1991

Master of Science in Computer Science Catalog

Nova Southeastern University

MASTER OF SCIENCE

Computer Science

NOVA UNIVERSITY
CENTER FOR COMPUTER
AND INFORMATION SCIENCES

MASTER OF SCIENCE

COMPUTER SCIENCE

The Center for Computer and Information Sciences offers a graduate program leading to the master of science degree with a major in computer science. This program is designed to give the student a thorough knowledge of computer systems through coursework, basic and applied research activities, and specialized projects. Current areas of specialization are network design, data communications, artificial intelligence, compiler construction, modeling and simulation, database design, computer systems performance, numerical analysis, operating systems design, structured programming, and software engineering.

PROGRAM FORMAT

The Master of Science in Computer Science program operates on a 12-week term. Each three-credit course meets for four hours per week for 12 weeks (one semester). All courses in the program are scheduled in the evenings or on Saturday. The Master of Science in Computer Science program should take between 18 and 24 months to complete.

ADMISSION REQUIREMENTS

This program has been designed for students with undergraduate training in computer science, engineering, mathematics, or physics. Applicants for this degree should have an undergraduate major in one of the above areas or a related area and must meet the following requirements:

A bachelor's degree from a regionally accredited college or university representing completion of coursework that fulfills prerequisites for graduate work in the area of Computer Science.

- A 2.5 undergraduate G.P.A. (3.0 in the undergraduate major)
- A completed application with application fee and official transcripts of all prior graduate and under graduate work
- Satisfaction of undergraduate prerequisites in:
  1. Data Structures
  2. Computer Architecture
  3. Experience with higher level programming languages such as FORTRAN, PASCAL, C, and assembly language programming
  4. Mathematics - including calculus, linear algebra, and discrete mathematics

Students not satisfying these prerequisites are required to make up the specific deficiencies before being granted full admission status.

TUITION AND FEES

Tuition is $225 per credit hour or $5,400 per year (eight courses). There is a $100 yearly registration fee. Included in the tuition are instructional materials, handouts, and the use of the computer lab. Students must purchase their textbooks. Tuition and fees are subject to change.

Tuition (per credit)	$ 225
Application Fee (non-refundable)	30
Registration Fee (non-refundable)	25
Late Registration Fee	30
Graduation Fee	30

REFUND POLICY

First 2 weeks of class	80% refund
Third week of class	60% refund
Fourth week of class	40% refund
Fifth week of class	20% refund

TERMS BEGIN

January 7, 1991 - March 29, 1991
April 1, 1991 - June 21, 1991
July 1, 1991 - September 20, 1991
September 23, 1991 - December 13, 1991

CURRICULUM

In addition to allowing professionals to pursue a systematic program of graduate study while working, the core courses are specifically designed for understanding and direct application of technology and are taught by experts in these fields.

Two options (thesis and nonthesis) leading to a Master of Science degree with a major in computer science are offered. The requirements for both the thesis and the non-thesis options include--

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

CISC 610 Theory & Principles of Programming
CISC 620 Modeling & Simulation
CISC 630 Compiler Design Theory
CISC 640 Operating Systems Theory & Design
CISC 650 Network Design & Analysis
CISC 660 Database Management
CISC 670 Artificial Intelligence/Expert Systems
CISC 680 Software Engineering

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

3) The additional requirements for the thesis option are the completion of six semester hours of approved elective courses in computer science and six semester hours for a written thesis.

4) The nonthesis option has the additional requirement of the completion of 12 semester hours of approved elective courses in computer science. The three-credit courses can be chosen from the following:

CISC 600 Computer Systems
CISC 601 Programming Languages
CISC 611 Systems Programming & Project Implementation
CISC 612 Concurrent Programming Languages
CISC 621 Mathematical Programming
CISC 622 Numerical Analysis
CISC 631 Language Theory & Automata
CISC 632 Compiler Implementation
CISC 633 Graph Theory
CISC 634 Complexity Theory
CISC 643 Array Processors & Super-computers
CISC 644 Operating Systems and Implementation
CISC 645 Microprogramming & Micro-processors
CISC 651 Data Communications
CISC 652 Systems Performance
CISC 661 Database Practicum
CISC 662 Distributed Database
CISC 671 Robotics and Automated Evaluation Processing
CISC 674 VLSI Design
CISC 682 Software Engineering
CISC 681 Interactive Computer Graphics Implementation
CISC 690 Special Topics

PROGRAM ADMINISTRATION

TRANSFER CREDIT

Up to six 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.

Students dismissed from the program may petition for re-admission after one academic year. Such students will have their records examined by the dean of the Center for Computer and Information Sciences and the Admissions Committee. Upon approval of the committee, the student will be re-admitted to the program. Only those courses with grades of "B" or better will be applicable to the M.S. program.

