

2001

Graduate Catalog of Computer and Information Science

Nova Southeastern University

Follow this and additional works at: http://nsuworks.nova.edu/cec_coursecatalogs



Part of the [Computer Engineering Commons](#)

NSUWorks Citation

Nova Southeastern University, "Graduate Catalog of Computer and Information Science" (2001). *College of Engineering and Computing Course Catalogs*. Paper 103.

http://nsuworks.nova.edu/cec_coursecatalogs/103

This Course Catalog is brought to you for free and open access by the NSU Course Catalogs and Course Descriptions at NSUWorks. It has been accepted for inclusion in College of Engineering and Computing Course Catalogs by an authorized administrator of NSUWorks. For more information, please contact nsuworks@nova.edu.



Graduate Catalog

2001-2002

The Graduate School of Computer and Information Sciences

Nova Southeastern University

Academic Calendar, Master's Program

(Master's programs have rolling admissions)

Fall 2001 (Sep 17 – Dec 7 01) Term Code: 200220

- Jul 23–Sep 7 01 Registration period (no late fees)
- Sep 8–17 01 Late registration period (late fees)
- Sep 17 01 First day of term
- Sep 22 01 Drop/add deadline
- Sep 18 01 Holiday
- Sep 27 01 Holiday
- Nov 22-23 01 Holiday
- Dec 7 01 Last day to withdraw from a course with a final grade of W
- Dec 7 01 Last day of term

Winter 2002 (Jan 7 – Mar 29 02) Term Code: 200230

- Nov 5–Dec 28 02 Registration period (no late fees)
- Dec 29–Jan 7 02 Late registration period (late fees)
- Jan 7 02 First day of term
- Jan 12 02 Drop/add deadline
- Jan 21 02 Holiday
- Mar 29 02 Holiday
- Mar 29 02 Last day to withdraw from a course with a final grade of W
- Mar 29 02 Last day of term

Spring 2002 (Apr 1 – Jun 21 02) Term Code: 200240

- Feb 4–Mar 22 02 Registration period (no late fees)
- Mar 23–Apr 1 02 Late registration period (late fees)
- Apr 1 01 First day of term
- Apr 6 01 Drop/add deadline
- May 27 02 Holiday
- Jun 21 02 Last day to withdraw from a course with a final grade of W
- Jun 21 01 Last day of term

Summer 2002 (Jun 24 – Sep 13 02) Term Code: 200305

- Apr 29–Jun 14 02 Registration period (no late fees)
- Jun 15–24 02 Late registration period (late fees)
- Jun 24 02 First day of term
- Jun 29 02 Drop/add deadline
- Jul 4 02 Holiday
- Sep 2 02 Holiday
- Sep 13 02 Last day to withdraw from a course with a final grade of W
- Sep 13 02 Last day of term

Fall 2002 (Sep 23 – Dec 13 02) Term Code: 200320

- Jul 29–Sep 13 02 Registration period (no late fees)
- Sep 14–23 02 Late registration period (late fees)
- Sep 23 02 First day of term
- Sep 29 02 Drop/add deadline
- Sep 16 02 Holiday
- Nov 28 02 Holiday
- Dec 13 02 Last day to withdraw from a course with a final grade of W
- Dec 13 02 Last day of term

Winter 2003 (Jan 6 – Mar 28 03) Term Code: 200330

- Nov 11–Dec 27 02 Registration period (no late fees)
- Dec 28 02–Jan 6 03 Late registration period (late fees)
- Jan 6 03 First day of term
- Jan 11 03 Drop/add deadline
- Jan 20 03 Holiday
- Mar 28 03 Last day to withdraw from a course with a final grade of W
- Mar 28 03 Last day of term

Spring 2003 (Mar 31 – Jun 20 03) Term Code: 200340

- Feb 3–Mar 21 03 Registration period (no late fees)
- Mar 22 – 31 03 Late registration period (late fees)
- Mar 31 03 First day of term
- Apr 5 03 Drop/add deadline
- Apr 18 03 Holiday
- May 26 03 Holiday
- Jun 20 03 Last day to withdraw from a course with a final grade of W
- Jun 20 03 Last day of term

Academic Calendar, Doctoral Program

(Doctoral programs have rolling admissions)

Fall 2001 (Sep 7 – Feb 6 02) Term Code: 200220

- Jul 30–Aug 23 01 Registration period (no late fees)
- Aug 24–Sep 7 01 Late registration period (late fees)
- Sep 6 01 New student orientation
- Sep 7 01 First day of term
- Sep 7–9 01 First meeting dates
- Sep 8 01 Drop/add deadline
- Nov 30–Dec 2 01 Second meeting dates
- Feb 6 02 Last day to withdraw from a course with a final grade of W
- Feb 6 02 Last day of term

Winter 2002 (Jan 6 – Jun 6 02) Term Code: 200230

- Nov 26–Dec 20 01 Registration period (no late fees)
- Dec 21–Jan 6 02 Late registration period (late fees)
- Jan 5 02 New student orientation
- Jan 6 02 First day of term
- Jan 6–11 02 Meeting dates
- Jan 7 02 Drop/add deadline
- Jun 6 02 Last day to withdraw from a course with a final grade of W
- Jun 6 02 Last day of term

Spring 2002 (Mar 1 – Jul 31 02) Term Code: 200240

- Jan 21–Feb 14 02 Registration period (no late fees)
- Feb 15–Mar 1 02 Late registration period (late fees)
- Feb 28 02 New student orientation
- Mar 1 02 First day of term
- Mar 1–3 02 First meeting dates
- Mar 2 01 Drop/add deadline
- Jun 7–9 02 Second meeting dates
- Jul 31 02 Last day to withdraw from a course with a final grade of W
- Jul 31 02 Last day of term

Summer 2002 (Jul 7 – Dec 5 02) Term Code: 200315

- May 27–Jun 20 02 Registration period (no late fees)
- Jun 21–Jul 7 02 Late registration period (late fees)
- Jul 6 02 New student orientation
- Jul 7 02 First day of term
- Jul 7–12 02 Meeting dates
- Jul 8 02 Drop/add deadline
- Dec 5 02 Last day to withdraw from a course with a final grade of W
- Dec 5 02 Last day of term

Fall 2002 (Sep 13 02 – Feb 12 03) Term Code: 200320

- Aug 5–29 02 Registration period (no late fees)
- Aug 30–Sep 13 02 Late registration period (late fees)
- Sep 12 02 New student orientation
- Sep 13 02 First day of term
- Sep 13–15 02 First meeting dates
- Sep 14 02 Drop/add deadline
- Dec 6–8 02 Second meeting dates
- Feb 12 03 Last day to withdraw from a course with a final grade of W
- Feb 12 03 Last day of term

Winter 2003 (Jan 5 – Jun 5 03) Term Code: 200330

- Nov 25–Dec 19 02 Registration period (no late fees)
- Dec 20 02–Jan 5 03 Late registration period (late fees)
- Jan 4 03 New student orientation
- Jan 5 03 First day of the term
- Jan 5–10 03 Meeting dates
- Jan 6 03 Drop/add deadline
- Jun 5 03 Last day to withdraw from a course with a final grade of W
- Jun 5 03 Last day of term

Spring 2003 (Mar 7 – Aug 5 03) Term Code: 200340

- Jan 27–Feb 20 03 Registration period (no late fees)
- Feb 21 03–Mar 5 03 Late registration period (late fees)
- Mar 6 03 New student orientation
- Mar 7 03 First day of the term
- Mar 7–9 03 First meeting dates
- Mar 8 03 Drop/add deadline
- Jun 6–8 03 Second meeting dates
- Aug 5 03 Last day to withdraw from a course with a final grade of W
- Aug 5 03 Last day of term

Nova Southeastern University

The Graduate School of Computer and Information Sciences

2001-2002 Graduate Catalog

This catalog describes the degrees and programs offered by the Graduate School of Computer and Information Sciences (SCIS). Policies and programs set forth in the catalog are effective through December 31, 2002. Policies, regulations, and requirements, including fees, are necessarily subject to change without notice at any time at the discretion of the Nova Southeastern University administration. The university reserves the right for any reason to cancel or modify any course or program listed herein. In addition, individual course offerings may vary from year to year as circumstances dictate.

The university recognizes that individual programs require different time limits for the completion of academic studies leading to a degree. Therefore, the time frame is a matter within the discretion of each academic program. All program/center catalogs, bulletins, and handbooks carry this information.

The official catalog of the Graduate School of Computer and Information Sciences is the governing document for all program-related information. Please become familiar with the policies and procedures contained within. Failure to read this catalog does not excuse students from the rules and procedures contained in it. Personal factors, illness, and contradictory advice from any source are not acceptable reasons for seeking exemption from the contents of this catalog. Revised official versions of this catalog will be posted to the school's Web site before becoming available in printed form. If there is any conflict between the information contained in the catalog and that contained in other documents, the information in the catalog prevails.

Non-academic policies and procedures are contained in the NSU Student Handbook which is provided to students on CD-ROM or may be downloaded from the school's Web site.

Nova Southeastern University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, Georgia 30033-4097; Telephone number 404-679-4501) to award bachelor's, master's, educational specialist, and doctoral degrees. The master of science curricula for computer science and computer information systems follow the guidelines of the Association for Computing Machinery (ACM).

