691 SOFTWARE ENGINEERING IMPLEMENTATION
The techniques of software engineering will be applied to practical projects. PREREQUISITE: ICS 690

ICS 694 MANAGEMENT IN DATA PROCESSING
Develops an awareness of the task of the manager of a data processing activity. The course introduces the student to the techniques and responsibilities of the manager in order to develop a better working relationship. PREREQUISITES: ICS 610, ICS 630

ICS 695 MANAGEMENT IN DATA PROCESSING PRACTICUM
The techniques of data processing management will be applied to practical examples. PREREQUISITE: ICS 694

ICS 696 MANAGEMENT OF RESEARCH AND DEVELOPMENT
This course analyzes the role of R & D in the company, its' relation to other activities. The planning and organization of R & D, its' control and evaluation. PREREQUISITES: ICS 610, ICS 630