GRADING POLICY

The instructors in the Master's Program assign grades to course work according to the following system:

Grade	Quality Points
A	4.0
A-	3.7
B+	3.2
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
F	0
I	Incomplete
PR	In Progress (used for dissertations only)
W	Withdrew

A "W" grade is assigned when a student withdraws from a course after the fifth scheduled class and prior to the eleventh scheduled class. Prior to and including the last day to drop courses, dropped courses will be deleted from the student's record. After that date, a grade will be assigned.

An "I" (incomplete) indicates that the student has not completed the course requirements and that the instructor has given additional time to do so. An "I" grade is not routinely assigned in courses, only when serious exigencies prevent completion of the course requirements. It is a prerogative of the instructor of a course to authorize an incomplete for a student. A student may not, by choice, take an incomplete in a course merely by failing to complete the course requirements. Grades normally are based on what has been achieved in the regular time period of a course.

Incompletes may be assigned at the discretion of the instructor at the request of the student. Should the instructor choose to assign an incomplete, a contract form is to be completed and signed by both the instructor and the student and the original kept on record in the Office of the Director of the Master's Program. The contract must specify the following:

1. The requirements to be completed by the student to remove the incomplete.

2. The time period within which the student must satisfy the incomplete. The time limit is to be specified by the instructor, but must not exceed 53 weeks.

3. A grade that the student will receive if the incomplete is not satisfied by the conclusion of the specified time period.

A student will not be permitted to register for a sequential course when a grade of "I" (incomplete) or "F" (failure) has been received in a prerequisite course.

ACADEMIC STANDING

The grading policy for the Master's Program in Computer Science requires the student to maintain a minimum cumulative grade point average of 3.0. In addition, other minimum requirements are in existence. Failure to meet them will result either in academic probation or dismissal as detailed below.

PROBATION POLICY

Students failing to achieve a minimum of a 3.0 (B) grade point average upon completion of the first four courses are not eligible for admission as candidates for the master's degree.

Those students who achieve a grade point average of 2.5 or lower for the first four courses are dismissed from the program.

Students with a grade point average greater than 2.5 but less than 3.0 for the first four courses are placed on academic probation. Such students are counseled as to the number of courses they may take in order to facilitate the raising of their averages. No more than four additional courses may be taken without achieving an overall grade point average of 3.0.

Should a student's grade point average fall below 3.0 after the initial four courses, he or she is placed on probation. The student is allowed one academic year to bring the grade point average up to the 3.0 minimum. Failure to achieve the minimum at that time results in dismissal from the program.

TIME LIMITATION

A candidate for a master's degree is expected to complete the program within five years from the first registration.

The Center for Computer and Information Sciences, Master of Science in Computer Science degree program maintains up-to-date progress records on each student. After each evaluation period, the University furnishes students with working transcripts showing current status and all courses completed and/or attempted. When these transcripts are sent to the student they serve as grade reports.

STUDENT CONDUCT AND RIGHTS

Students are expected to comply with the legal and ethical standards of Nova University. Academic dishonesty and nonacademic misconduct are subject to disciplinary action. Specific instances of misconduct include, but are not limited to, cheating, plagiarism, knowingly furnishing false information to the University, and forging or altering University documents or academic credentials. The institution reserves the right to require a student to withdraw at any time for misconduct as described above. It also reserves the right to impose probation or suspension on a student whose conduct is determined to be unsatisfactory.

Students who feel their rights have been denied are entitled to due process. Information on grievance procedures is contained in the Policy and Procedures Manual and is available from the Center for Computer and Information Sciences.

PLAGIARISM

At Nova University it is plagiarism to represent another person's work, words, or ideas as ones own without use of a University recognized method of citation.

Assignments such as course preparations, exams, tests, projects, term papers, practicums, etc., must be the original work of the student. Original work may include the thoughts and words of another, but if this is the case, those ideas or words must be indicated in a manner consistent with a University-recognized form and style manual. Violation of the requirement of original work constitutes plagiarism at Nova University and may result in disciplinary action up to and including termination from the institution.

Work is not original that has been submitted previously by the author or by anyone else for academic credit. Work is not original that has been copied or partially copied from any other source, including another student, unless such copying is acknowledged by the person submitting the work for the credit at the time the work is being submitted or unless copying, sharing, or joint authorship is an expressed part of the assignment. Exams and tests are original work when no unauthorized aid is given, received, or used prior to or during the course of the examination.

REFERENCING THE WORK OF ANOTHER AUTHOR

All academic work submitted to Nova University for credit or as partial fulfillment of course requirements must adhere to the accepted rules of documentation. Standards of scholarship require that proper acknowledgement be given by the writer when the thoughts and words of another author are used. It is recommended that students acquire a style manual appropriate to their program of study and become familiar with accepted scholarly and editorial practice.