Published August 2001

President's Message

The 21st century will be historic for technological advances, and the Graduate School of Computer and Information Sciences (SCIS) at Nova Southeastern University has accepted the challenge to prepare students for this fast-paced, ever-changing field.

From our early beginnings with 17 students, NSU has grown into the largest independent educational institution in Florida with 16 centers, colleges and schools. NSU has 63,000 alumni, and more than 18,000 students enrolled in programs at the main campus, throughout Florida, in 22 states, eight foreign countries, and Puerto Rico. In addition, the university has online students in every state and in 38 foreign countries.

As an integral component of NSU's quality educational program, SCIS pioneered the electronic classroom, offering online courses in 1983. To date, SCIS offers all four master's degree programs entirely online, which allows degree-seeking working professionals convenience and flexibility.

NSU is continuing to launch new degree programs, and to expand our facilities to meet the needs of our growing community. Construction is underway for the Nova Southeastern University Library, Research, and Information Technology Center, a joint-use facility with Broward County that will be open to the community as well as to students, faculty, and staff members of NSU. The largest library in Florida will house 1.4 million volumes, 1,000 user seats, a 500-seat performing arts auditorium, 20 electronic classrooms, and museum-style art collections and exhibits. Its presence will enhance NSU's efforts to join academe, government, citizenry, and business communities through technology. Completion of the high-tech library is scheduled for fall 2001.

Plans for the future also include the development of the Wayne Huizenga Graduate School of Business and Entrepreneurship, a three-story, 110,000-square-foot facility that will house 40 classrooms, administration and faculty offices, and student service areas. The new facility is made possible through gifts by Wayne and Marti Huizenga, Carl DeSantis, Hudson Family Foundation, August and Melba Urbanek, Leonard and Antje Farber, and many other donors.

Also on the horizon is the new Family Center Village, a \$12.5 million project to house the university's growing programs for infants, toddlers, and preschoolers, and the NSU Field House, a comprehensive, 163,000-square-foot facility that would accommodate both sports competition and recreational activities.

We affirm our commitment to adopt the latest technological advances to improve the delivery of our programs and services. SCIS will continue to preserve our tradition of representing the forefront of education in the age of technology.

The future of education is here.

Ray Ferrero, Jr.
President
Nova Southeastern University

Dean's Message

Welcome to the Graduate School of Computer and Information Sciences. In this era of rapid technological growth, each new day brings demands for increased proficiencies of those whose professions intimately involve computers and information technology, e.g., creation of computer/software products or information systems, teaching computing, using computing technology in education and training, managing computing resources, or conducting research. The Graduate School of Computer and Information Sciences understands that it has a critical responsibility to offer programs that are timely yet provide an enduring foundation for future professional growth.

To provide timely programs, it reviews its curricula at least once a year, and makes revisions quickly. To provide a solid foundation for future growth, the school's courses are an effective blend of theory and practice that enables students to continue to advance their knowledge after they graduate consistent with the evolution of theory and technology.

The school's strengths include a distinguished faculty, a cutting edge curriculum, and flexible online and campus-based formats for its four M.S. and five Ph.D. programs. It has approximately 2,000 graduate students. All of the school's programs enable working professionals to earn the M.S., Ph.D., or Ed.D. without interrupting their careers. On-campus evening master's degree programs are tailored to meet the needs of those who reside in South Florida. Online master's degree programs, which require no campus attendance, are available to part-time or full-time students worldwide. A unique online doctoral program requires only four weekends or two weeklong visits to the campus each year. The school has online students living in every state in the U.S. and in 35 foreign countries. The school welcomes students who wish to attend full-time, whether on-campus or online.

The school has been a pioneer in online graduate education. It began offering online programs in 1983 and created the first electronic classroom in 1985. Since that time, it has developed other unique software tools to enhance the online learning environment. Ranked by *Forbes* as one of the nation's top 20 cyber-universities, and listed in the Princeton Review's *The Best Distance Learning Graduate Schools*, the school currently offers over 250 online classes annually.

In addition to its regional accreditation by the Commission on Colleges of the Southern Association of Colleges and Schools, the school is a certified member of the Electronic Campus of the Southern Regional Education Board, and all of its online M.S. courses and programs are offered via this highly successful consortium. It also participates in several federal and military programs including the Information Resources Management (IRM) Graduate Certificate Program, the DANTEs Distance Learning Program, and the Army's new online initiative, eArmyU.

Online students use Web pages to access course materials, announcements, the Electronic Library, and other information, and participate in a range of activities that facilitate frequent interaction with their professors and fellow students. Online activities may include forums using threaded discussion boards, chatrooms, email, and electronic classroom sessions. In addition, the school provides a system that enables the student to submit assignments online in multimedia formats and to receive his or her professor's online reviews of assignments in the same formats.

To hone skills and develop confidence and independence, our programs — both on-campus and online — place greater-than-usual emphasis on projects. In many cases, a subject course is supplemented by a project course of equal or greater academic credit.

I invite you to review our catalog, explore our Web site, and visit our campus to seek ways in which we can help you fulfill your educational goals. Thank you for visiting our dynamic learning community. I wish you success in your graduate studies and your career.

Edward Lieblein, Ph.D.

Dean

Graduate School of Computer and Information Sciences

CONTENTS

Academic Calendars	ii
President's Message	iv
Dean's Message	v
Nova Southeastern University	1
The Graduate School of Computer and Information Sciences	2
Degrees and Programs of the Graduate School of Computer and Information Sciences	2
Application for Admission	2
General Information on Graduate Programs	3
Admissions	3
Library Resources	3
Student Organizations	3
Student Research Involving Human Subjects	3
Teaching Assistantship Program	4
Financial Information	4
Tuition and Fees	4
Tuition Payment Policy	4
Refunds	5
Financial Aid	5
Registration	5
Academic Advising and Registration	5
Deadlines	5
Drop/Add Periods	6
Withdrawal and Refund Policy	6
Auditing a Course	6
Academic Information and Policies	6
Student Original Work	6
Form and Style Requirements for Student Work	7
Attendance Policy	7
Grading System	7
Repeating a Course	8
Grade Requirements and Academic Standing	8
Time Limitations	9
Reinstatement	9
Inactive Status	9
Student Records and Transcripts	9
Challenge of Course Grade	9
Student Misconduct	9
Procedures for Resolving Allegations of Student Misconduct	10
Student Grievance Procedures	10
Textbooks	10
Communication by Email	11
Student Services	11
Student ID Cards	11
Student Housing	11
Travel Services	11
Graduation	11
Graduation Requirements	11
Commencement	11
Alumni Association	11

Master's Degree Programs 12

General Information on Master's Degree Programs 12

- Application for Admission 12
- Additional Admission Requirements for International Master's Students 12
- Admission of Non-Degree Students 13
- Provisional or Conditional Admission 13
- Transfer Credit Policy 13
- Orientation and Advisement Program 13
- Early Admission into the Doctoral Program 13
- Thesis and Non-Thesis Options 14
- Term Dates 14
- Program Formats 14
- Grade Requirements and Time Limitations 14
- Independent Study and Directed Independent Study 14
- Cross-Registration 14

Master of Science in Computer Information Systems 14

- Program-Specific Admission Requirements 15
- Early Admission into the Doctoral Program 15
- The Curriculum 15
- Course Descriptions 15

Master of Science in Computer Science 17

- Program-Specific Admission Requirements 17
- Early Admission into the Doctoral Program 18
- The Curriculum 18
- Course Descriptions 18

Master of Science in Computing Technology in Education 20

- Program-Specific Admission Requirements 20
- Early Admission into the Doctoral Program 20
- The Curriculum 20
- Course Descriptions 21

Master of Science in Management Information Systems 22

- Program-Specific Admission Requirements 22
- Early Admission into the Doctoral Program 22
- The Curriculum 22
- Course Descriptions 23

Doctoral Degree Programs 25

General Information on Doctoral Degree Programs 25

- Application for Admission 25
- Additional Admission Requirements for International Doctoral Students 26
- Provisional or Conditional Admission 26
- Early Admission into the Doctoral Program 26
- Orientation and Advisement Program 26
- Program Formats and Term Dates 26
- Grade Requirements and Time Limitations 27
- Independent Study and Directed Independent Study 27
- The Dissertation 27
- Evaluation of Dissertation Progress 27

Ph.D. Program in Computer Information Systems 28

- Program-Specific Admission Requirements 28
- The Curriculum 28
- Course Descriptions 28

Ph.D. Program in Computer Science	31
Program-Specific Admission Requirements	31
The Curriculum	31
Course Descriptions	31
Ph.D./Ed.D. Program in Computing Technology in Education	33
Program-Specific Admission Requirements	33
The Curriculum	33
Course Descriptions	34
Ph.D. Program in Information Science	36
Program-Specific Admission Requirements	36
The Curriculum	36
Course Descriptions	37
Ph.D. Program in Information Systems	39
Program-Specific Admission Requirements	39
The Curriculum	39
Course Descriptions	40
Faculty and Staff of the Graduate School of Computer and Information Sciences	42
The Faculty	42
The Administrative and Technical Staff	43
Provisions	44
Policies Governing Student Relations	44
General	44
Institutional and Academic Information	44
International Students	44
Veterans' Benefits	44
Notice of Nondiscrimination	45
Americans with Disabilities Act	45
Grievances	45
Student Publications	45
Student Participation in University Governance	45
Code of Student Conduct and Academic Responsibility	45
Code of Student Conduct	46
Statement of Academic Rights and Responsibilities	46
Academic Standards	46
Conduct Standards	47
Supplementary Standards	47
Violations	47
Sanctions	48
Appeal Process	48
Policy on Acceptable Use of Computing Resources	49
Policy on the Use of Material in Web Pages	50

Nova Southeastern University (NSU)

NSU is a dynamic, not-for-profit independent institution dedicated to providing high-quality educational programs of distinction from preschool through the professional and doctoral levels, as well as service to the community. It prepares students for lifelong learning and leadership roles in business and the professions. It offers academic programs at times convenient to students, employing innovative delivery systems and rich learning resources on campus and at distant sites. The university fosters inquiry, research, and creative professional activity, by uniting faculty members and students in acquiring and applying knowledge in clinical, community, and professional settings.