INTERNATIONAL STUDENTS

International Student Advising Service
(305) 475-7413 or 1-800-541-6682 x 7413

An International student applying to Nova University must (1) obtain a student (F-1) visa or an exchange visitor (J-1) visa (students are not permitted to study in the United States on a visitor [B-2] visa); (2) submit all secondary school and/or college level transcripts (transcripts must be in official English language translation); (3) demonstrate the ability to meet all costs of his/her education without financial aid from Nova University; (4) purchase medical insurance (J-1 visas only), contact the international student advisor for further information concerning insurance; (5) demonstrate proficiency in the English language through testing in the Nova University Intensive Language Program, or minimum of **550** on the **TOEFL** exam.

INTENSIVE LANGUAGE PROGRAM

Intensive Language Center
(305) 475-7430 or 1-800-541-6682 x 7430

The Intensive Language Program provides students from non-English language backgrounds with English language proficiency through one of two curricular emphases: college preparatory or career preparatory. It also provides intensive instruction in other languages.

The college preparatory curriculum provides students with the necessary English language skills to enable them to function in American colleges and universities. This curriculum prepares students for successful university study in English, as well as providing TOEFL (Test of English as a Foreign Language) preparation.

The career preparatory curriculum provides students with the English language skills to enable them to function in career and professional situations requiring English proficiency.

VETERANS SERVICES & BENEFITS

(305) 475-7413 or 1-800-541-6682 x 7413

Nova University's academic programs are approved for the training of Veterans and other eligible persons by the Bureau of State Approval for Veteran's Training, State of Florida Department of Veteran's Affairs.

The VA Representative will assist veterans in applying for benefits. A VA student must attain and maintain satisfactory progress as determined by the program director each evaluation period. The VA student who, at the end of any evaluation period, has not attained and maintained satisfactory progress will be placed on academic probation for the next evaluation period. Should the student not attain and maintain satisfactory progress by the end of the probationary period (one 6-month term), the student's VA educational benefits will be terminated for unsatisfactory progress. A student whose VA educational benefits have been terminated for unsatisfactory progress may petition the school to be recertified after one six-month term has elapsed. The school may recertify the student for VA educational benefits only if there is a reasonable likelihood that the student will be able to attain and maintain satisfactory progress for the remainder of the program.

FINANCIAL AID INFORMATION

(305) 485-7411 or 1-800-541-6682 x 7411

Nova University offers several programs of student financial aid in order to assist the greatest number of its students possible in meeting educational expenses. In order to qualify and remain eligible for financial aid, students must be accepted for admission into a University program; eligible for continued enrollment; a United States citizen, or in the U.S. for other than a temporary purpose; and making satisfactory academic progress toward a stated educational objective in accordance with the University's policy on satisfactory progress for financial aid recipients.

OTHER INFORMATIONAL PHONE NUMBERS

Registrar's Office	(305) 475-7400 or 1-800-541-6682 x 7400
Student Housing	(305) 475-7052 or 1-800-541-6682 x 7052

Nova University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award bachelor's, master's, educational specialist, and doctoral degrees.

COURSE DESCRIPTIONS

CISC 600 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 may be required of students whose undergraduate major was not computer science.

CISC 601 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 may be required of students whose undergraduate major was not computer science.

CISC 610 Theory and Principles of Programming
The mathematics of algorithm and programming construction. The art of structured programming. The dynamic environment of a program and its record of execution. The theory of concurrent programming. Prerequisite: CISC 600, CISC 601

CISC 611 Systems Programming and Project Implementation
Participation in the implementation of an industrial, business or university project requiring the knowledge of systems programming.

CISC 612 Concurrent Programming Languages (ADA, MODULA and SIMULA-67)
An introduction to concurrent programming languages. Modules and class structures, packages and concurrent tasks in ADA. Generic procedures. Concurrent programming, mailbox tasks, signals and semaphores. Abstract data types, operations on abstract objectives, hiding of the representation of objectives of a given type, private data types. Prerequisites: CISC 600, CISC 601

CISC 620 Modeling and Simulation
Introduction to modeling techniques. Discrete events systems. Development programs such as SIMULA, GPSS, and SIMSCRIPT. Prerequisite: Consent of instructor.

CISC 621 Mathematical Programming
Introduction to linear programming. Non-linear models. Integer programming. The transportation problem. Mathematical programming models. Model languages. Prerequisite: Consent of instructor.

CISC 622 Numerical Analysis
Introduction to error analysis, iterative methods, eigenvalue problems, integration and differentiation by computer, interpolation, ill-conditioned problems. Prerequisites: CISC 600, CISC 601

CISC 630 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: CISC 600, CISC 601

CISC 631 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: CISC 600, CISC 601

CISC 632 Compiler Implementation
Design, implementation, and testing of a compiler for a high-level language. Prerequisites: CISC 630

CISC 633 Graph Theory
Finite linear graphs. Applications to modeling optimization, networks, operating systems design, digital design. Prerequisites: CISC 600, CISC 601

CISC 634 Complexity Theory
A general theory of computational complexity. Theory of algorithms, turing machines, unsolvable problems, exponential difficulty, and NP-Completeness. Prerequisites: CISC 633

CISC 640 Operating Systems Theory and Design
Analysis of computer operating systems with emphasis on structured design. Multi-programming 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: CISC 600, CISC 601

CISC 641 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, microprogramming. Prerequisites: CISC 600, CISC 601

CISC 642 Integrated Computer Systems (VLSI)
Introduction to MOS circuits. The technology of integrated systems. Design of elementary components and subsystems (shift registers, dynamic registers, stacks). Fabrication process and implementation procedures. The design of an integrated computer system (data path, controller, microprogrammed control). System timing, processor arrays and the physics of integrated system. Prerequisite: Consent of instructor

CISC 643 Array Processors and Supercomputers
An introduction to supercomputers. Parallel computer organization. Pipline, associative and array computer architectures. Examples: Texas Instrument ASC, Control Data STARAN, CRAY-I, Burroughs BSP. Control and parallel processors. Stream of micro-instructions. Conflict-free memory, algorithmic detection of recurrent relations, and control flow graphs. Prerequisites: CISC 600, CISC 601

COURSE DESCRIPTIONS

CISC 644 Operating Systems Implementation
Implementation and testing of operating system design on actual hardware. Prerequisite: CISC 640

CISC 645 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, Micro-assembler, and Register Transfer language. Advanced topics in special-purpose processor design and architecture definition (dynamic) will be presented. Prerequisite: Consent of instructor

CISC 650 Network Design and Analysis
Distributed processing and other forms of network systems. Prerequisites: CISC 600, CISC 601

CISC 651 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: CISC 650

CISC 652 Systems Performance Evaluation
An analysis of the computer resources in a monitoring environment. CPU, channel, memory and mix utilization statistics. Hardware monitors and software monitors. Determining the overloaded computer system. Capacity analysis. Prerequisites: CISC 600, CISC 601

CISC 660 Database Management
Computer-oriented techniques for information storage and retrieval with emphasis on on-line capability. File structures, including data definition and manipulation languages. Prerequisites: CISC 600, CISC 601

CISC 661 Database Practicum
The techniques of Database Management will be applied to practical projects. Prerequisite: CISC 660

CISC 662 Distributed Database
The study of information storage and retrieval in a distributed environment. Distributed processing networks. Prerequisite: Consent of instructor

CISC 670 Artificial Intelligence/Expert Systems
This course emphasizes the area of programming involved with non-deterministic solutions to problems. Concepts of LISP, PROLOG, OPS5 and other specialized programming languages will be presented. The notion of knowledge bases will be developed and all students will be expected to produce a working expert system which embodies these concepts. Prerequisites: CISC 600, CISC 601

CISC 671 Robotics and Automated Processing
The principles and concepts of modern robots and automation are developed. The concepts of algorithmic and non-algorithmic control are presented along with the details of sensor and device I/O. Experiments with simulated and real robots will be performed to reinforce the basic concepts presented. Prerequisite: CISC 670

CISC 674 VLSI Design
Silicon, gallium-arsenide, and superconducting devices are covered. Also covered are system design automation and CAD tools, and system architecture. Symbolic CMOS layout projects using MAGIC, and circuit simulation using SPICE are conducted by the student.

CISC 680 Software Engineering
This course offers a thorough analysis of the process of developing software systems. A comprehensive approach to current and advanced techniques for the major phases of the software life-cycle (requirements specification, functional specification, software design, implementation, and evolution) is presented. Software verification and validation, software security, software engineering environments, CASE tools, and software project management will also be analyzed in detail.

CISC 681 Interactive Computer Graphics
The principles of interactive computer graphics are presented. Emphasis will be placed on mastering the concepts of two-dimensional graphics including the basic transformations (scale, translate, rotate), perspective, hidden-line removal, and hardware support devices. The two-dimensional concepts will be extended to include three-dimensional computer graphics including smoothing algorithms, animation, and a variety of related topics. Prerequisites: CISC 600, CISC 601

CISC 682 Software Engineering Implementation
The techniques of software engineering will be applied to practical projects. Prerequisite: CISC 680

CISC 690 Special Topics
This seminar will focus on the professor's current research interests. Prerequisite: Consent of instructor

WHY THE MASTER OF SCIENCE IN COMPUTER SCIENCE IS RIGHT FOR YOU

- Fully accredited programs
- Part-time and full-time degree programs designed to meet the needs of South Florida industry
- Evening classes
- A graduate degree program for those who need a technical degree
- Solid academic foundation with a practitioner's approach to technology
- Faculty: practicing Computer Scientists and Engineers

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