Located on a beautiful 250-acre campus in Fort Lauderdale, Florida NSU has over 20,000 students and is the largest independent institution of higher education in the Southeast. It is the 14th largest private university in the United States. NSU awards bachelor's, master's, educational specialist, doctoral, and first-professional degrees in more than 80 disciplines. It has an undergraduate college and graduate schools of medicine, dentistry, pharmacy, allied health, optometry, law, computer and information sciences, psychology, education, business, oceanography, and humanities and social sciences. The institution's programs for families, offered through the Family Center and University School, include innovative parenting, preschool, primary, and secondary education programs. Its programs are administered through academic centers that offer courses in Fort Lauderdale as well as in locations throughout Florida, across the nation, and at selected international sites in Europe, Canada, Israel, and the Caribbean. Despite the geographic diversity of sites where classes are offered, 82 percent of the student body attends classes in Florida.

NSU's library system is composed of the East Campus Library, Einstein Library, Health Professions Division Library, Law Library, North Miami Beach Fischler Graduate School of Education and Human Services Media Union, Oceanographic Library, and four school libraries on the main campus. The catalogs of all NSU libraries are accessible to local and distance education students and faculty members, wherever they may be located, via computers using the Electronic Library. Overall, the university libraries house approximately 340,000 volumes and 1,200,000 microform units. Online and CD-ROM databases complement the paper-based holdings and provide full-text resources. In order to further assist distance education students with library requirements, contracts, when necessary, are signed with local university libraries to provide library services. Interlibrary loan arrangements through networked organizations such as the Online Computer Library Center (OCLC), the Southeast Florida Library Information Network (SEFLIN), the Consortium of Southeastern Law Libraries (COSELL), and the National Library of Medicine provide broad access to a wide range of materials. The university continues to expand its library system to meet the needs of its growing community. Construction is underway for a new Library, Research, and Information Technology Center, a joint venture between NSU and the Broward County Board of County Commissioners. The five story, 325,000 square foot facility, the largest library in Florida, will have 1.4 million volumes, 1000 user seats, 20 electronic classrooms (one is for children), and a 500-seat auditorium. Half of the construction funds are provided by NSU and half are provided by the Broward County Board of County Commissioners. Completion is scheduled for October 2001.

Nova Southeastern University has produced more than 68,000 alumni. Since 1971, it has enjoyed full accreditation by the Commission on Colleges of the Southern Association of Colleges and Schools, the regional accrediting body for this region of the United States.

The success of NSU's programs is reflected in the accomplishments of its graduates among whom are:

- Thirty-nine college presidents and chancellors
- More than 100 college vice presidents, provosts, deans, and department chairs
- Sixty-five school superintendents in 16 states, including nine of the nation's largest school districts
- Hundreds of college and university faculty members nationwide
- More than 100 high-ranking United States military officers, including admirals and generals, and business presidents, vice presidents, executives, middle managers, and researchers at companies such as American Express, AT&T, Bell Atlantic, BellSouth, General Electric, GTE, Harris Corporation, IBM, Lenox China, Microsoft, Motorola, Nortel Networks, Sun Microsystems, Texas Instruments, Westinghouse, and William Penn Bank

The Graduate School of Computer and Information Sciences

A major force in educational innovation, the Graduate School of Computer and Information Sciences (SCIS) provides educational programs of distinction to prepare students for leadership roles in its disciplines. It is distinguished by its ability to offer on-campus, online (via the Internet and World Wide Web), and combined on-campus/online formats that enable professionals to pursue M.S., Ed.D., and Ph.D. degrees without career interruption. The school also welcomes students who wish to earn the M.S. Ph.D., or Ed.D. on a full-time basis.

Degrees Offered

Master of Science (M.S.)

- Computer Information Systems
- Computer Science
- Computing Technology in Education
- Management Information Systems

Doctor of Philosophy (Ph.D.) or Doctor of Education (Ed.D.)

- Computer Information Systems (Ph.D.)
- Computer Science (Ph.D.)
- Computing Technology in Education (Ph.D. or Ed.D.)
- Information Science (Ph.D.)
- Information Systems (Ph.D.)

Master of Science (M.S.)

Full-time on-campus and online students may complete the degree in 12 months and, in some cases, as few as nine months. Part-time on-campus and online students may complete the degree in 18 months. On-campus programs are offered in the evening—each class meets one night a week. The degree requires 36 credit hours (12 courses or 10 courses and a thesis). Master's terms are 12 weeks long and there are four terms each year. They start in September, January, April, and July. To earn the M.S. in 12 months students must enroll in three courses each term. (This is the normal full-time load. Students who wish to take four courses per term must obtain permission from the program office.) To earn the degree in 18 months, students must enroll in two courses each term. On-campus students are permitted to take online courses, and online students are permitted to take on-campus courses. All students must have a computer and an Internet service provider. Students can participate in online courses from anywhere in the world where Internet access is available.

Master's students may apply for early admission into the doctoral program, which provides the opportunity to earn the Ph.D. or Ed.D. in a shorter time.

Doctor of Philosophy (Ph.D.) or Doctor of Education (Ed.D.)

The school offers a unique doctoral program that requires only four weekend or two weeklong visits to the campus each year. The former is called the *cluster format*, and the latter is called the *institute format*. Both formats include a blend of on-campus and online activities. Students choosing the cluster format attend four cluster sessions each year, held quarterly over an extended weekend at the university, during the first two years of their program. Cluster terms are five months long. They start in September and March. Students choosing the institute format attend weeklong sessions twice a year at the university during the first two years of their program. Institute terms are five months long. They start in January and July.

Clusters and institutes bring together students and faculty for participation in courses, dissertation counseling (individual and group), special lectures, and ample opportunity for student–faculty and student–student interaction. Between sessions students work on assignments and projects, and participate in online activities that facilitate frequent interaction with the faculty and with other students. Interactive learning methods, consistent communication between faculty and students and accessible learning resources provide a powerful and supportive learning environment that can be accessed anywhere around the globe. Online activities may include forums using threaded discussion boards, chatrooms, email, and electronic classroom sessions. In addition, the school provides a system that enables students to submit assignments online in multimedia formats.

Faculty and Research

The school's faculty members are leaders in their fields and are active in teaching and research over a range of disciplines. The school's research, conducted by students and faculty, advances knowledge, improves professional practice, and contributes to understanding in the computer and information sciences. Faculty research interests are listed in this catalog and also in individual faculty Web pages.

General Information on Graduate Programs

Admissions

Admission to the Graduate School of Computer and Information Sciences is competitive, consequently applicants who meet the minimum requirements specified in the catalog are not assured admission. The school qualitatively and quantitatively evaluates applicants and makes selections based on performance, personal qualifications, and evidence of potential for success. Admission requirements for master's degree programs are specified in the section General Information on Master's Degree Programs and in descriptions of individual master's programs. Admission requirements for doctoral degree programs are specified in the section General Information on Doctoral Degree Programs and in descriptions of individual doctoral programs. Admission requirements for international students are described in the individual degree program sections of this catalog. Applicants not having an immediate degree objective are welcome to apply for master's-level courses. Requirements are described in the section General Information on Master's Degree Programs. Newly admitted students must register within one year from the date of their first possible registration. Failure to do so will require a formal petition for readmission.

Application for Admission

Applicants must satisfy the admission requirements described in the individual program sections of this catalog. To obtain information or admission forms, contact:

The Graduate School of Computer and Information Sciences
Nova Southeastern University
6100 Griffin Road
Fort Lauderdale, FL 33314-4416

800-986-2247 or (954) 262-2000
Email: scisinfo@nova.edu
www.scis.nova.edu

Admission forms also may be downloaded from the school's Web site.

Library Resources

Students must be registered in order to use the university's library services. NSU's library system comprises the Einstein Library, Health Professions Division Library, Law Library, East Campus Library, North Miami Beach Fischler Graduate School of Education and Human Services Media Union, Oceanographic Library, and four school libraries on the main campus. The catalogs of all NSU libraries are accessible for remote searching (as are catalogs of other university libraries) to online students via the Electronic Library. Online and CD-ROM databases complement the paper-based holdings and provide full-text resources.

Interlibrary loan arrangements through networked organizations such as the Online Computer Library Center (OCLC), the Southeast Florida Library Information Network (SEFLIN), the Consortium of Southeastern Law Libraries (COSELL), and the National Library of Medicine provide broad access to a wide range of materials. The library also has lending agreements with large research libraries in the Midwest, which provide priority document delivery services to students. The Einstein Library is a cooperating library of the Foundation Center in New York, giving students access to collections for grants and foundation research.

Online students have access to books, journal articles, microfiche, dissertations, index searches, catalog searches, and reference librarians. Distance students may request library materials using fax, mail, or online forms. To contact Distance Library Services (DLS) by phone, call 800-541-6682, ext. 4602, or (954) 262-4602. Use the toll-free fax to order library materials: 888-347-3627 (in Broward County, fax 262-3947). Students can send email to DLS: library@nova.edu, or can reach DLS via the Web: www.nova.edu/library. All materials mailed by the DLS office are sent by first-class mail. When books are borrowed, the student will have to pay a small charge for third-class postage to return the books. Books are loaned for one month. Periodical copies or ERIC documents need not be returned.

Student Organizations

There are several organizations that are open to SCIS students. The goal of these organizations is to help students advance in their professions through contact with working professionals, and participation in conferences. Student membership provides a variety of benefits including technical publications, career development, and financial services. Some of the organizations open to SCIS students are:

Association of Computing Machinery (ACM)
Institute of Electrical and Electronics Engineers (IEEE) and IEEE Computer Society
Upsilon Pi Epsilon (UPE) International Honor Society for the Computing Sciences (pending approval)

Student Research Involving Human Subjects

All students must be aware of the university's policy regarding research involving human subjects. If you plan to do surveys (email, telephone, regular mail), interviews, testing, or any other types of assessments involving human subjects as part of your dissertation, the instruments and protocols must be reviewed by the university's Institutional Review Board (IRB). The purpose of the IRB is to protect the rights of human subjects involved in research and ensure

appropriate practices are being carried out at NSU. SCIS has a representative to the IRB who can help students with the review process. There are three levels of review: exempt, expedited, and full review. The SCIS representative guides students regarding the level of review required and assists with any paperwork and procedures that might be required. Most research at SCIS falls into the exempt category, which requires a rather simple process, but it must be logged appropriately. Students should contact the SCIS IRB representative by the time they start working on their preliminary proposals. Courses also may involve human subject research. In most cases, faculty members secure approval in advance for all students in the course. If you plan to conduct human subject research in a project course or as independent study, you should raise the matter with your professor. Students may obtain additional information from their program office and from www.nova.edu/cwislogc/irb.

Teaching Assistantship Program

The school has a limited number of teaching assistantship positions. To be considered for a teaching assistantship, candidates must have a master's degree in a related field and must be a student in an SCIS doctoral program. Teaching assistants will spend from 20 to 30 hours per week at the university. The assistantship program includes tuition and fees; however, other expenses, e.g., books, are not included. Medical insurance is available under the monthly employee plan. Residence within daily commuting distance to the campus is required. Each award includes a one-year renewable contract with renewal based on faculty evaluation.

Teaching assistants may teach courses, assist faculty members with course work, counsel students, conduct literature searches, assist in the preparation of course syllabi, evaluate textbooks, grade papers and projects, and participate in technical/research projects. In order to teach graduate courses, the teaching assistant must have completed 18 doctoral credits.

Interested SCIS doctoral students must submit an application, including an up-to-date curriculum vita, cover letter, and arrange for submission of SCIS evaluation forms by three SCIS faculty members. For information and applications, call 800-986-2247, ext. 2044. (The application also may be downloaded from the school's Web site.)

Financial Information

Tuition and Fees

Academic, program, and online services are provided only to SCIS students who are currently registered. Students who are not registered are not entitled to receive services. Textbooks are not included in tuition and fees and must be purchased by the student. Students are responsible for their own lodging and travel expenses. Students must be registered to gain access to NSU's computing services. Students who have grades of *Incomplete* to resolve must register for *Continuing Services* (see table below for costs). Doctoral students must be registered for courses, projects, dissertation, or continuing dissertation to receive the support of the faculty on the dissertation process.

Master's Degree Programs (Rates are subject to change.):

Tuition	\$395 per credit hour
Application Fee.....	\$50 nonrefundable
Registration Fee.....	\$30 nonrefundable
Late Registration Fee	\$100 nonrefundable
Reinstatement Fee	\$50 nonrefundable
Program Change Fee	\$100 nonrefundable
Graduation Fee.....	\$75
Deferment Fee for Installment Payment	\$50
Continuing Services.....	\$160 (leave of absence with online privileges per term)

Doctoral Degree Programs (Rates are subject to change.):

Tuition for Course Work.....	\$4,450 per term (10 credit hours)
Tuition for Dissertation I or II.....	\$4,860 per term
Tuition for Continuing Dissertation.....	\$2,430 per term
Tuition for Continuing Services, Incompletes.....	\$445 per incomplete (I) grade per term
Application Fee.....	\$50 nonrefundable
Registration Fee.....	\$30 nonrefundable
Materials Fee	\$20 per 700-level course
Late Registration Fee	\$100 nonrefundable
Reinstatement Fee	\$50 nonrefundable
Program Change Fee	\$100 nonrefundable
Deferment Fee for Installment Payment	\$50
Graduation Fee.....	\$75

Tuition Payment Policy

Tuition and fees may be satisfied with payment by check, money order, credit card, or official financial aid award letter with associated financial aid documentation. Cash will not be accepted as payment for tuition and fees unless paid at the Office of the University Bursar. All postdated checks or credit card authorizations will be held by the university for processing until the due dates specified in this policy. The tuition payment policy is subject to change at any time at the discretion of the administration of Nova Southeastern University. There are five options available for the payment of tuition. These options are described below:

1. *Full payment by the student:* Full payment of tuition and fees is to be made at the time of registration. Registration after the registration period, when permitted, will involve payment of a late registration fee.
1. *Installment payment by the student (students attending on an I-20 are not eligible for this option):* This plan requires three payments spread over the first 90 days of the term. The first payment must be made by check, money order, or credit card. At the time of registration, the student must submit postdated checks or credit card authorizations for the second and third installments. The first payment, due at registration, includes all fees, 50 percent of the tuition, plus a \$50 deferment fee. The second payment, due 60 days from the beginning of the term, shall equal 25 percent of the tuition. The third payment, due 90 days from the beginning of the term, shall equal 25 percent of the tuition. Registrations received without the three payments cannot be processed.
1. *Direct payment by the student's employer:* If a letter of commitment or a voucher from the student's employer accompanies the registration form, then the student will not be required to make a payment at registration time. The letter of commitment or the voucher must indicate that the employer will remit full payment of tuition and fees to Nova Southeastern University upon receipt of the invoice from the university's accounts receivable office.
1. *Tuition reimbursement by the student's employer:* If the student submits a letter from the employer at registration time that establishes eligibility for tuition reimbursement, the student may choose a two-payment plan. The first payment, due at registration, shall include all fees, 50 percent of the tuition, plus a \$50 deferment fee. The second payment, due five weeks after the end of the term, shall equal 50 percent of the tuition. To secure this plan, the student must provide, at registration, a postdated check or credit card authorization for the deferred portion.
1. *Financial aid award:* Students who have applied for financial aid and have submitted all the required paperwork to the Office of Student Financial Assistance may register without payment.

Refunds

To receive a full refund of tuition (not including fees), a student must cancel any registration, enrollment contract, or financial agreement made with the university and such cancellation must be made in writing within three working days from the date such payment is due. A student withdrawing from a course may be eligible for a refund (full or partial) depending on the date of withdrawal. The section Withdrawal and Refund Policy describes the refund policy regarding withdrawals. Failure to attend classes does not automatically drop or withdraw a student from the class or the university.

Financial Aid

The Office of Student Financial Assistance administers the university's financial aid programs of grants, loans, scholarships, and student employment, and provides professional financial advisers to help students plan for the most efficient use of their financial resources for education. In order to participate in financial aid programs, a student must be admitted into a university program, and must be a citizen, a national, or a permanent resident of the United States, or be in the United States for other than a temporary purpose. A prospective student who requires financial assistance must apply for financial aid while he or she is a candidate for admission. Students/applicants may apply for financial aid online at www.nova.edu/cwis/finaid. Students must work directly with the university's Office of Student Financial Assistance because the school's program office does not administer or manage the financial aid process. For additional information or application forms call (954) 262-3380, 800-806-3680, or send email to lordcarl@nova.edu or finaid@nova.edu. To continue financial aid, at a minimum, enrolled students must demonstrate satisfactory academic progress toward a stated educational objective in accordance with the university's policy on satisfactory progress for financial aid recipients.

Registration

Academic Advising and Registration

Academic advising is provided by the student's program office in concert with the faculty. The registration process begins when the program office sends each student a registration packet that contains class schedules and information about the registration period and the registration process.

Deadlines

Students are expected to register during the announced registration period. Registration after the close of the announced registration period, when permitted, will require the payment of a late fee.

Drop/Add Periods

Master's degree students:

Registered students may drop/add a course prior to the first day of the term and up to and including the sixth calendar day of the term (the drop/add period) without penalty. If a course is dropped between the first day of the term and the end of the drop/add period and another course is not added in its place, the withdrawal policy applies. Failure to attend classes does not automatically drop or withdraw a student from the class.

Doctoral degree students:

Registered students may drop/add a course prior to the first day of the term and up to and including the second day of classes (the drop/add period) without penalty. If a course is dropped between the first day of the term and the end of the drop/add period and another course is not added in its place, the withdrawal policy applies. Failure to attend classes does not automatically drop or withdraw a student from the class.

Withdrawal and Refund Policy

Withdrawal requests must be submitted to the student's program office and must be made *in writing* by the student. Requests for withdrawal received after the last day of the term will not be accepted. Failure to attend classes or participate in course activities will not automatically drop or withdraw a student from the class or the university. Students who have not withdrawn on or before the last day of the term will receive letter grades that reflect their performance in the course(s). When a withdrawal request is approved, the transcript will show a grade of W for the course. Depending on the date of withdrawal, the student may be eligible for a partial refund. Refund schedules are as follows:

Refund Schedule for Master's Courses:

Students withdrawing between the first and the ninth calendar day of the term will receive a 90 percent refund of tuition paid. Students withdrawing between the 10th and the 21st calendar day of the term will receive a 50 percent refund of tuition paid. Students withdrawing between the 22nd and the 42nd calendar day of the term will receive a 25 percent refund of tuition paid. Students withdrawing after the 42nd calendar day of the term will receive no refund. If a student is using one of the payment plans (see Tuition Payment Policy), the tuition due or the amount refunded will be adjusted accordingly.

Refund Schedule for Doctoral Courses:

Students withdrawing between the first and the 15th calendar day of the term will receive a 90 percent refund of tuition paid. Students withdrawing between the 16th and the 38th calendar day of the term will receive a 50 percent refund of tuition paid. Students withdrawing between the 39th and the 76th calendar day of the term will receive a 25 percent refund of tuition paid. Students withdrawing after the 76th calendar day of the term will receive no refund. If a student is using one of the payment plans (see Tuition Payment Policy), the tuition due or the amount refunded will be adjusted accordingly.

Auditing a Course

To audit a course, degree and non-degree students must request permission from the program office in which the course is offered. Audited course work will appear on the student's official transcript with the grade of AU. An auditor may attend classes, submit assignments, and take examinations. Registered students may change from credit to audit status or audit to credit status during the drop/add period. A previously audited course may be taken for credit at a later date. Also, a student may audit a course previously taken and passed. Persons may not attend a class without being properly admitted to the university and registered in the class. The usual tuition and fees apply to all audited courses.

Academic Information and Policies

Student Original Work (See also Student Rights and Responsibilities)

Each student is responsible for maintaining academic integrity and intellectual honesty in his or her academic work. It is the policy of the school that each student be academically honest, which means that each student must:

- Submit his or her own work, not that of another person
- Not falsify data
- Not engage in cheating (giving or receiving help during examinations, acquiring and/or transmitting test questions prior to an in-class examination, or falsifying any records, including admissions material)
- Not receive or give aid on assigned work that requires independent effort
- Properly credit the words or ideas of others according to accepted standards for professional publications (See, for example, *The Publication Manual of the American Psychological Association*.)
- Not use term paper writing services or consult such services for the purpose of obtaining assistance in the preparation of materials to be submitted in courses
- Not engage in plagiarism

Webster's defines plagiarism as "stealing or passing off ideas or words of another as one's own" and "the use of a created production without crediting the source." The university's policies regarding student original work are contained in the Student Handbook and repeated in this catalog (see Nova Southeastern University Statement of Student Rights and Responsibilities, A. Academic Standards).

Refer also to the section Student Misconduct and the section Procedures for Resolving Allegations of Student Misconduct.

Form and Style Requirements for Student Work

Doctoral students must follow the policies, procedures, and formatting requirements contained in the school's *Dissertation Guide* for the planning and preparation of the doctoral dissertation. For reference lists, doctoral students must follow the instructions given in the section Reference List and Annotated Bibliography of the *Dissertation Guide*. Master's and doctoral students may find the *Dissertation Guide* useful for the preparation of other work. For an individual course (master's or doctoral) the course professor will specify form and style requirements in the course syllabus. There are several books that provide general guidelines for form, style, and general writing principles in the preparation of papers, assignments, and reports. *Bugs in Writing* (Dupré, 1998) contains valuable guidance on professional writing and is specifically oriented to the computer and information sciences. The *Publication Manual of the American Psychological Association, Fifth Edition, 2001*, addresses content and organization, the expression of ideas, grammar, and editorial style. *The Chicago Manual of Style, 14th Edition*, is another excellent style guide.

Attendance Policy

Master's degree students are expected to be present at each meeting of their classes on campus. Exceptions to this rule may be made in the case of illness and possibly in other instances when approved by the course professor. Students should advise their course professors in advance of any anticipated absences. Additional work may be required by a course professor for any absence. Excessive absences will result in a failing grade. For online master's courses, participation/attendance policies will be covered in the syllabus of each course.

Doctoral degree students are required to attend all of their scheduled clusters or institutes. Students are cautioned that they will risk withdrawal from courses and suspension or dismissal from the doctoral program should they miss institutes or clusters. Exceptions to this rule may be made in the case of illness and possibly in other hardship situations. Such exceptions must be approved first by the course professor and then by the program director. Absence from individual class sessions must be approved by the course professor. Students are required to advise the program office and their course professor in advance of any anticipated absences. Participation/attendance policies regarding the online components of doctoral courses will be covered in the syllabus of each course.

Grading System

Students will be assigned grades for courses and projects according to the following system:

Grade	Grade Points
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
F	0.0
I	A temporary grade assigned for incomplete work. See the section The Grade of Incomplete (I) for policy.
W	Withdrawn from course. See the section The Grade of Withdrawn (W) for policy.
WU	Withdrawn by the university
PR	Progress. May be assigned to thesis or dissertation registrations. Carries credit hours but no quality points. Indicates progress toward completion of a thesis or dissertation.
NPR	No Progress. May be assigned to thesis or dissertation registrations. Carries credit hours but no quality points. Indicates no progress or inadequate progress toward completion of a thesis or dissertation. Repeated NPR grades may result in evaluation for dismissal.
P	Pass. Thesis and dissertation grades of PR and NPR will be changed to P when the thesis or Dissertation report receives final approval.
AU	Audit. For students who register for a course on an audit basis.

To determine the grade point average (GPA), divide the sum of all the grade points earned in graduate courses taken toward the graduate degree by the number of course credit hours taken toward that degree. Only those courses and projects taken toward the degree that carry grade points, except repeated courses, transfer credits, and 500-level courses,

are included in the computation of the GPA. The grades of I, W, WU, P, PR, and NPR do not affect the GPA. With the exception of the grade of I, once a final grade in a course has been recorded by the Office of the University Registrar it can be changed only in cases of computational error or other justifiable cause approved by the dean (Refer to Challenge of Course Grade). A student may not do additional work or repeat an examination to raise a final grade.

The Grade of *Incomplete (I)*

The grade of Incomplete (I) will be granted only in cases of extreme hardship. In such cases, a student requiring an incomplete must submit a written appeal with full rationale to the course professor at least two weeks prior to the end of the term. The student does not have a right to an incomplete, which may be granted only when there is clear evidence of just cause. Should the course professor agree, an *incomplete contract* will be prepared by the student and signed by both student and course professor. The *incomplete contract* must contain a description of the work to be completed and a completion date. The completion period should be the shortest time possible. In no case may the completion date extend beyond 30 days from the last day of the term for master's courses or beyond 60 days from the last day of the term for doctoral courses. The *incomplete contract* will accompany the formal submission of the course professor's final grade roster to the student's program office. The program office will monitor each *incomplete contract*. If a change-of-grade form is not submitted by the scheduled completion date, the grade will be changed automatically from I to F. No student may graduate with an I on his or her record. The grade of I does not apply to master's thesis or doctoral dissertation registrations.

The Grade of *Withdrawn (W)*

Withdrawal requests must be submitted to the student's program office and must be made *in writing* by the student. Requests for withdrawal received after the last day of the term will not be accepted. Failure to attend classes or participate in course activities will not automatically drop or withdraw a student from the class or the university. Students who have not withdrawn on or before the last day of the term will receive letter grades that reflect their performance in the course(s). When a withdrawal request is approved, the transcript will show a grade of W for the course. Depending on the date of withdrawal, the student may be eligible for a partial refund (see the section Withdrawal and Refund Policy).

Repeating a Course

A student who has passed a course with a grade of B- or higher is not permitted to repeat it for credit. A student may repeat a course in which a grade of C+ or lower has been earned but credit toward the degree and the GPA will be granted only once. Permission for repeating a course must be obtained from the student's program office. The transcript will show both the original and repeat grades; however, only the higher grade will be counted in the computation of the student's GPA. Students repeating a course must pay course tuition and fees.

Grade Requirements and Academic Standing

Each student must maintain a cumulative grade point average (GPA) of at least 3.0 to remain in good academic standing. When the cumulative GPA falls below 3.0 the student is automatically placed on academic probation and will not be permitted to graduate. (Academic probation may adversely affect financial aid.) If the cumulative GPA is not raised to 3.0 within two terms, the student will be dismissed from the program. Upon achieving a cumulative GPA of 3.0, the student will be removed from academic probation. If a very low cumulative GPA could not possibly be raised to 3.0 within two terms the student will be dismissed immediately. Doctoral students who do not have a cumulative GPA of 3.0 at the end of their course work will not be admitted to candidacy and will not be permitted to register for dissertation. Doctoral students who received NPR grades for successive dissertation registrations will be evaluated for probation or dismissal (see Evaluation of Dissertation Progress in the section Doctoral Degree Programs).

Time Limitations

Master's Students:

Students must complete requirements for the degree within five years from the date of their first registration. Students wishing an extension of time must petition the program office in writing at least three months before the time limit is reached. Extensions may be granted only if the petition presents justifiable cause and an acceptable plan for program completion. In the absence of a petition for extension, the student will be automatically dismissed from the program.

Doctoral Students:

Students must complete requirements for the degree within seven years from the date of their first registration. Students desiring an extension of the time limit must petition the program office in writing at least three months before the time limit is reached. In the absence of a petition for extension, the student will be automatically dismissed from the program. Only the dean can grant an extension. Extensions are granted reluctantly and only when it is believed that the student is very close to finishing the dissertation and when the knowledge the student gains from the program will be contemporary. For a petition for extension to be considered, the following conditions must be met: (1) The student must be in the final report stage of the dissertation; (2) the dissertation advisor, committee members, and the program director must support the petition for extension; and (3) there must be a high probability that the student will complete

the final dissertation report within three to six months of the date of the petition for extension. Students reaching the seven year time limit but who do not meet the conditions listed above may petition the program office in writing for readmission. Such petitions must be received at least three months before the time limit is reached. Readmission is a process whereby exceptional Ph.D. students may be granted a new time limit to complete the degree. A student who applies for readmission will be reviewed by a faculty committee that will present a recommendation to the dean. A petition for readmission will be considered when the following conditions must be met: (1) The student must, at a minimum, have an approved idea paper and an advisor; and (2) the dissertation advisor and the program director must support the petition for extension. The faculty committee must decide if the student has the potential to successfully complete a dissertation. Recommendations to the dean that are favorable toward readmission will include a new time limit and may contain other requirements such as taking additional courses to ensure that the knowledge the student gains from the program will be contemporary.

Reinstatement Following Dismissal

A dismissed student may petition the program office, in writing, for reinstatement after six months. Each petition must include a reinstatement fee of \$50 (nonrefundable). Petitions must meet application for admission deadlines and must describe the reasons why academic potential has changed. Reinstatement will be evaluated by the Academic Review Committee. Reinstated students unable to achieve a GPA of 3.0 in their program during the two terms following reinstatement will be dismissed from the school and will not be eligible for reinstatement again.

Inactive Status

Students who are not registered are considered to be *inactive*. Inactive students are not eligible for academic services from faculty and staff members and are not eligible to receive computing, library, and other university services. A student who has not registered for one or two consecutive terms will be reactivated upon registration with no academic penalty. Students who have not registered for one year must petition the Office of Admissions, in writing, for reinstatement and submit a reinstatement fee of \$50. Students who are reinstated will be required to meet all program requirements and policies in effect at the time of reinstatement. Reinstated students must still meet their degree program time limitations based on the date of their first registration in the program unless extensions were granted at the time of reinstatement.

Student Records and Transcripts

The university maintains a system of record keeping and provides students with official grade reports and transcripts reflecting their academic progress. This system documents all official information from the time of application for admission to graduation. Official hard copies of records are maintained by the registrar's office. Records are secured via the computerized student information system in addition to back-up hard copy files. Computer files are secure and kept up to date. The registrar's office follows the American Association of Collegiate Registrar's and Admissions Officer's (AACRAO) guidelines for the retention and disposal of records. After the appropriate time period, hard copy files are retired to storage. Computer files are moved to historical files and permanent records are microfilmed for later reference.

Students may obtain copies of their transcripts; however, an official transcript of a student's academic record cannot be released until after all of his or her accounts, academic or nonacademic, are paid. Upon completion of a degree program at the university, students receive one transcript without charge. Any other transcripts, before or after graduation, must be specifically requested. For these, there is a \$5 fee for each official transcript requested. To obtain an official transcript, a written request is required. Students or graduates may complete a Transcript Request Form at the registrar's office or send a letter to the Office of the University Registrar, 3301 College Avenue, Fort Lauderdale, FL 33314-7796 containing your name, address, Social Security number, and answers to the following questions:

- In what program were you enrolled? When did you attend? If you graduated, what date?
- Do you want to delay processing because of term grades, change of grades, or conferral of degree?
- How many transcripts do you want? Where should they be sent?

To receive an unofficial transcript by fax, send a signed request or fax a request to (954) 262-7265.

Challenge of Course Grade

A student who wishes to challenge a grade assigned for an entire course must communicate with the course professor, in writing, within ten days of receipt of the grade. In this communication, the student must state the reasons for requesting a change in the grade. A decision will be made by the course professor following his or her review of the appeal. The student will not be permitted further appeal. If, however, evidence of discrimination or a violation of the student's rights is presented, then the Student Grievance Procedure shall be followed. A student may neither do additional work nor repeat an examination to raise a final grade.

Student Misconduct

Students are expected to deport themselves as respectable and respectful members of the academic community. The school will not tolerate acts of academic dishonesty or behavior that are clearly unethical, unprofessional, flagrantly

disruptive, or that violate the general understanding of the proper conduct of graduate students. Committing an act of misconduct will subject the student to dismissal from the university. Violations of academic standards will be examined by the Academic Review Committee, which will present its findings to the dean for adjudication. Violations of conduct or supplementary standards will be handled by the Office of the Dean of Student Affairs or by the Graduate School of Computer and Information Sciences. Student conduct standards and detailed procedures regarding violations are contained in this catalog in the section Student Rights and Responsibilities. Non-academic conduct policies are contained in the university's Student Handbook.

Procedures for Resolving Allegations of Student Misconduct

Violations of academic standards will be examined by the Academic Review Committee, which will present its findings to the dean for adjudication. Violations of conduct or supplementary standards will be handled by the Office of the Dean of Student Affairs or by the Graduate School of Computer and Information Sciences. Allegations of student misconduct must be made in writing to the student's program office by a faculty member, staff member, or student. All pertinent factors, witnesses, events, and evidence related to the alleged misconduct should be included. If the allegations constitute *probable cause* to proceed, the program director or assistant program director will notify the accused in writing that an inquiry will be conducted. Inquiries regarding alleged violations of academic standards will be conducted by the Academic Review Committee which will submit its findings and recommendation to the dean. Inquiries regarding alleged violations of non-academic standards will be reviewed by the administration of the school and adjudicated by the dean, or will be presented to the Office of the Dean of Student Affairs for adjudication. As part of the inquiry, all pertinent documentary evidence and statements from witnesses will be assembled. The accused will be given an opportunity to provide a written response to the allegations. When misconduct is indicated beyond reasonable doubt, an appropriate sanction will be chosen (see Students Rights and Responsibilities). A report of the findings and penalty will be provided to the accused who may acquiesce in the penalty or may contest and ask for a hearing. Failure of the accused to respond within 20 days shall be construed as acquiescence in the report of the inquiry. If a hearing is requested, it will be conducted by the Academic Review Committee in the case of academic violations or by the Office of the Dean of Student Affairs in the case of non-academic violations. If, after the hearing, the accused is found guilty of misconduct, the dean of the school or the dean of student affairs will decide on the final action to be taken.

Student Grievance Procedure

This section describes the procedure for student grievances regarding academic matters. (Grievance procedures for nonacademic disputes are contained in the Student Handbook.) If the issue concerns the fairness of a grade, the procedure described in the section Challenge of Course Grade must be followed. For all other matters, the procedures shall be as follows:

First, the student should attempt to resolve an issue in dispute at the level at which the dispute occurred, for example, with the appropriate faculty member or program director. This attempt must be in writing (e.g., email, regular mail, or fax). The student may wish to use certified mail to verify receipt of correspondence. In the correspondence, the student must present a rationale for his or her position based on factual information. The student will receive a reply from the recipient, in writing, that addresses the complaint. If the reply is not acceptable, the student is encouraged to submit the complaint in writing, to the next higher level, e.g., the appropriate program director. If the program director is unable to resolve the dispute, he or she will notify the student and the dean of this in writing. The student may then appeal in writing to the dean of the Graduate School of Computer and Information Sciences. The dean will attempt resolution. If appropriate, the dean may assign the matter to the Academic Review Committee consisting of at least three faculty members of the school, one of whom will be appointed chair. The committee will meet, carefully review the case, and make a written recommendation, including rationale, to the dean to either accept or reject the student's appeal, or may propose an approach to resolve the dispute. The dean will review the findings and recommendations of the Academic Review Committee, and will notify the student in writing of his or her decision. The dean's decision is final and cannot be appealed.

Textbooks

Book information can be found on the SCIS Web site. Click on *Master's Programs* or *Doctoral Programs* and then on *Book Information*. SCIS students must find their own sources to purchase textbooks. Possible sources include online booksellers and national bookstores. Students may find online purchasing to be faster and less expensive. Inquiries as to availability via the Internet may be made to online booksellers such as Amazon Books (www.amazon.com), Barnes and Noble (www.bn.com), Borders Online (www.borders.com) and Fatbrain.com (www.fatbrain.com). Other possible sources may be found via Internet search. Discounts are often available. Students should compare prices, availability, and shipping options. Students should place their orders early enough to ensure delivery prior to the start of the term. Please note that some texts may involve a wait of six to eight weeks. There may be occasions when books are not available for the start of the term because they are out of stock or temporarily out of print. In such cases, faculty members will ensure that courses progress according to their schedules.

Communication by Email

Students must use the email accounts issued by SCIS when sending email to faculty and staff. When communicating with students via email, faculty and staff members will send mail only to NSU email accounts using NSU usernames. Students may forward their NSU-generated email to external locations, but do so at their own risk. SCIS uses various course management tools that use private internal email systems. Students enrolled in courses using these tools should check both the private internal email system and NSU's regular email system daily. NSU offers students Web-based email access.

Student Services

Student ID Cards

Registered students are issued student ID cards. These are required to check out books from the Einstein Library. A number of businesses in the community will give students discounted rates on a variety of services ranging from movies to dinner if an ID card is shown. If an ID card is lost or destroyed, a new one may be requested at the registrar's office. There is an additional fee to replace a lost card.

Student Housing

On the main campus, one-bedroom and two-bedroom furnished and unfurnished apartments are available for graduate and married students without children. Utilities, basic cable TV, and central air conditioning are included in the housing rates. Interested students are invited to obtain further information from the university's Office of Residential Life at (954) 262-7052 or (800) 541-6682, ext. 7052.

Travel Services

Nova Southeastern University has a full-service travel agency in the Horvitz Administration Building that can make reservations and issue airline tickets and reserve rental cars. In addition, travel agents can also help make arrangements for trips and vacations. NSU's travel service accepts money orders and major credit cards. The travel agency can be reached at (954) 262-8888 or toll free 800-541-6682, ext. 8888.

Graduation

Graduation Requirements

All degree-seeking students must complete the minimum number of credit hours designated for the chosen program, and must meet the following requirements:

- Admission as a degree-seeking candidate in one of the programs
- Satisfy program requirements including completion of courses, master's thesis where appropriate and, for the doctorate, an approved dissertation as specified in program documentation
- Doctoral students: Attendance at all required cluster or institute meetings
- Attainment of a cumulative grade point average of at least 3.0
- Payment of all tuition and fees
- Completion of the form *Application for Degree* and payment of graduation fee. The *Application for Degree* form may be downloaded from the school's Web site, or obtained from the program office or the Office of the University Registrar. Master's students should complete the form at the time of registration for their final term. Doctoral students should complete the form upon written notification of acceptance of their dissertation report.
- Fulfillment of all obligations to the library, the student's program, and the comptroller's office
- Removal from provisional admission status and conditional admission status

Commencement

A commencement ceremony is held in June or July for Nova Southeastern University graduate students. All graduating students are encouraged to participate in this ceremony. In order for a student to participate, the program director must expect the completion of all the student's graduation requirements within six weeks following the date of the commencement ceremony. Students expecting to graduate must complete an application for graduation and submit it to the program office at least six weeks prior to the date of the commencement ceremony. The program office will advise the university registrar of eligible students, who will distribute commencement procedures to these students.

Alumni Association

Nova Southeastern University has an active alumni association that is a division of the Office of Institutional Advancement. The association is organized on three levels—local, state, and national—that work in concert to provide special programs and other services that promote the professional and intellectual growth of graduates and maintain communications between graduates and the university. Additional information can be obtained from the Office of Alumni Relations and Special Events at (954) 262-2118 or (954) 262-2103.

Master's Degree Programs

General Information on Master's Degree Programs

Application for Admission (See Admissions under the section General Information on Graduate Programs)

Admission decisions are made on a rolling basis. Before an application can be considered reviewable by the Admissions Committee, the following items must be received by the admissions office: application form, application fee, essay, summary of professional experience or GRE scores, at least two of the required three evaluation forms and all transcripts (unofficial copies are acceptable pending receipt of official transcripts). To ensure evaluation for the desired starting term, reviewable applications must be received at least one month prior to the start of that term. Late applications that cannot be processed in time for the desired starting term will be considered for the next term.

Applicants must meet the general requirements, submit the items specified below, and must also satisfy the program-specific admission requirements contained in the individual program sections of this catalog. Detailed instructions for the preparation and mailing of admissions materials are contained in the school's admission forms. Admission forms, brochures, and this catalog may be downloaded from the school's Web site: www.scis.nova.edu.

1. An earned bachelor's degree from a regionally accredited institution with an appropriate major (see program-specific admission requirements).
2. Application form, application fee, and essay.
3. Official transcripts of all graduate and undergraduate education. Transcripts must show an undergraduate GPA of at least 2.5 and a GPA of 3.0 in a major field.
4. Evaluation forms from three individuals who are familiar with your academic and/or professional capabilities and are able to assess your intellectual abilities, maturity, and motivation. Forms from family members or individuals who are unable to evaluate your academic or professional background are unacceptable.
5. Summary of Professional Experience or score report of the Graduate Record Examination (GRE).
6. Proficiency in the English language is a prerequisite for study at the Graduate School of Computer and Information Sciences. Master's students are expected to write numerous papers. It is very important to note that grammatical errors, spelling errors, and writing that does not express ideas clearly will affect a student's grades and the completion of his or her degree. The faculty will not provide remedial help concerning grammatical errors or other writing problems. Applicants who are unable to write correctly and clearly are urged to seek remedial help before enrolling in any of the school's programs.

Additional Admission Requirements for International Master's Students

1. The application fee must be in U.S. dollars.
2. Online international students who do not live in the United States do not need visas to participate in the program because they do not have to travel to the United States to complete the degree.
3. Requirements for campus-based students: The university will not enroll a campus-based student who has not been approved initially, or approved for transfer, by the Immigration and Naturalization Services (INS) to attend Nova Southeastern University. The INS requires that all students on an F-1 student visa must enroll full time and attend the main campus only. All students holding J-1 or F-1 visas are required to carry medical insurance. Students on J-1 visas are required to secure an affidavit of support, from an agency or government who will be the financial sponsor, stating that they have a sufficient amount of money to support themselves for the duration of their study. Students on F-1 visas need an affidavit of support and a notarized/attested financial statement proving that they have a sufficient amount of money to support themselves for one academic year (generally nine months). Non-degree or provisional admission status is not considered a basis for the issuance of an I-20. After applicants receive a written offer of admission, the I-20 will be provided, upon request, to those who have verified financial support and require an F-1 student visa. International students must enter the United States on a valid student or other visa. Nonresident aliens currently in the United States must have a valid student or nonimmigrant visa (except B1/B2 visa) for enrollment in the university. Students sponsored by the United States government or their home government are required to enter the United States on a J-1 visa (exchange visitor's visa). For additional information regarding international students, contact the university's International Student Advising Service at (954) 262-7240 or 800-541-6682, ext. 7240; fax: (954) 262-7265.
4. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL). A minimum test score of 550 is required for applicants taking the written examination. A minimum test score of 213 is required for applicants taking the computer-based examination. (Scores must be no more than two years old.) Test results must be sent directly to the Graduate School of Computer and Information Sciences from TOEFL/TSE Services, P.O. Box 6153, Princeton, NJ, 08541-6153, USA; phone: (609) 771-7100; fax: (609) 771-7500, Web site: www.toefl.org.

5. The applicant must have a university-level education at least equivalent to a regionally-accredited United States bachelor's degree in a related field (see program-specific admission requirements) with an equivalent GPA of at least 2.5 and an equivalent GPA in the applicant's major field of 3.0. To enable SCIS to determine these equivalencies, the applicant must have his or her degree evaluated by an agency that is a member of the National Association of Credential Evaluation Services (NACES). (For more information about evaluation agencies you may contact the SCIS Office of Admissions). To apply for the transfer of graduate credits from a foreign institution, the applicant must have the courses proposed for transfer evaluated by an agency that is a member of the National Association of Credential Evaluation Services.

Admission of Non-Degree Students

A qualified applicant wishing to take one or more master's-level courses but not having an immediate degree objective is welcome to the extent that school resources allow. An applicant requesting non-degree status must have an earned bachelor's degree in a related field from a regionally accredited college or university and must submit an application form, official transcripts of undergraduate and graduate education, a request for Unix account form, and an application fee. Admission forms may be obtained from the school's Office of Admissions or may be downloaded from the school's Web site (www.scis.nova.edu).

Non-degree students may take up to 18 credits and must maintain a 3.0 GPA to continue enrollment in non-degree status. The non-degree student may apply for degree status at any time by completing the regular graduate admissions application process. Satisfactory completion of courses by non-degree students does not guarantee admission to the master's degree program. Courses completed while the student is in a non-degree status will be evaluated by a faculty committee as to the suitability of their transfer into the desired master's degree program. Courses applied to a graduate degree must fall within the time frame specified for the master's degree. An international student on an I-20 may not enroll in the non-degree status. Non-degree students are not eligible for financial aid.

Provisional or Conditional Admission

A degree-seeking applicant who has missing documents but appears to be acceptable based on documents received by SCIS may be offered *provisional admission*. Official admission will be granted upon receipt and acceptability of the remaining required documents. Examples of missing documents are an official transcript and an evaluation form. All missing documents must be submitted by the end of the student's first term. An applicant who has not met all admission requirements may be offered *conditional admission* if sufficient evidence exists to suggest the ability to perform successfully in the program. A student with conditional status must remove stated deficiencies as specified in the acceptance letter.

Transfer Credit Policy

Up to six graduate credits may be transferred from a regionally accredited institution. Courses proposed for transfer must have received grades of at least B. Students must request approval of transfer credits in writing at the time of application (see instruction on the application form). Copies of catalog course descriptions or course syllabi are required to process requests for transfer credits. Federal regulations require that veteran students **MUST** report all prior credit and training, and that the school **MUST** evaluate such and grant credit as appropriate, with training time and tuition reduced proportionately and with the VA and student so notified.

Orientation and Advisement Program

New students are invited to the campus for an orientation and are also provided Web-based and CD-ROM-based orientations that includes computer/software requirements, online access, tools and methods, and library access. A guide to the school's online learning environment can be downloaded, and a hard copy is provided to each student. The school's Web site provides an extensive online "help" system including downloadable software and documents. Advisement is provided by the master's program office and the faculty.

Early Admission into the Doctoral Program (See program options in the individual M.S. program sections.)

This option provides the school's M.S. students the opportunity to earn the doctorate in a shorter time. Minimum requirements for early admission are the completion of 24 credits in the M.S. program with a GPA of 3.5 or higher and the completion of specific master's courses (see doctoral program sections for details). If admitted into the doctoral program, students will take the remaining 12 credits for the M.S. degree in the doctoral program. Master's students may apply for early admission no sooner than during the term in which they will be completing 24 credits. Students must submit applications for early admission to the SCIS Office of Admissions. Doctoral admission forms may be downloaded from the SCIS Web site. An application fee is not required. The SCIS Office of Admissions will supply the Admissions Committee with the student's current transcripts. Three evaluation forms must be completed by SCIS faculty members. Upon successful completion of 12 credits in the doctoral program, the student may apply for the master's degree. Contact the master's program office for a degree application.

Thesis and Non-Thesis Options

For the thesis option, 30 credit hours of course work and six credit hours for the master's thesis are required. For the non-thesis option, 36 credit hours of course work are required. Students interested in completing the master's thesis should contact the master's program office to make arrangements.

Term Dates

Four 12-week terms are offered each year. Terms start in September, January, April, and July. (The Academic Calendar for the master's program is printed on the inside of the front cover of this catalog.)

Program Formats

The 36-credit hour program is designed so it may be completed by full-time students in 12 months or by working professionals in 18 months while remaining in their current positions. To earn the degree in 12 months, students must enroll in three courses per term. To earn the degree in 18 months, students must enroll in two courses per term. Terms are 12 weeks long and there are four terms each year. Students select one of two formats: online or on-campus (on-campus is not available for the M.S. in computing technology in education). With the permission of the program office, a student in one format may take a course in another format.

The online format requires the completion of 12 courses via online techniques or 10 online courses and a six-credit thesis (see section on thesis option). Students participate in online courses from anywhere in the world where Internet access is available.

The on-campus format requires the completion of 12 courses or 10 courses and a six-credit thesis (see section on thesis option). Classes are held on the campus in Fort Lauderdale. Each class meets once a week from 6:30 p.m. to 9:30 p.m. for 12 weeks.

All SCIS students are provided NSU computer accounts but must obtain their own Internet service providers and use their own computer systems. New students are provided an orientation on computer and software requirements, online access, online tools and methods, and library resources. Students use the Web to access course materials, announcements, email, the Electronic Library, and other information, and for interaction with faculty and fellow students. Online activities may include Web pages, forums using threaded bulletin boards, and chatrooms. In addition, the school provides a system that enables the student to submit assignments online in multimedia formats and to receive the professor's online reviews of assignments in the same multimedia formats. Some online courses may include electronic classroom sessions. Students must comply with NSU policies on acceptable use of computing resources and use of material in Web pages.

Grade Requirements and Time Limitations

See the section General Information on Graduate Programs.

Independent Study and Directed Independent Study

A student wishing to take an existing course on an independent study basis must obtain written approval from the faculty member responsible for the course and then forward a request to the program office for final approval. A student interested in conducting study or research under the supervision of a faculty member in areas not normally covered in regular courses may request approval by a faculty member and the program office to register for directed independent study. A contract for independent study or directed independent study must be prepared by the student and must include an assignment timeline. The contract must be approved by the mentoring faculty member and the program director.

Cross-Registration

Students may apply to cross-register for courses offered in other SCIS master's degree programs. Approval for cross-registration must be obtained from the student's program office prior to registration.

Master of Science (M.S.) in Computer Information Systems

This program offers a course of study leading to the master of science (M.S.) in computer information systems. It focuses on the technological foundations of computer information systems including areas such as database systems, human-computer interaction, data and computer communications, computer security, computer graphics, software engineering, and object-orientation. It is designed to give students a thorough knowledge of the field and to provide an enduring foundation for future professional growth. The program blends theory and practice into a learning experience that develops skills applicable to complex real-world problems. Its formats offer full-time students the opportunity to earn the master's degree in 12 months and working professionals the opportunity to earn the degree in 18 months while remaining in their current positions. The curriculum is consistent with recommendations for a model curriculum in computer information systems as outlined by the Association of Computing Machinery (ACM).

Program-Specific Admission Requirements (See pp. 12–13 for general admission requirements.)

This program is designed for students with undergraduate majors in computer science, information systems, engineering, mathematics, or physics. Applicants must have knowledge of data structures and algorithms, assembly language and computer architecture, structured programming in a modern high-level language, college algebra, and discrete mathematics. An applicant who does not have an adequate background may be required to take one or more of the following 500-level graduate courses during the first two terms of the student's program. These are in addition to the required 36 credit hours at the 600 level. Courses at the 500 level, when required, must be completed prior to taking courses at the 600 level; however, some exceptions may be permitted by the program director. Students must earn a B or better in 500-level courses. Grades for 500-level courses are not included in the student's GPA. MCIS 501 is prerequisite to MCIS 503.

MCIS 500 Assembly Language and Architecture	MCIS 502 Mathematics in Computing
MCIS 501 Java Programming Language	MCIS 503 Data Structures and Algorithms

Early Admission into the Doctoral Program

This option provides the opportunity for master's students in computer information systems to earn the Ph.D. in computer information systems or information systems in a shorter time. In addition to the requirements specified in the section General Information on Master's Degree Programs, the student must have completed and passed MCIS 611 (Survey of Programming Languages), MCIS 615 (Operating Systems Concepts), MCIS 620 (Information Systems), MCIS 630 (Database Systems), and MCIS 645 (Software Engineering).

The Curriculum for the M.S. in Computer Information Systems

Core courses and electives are listed below. Students may substitute up to two electives in lieu of two core courses. Students who wish to take an additional elective in lieu of a core course must request approval from the program office prior to registration. If the thesis option is elected, two courses may be omitted. Plans for the thesis option must be made with the program office. A student wishing to register for MCIS 682, Project in Information Systems, must first obtain the approval of the faculty member who would supervise the project.

Core Courses:

MCIS 611 Survey of Programming Languages
MCIS 615 Operating Systems Concepts
MCIS 620 Information Systems
MCIS 625 Computer Graphics
MCIS 630 Database Systems
MCIS 645 Software Engineering
MCIS 650 Data Communications Networks
MCIS 661 Object-Oriented Applications
MCIS 665 Client-Server Computing
MCIS 670 Artificial Intelligence and Expert Systems
MCIS 671 Decision Support Systems
MCIS 680 Human-Computer Interaction

Electives:

MCIS 621 Information Systems Project Management
MCIS 623 Legal and Ethical Aspects of Computing
MCIS 631 Database Systems Project
MCIS 651 Project in Data Communications Networks
MCIS 652 Computer Security
MCIS 654 Electronic Commerce on the Internet
MCIS 681 Multimedia Systems
MCIS 682 Project in Information Systems
MCIS 688 Continuing Thesis in Computer Information Systems
MCIS 691 Special Topics in Computer Information Systems
MCIS 699 Master's Thesis in Computer Information Systems

Course Descriptions for the M.S. in Computer Information Systems

MCIS 500 Assembly Language and Architecture (3 credits)

A comprehensive examination of the fundamental concepts and architectural structures of contemporary computers. The course focuses on assembly language programming and the influence of low-level computer architecture on modern computer applications.

MCIS 501 Java Programming Language (3 credits)

An in-depth study of the Java programming language. Principles of the object-oriented paradigm. Object-oriented programming theory and practice.

MCIS 502 Mathematics in Computing (3 credits)

Graph theory, lattices and boolean algebras, state models and abstract algebraic structures, logical systems, production systems, computability theory, recursive function theory.

MCIS 503 Data Structures and Algorithms (3 credits)

Sorting and searching, algorithms for tree structures, advanced data structures, graph algorithms, complexity, dynamic programming, optimization problems. Prerequisite: MCIS 501 or equivalent.

MCIS 611 Survey of Programming Languages (3 credits)

Organization and types of programming languages. Analysis of imperative, object-oriented, and declarative language paradigms. Higher-level languages. Comparative analysis of programming languages used in the development of computer information systems.

MCIS 615 Operating Systems Concepts (3 credits)

Objectives of managing computer system resources. Memory management, process management, file system management, scheduling, synchronization, interrupt processing, distributed processing, and parallel systems. An analysis of the role of operating systems in computer information systems development, operation, and evolution.

MCIS 620 Information Systems (3 credits)

Covers major concepts and architecture of computer information systems, including information concepts; information flow; types of information systems; the role of information in planning operations, control, and decision making; integrated information systems across a range of functional elements. Computer information systems in organizations.

MCIS 621 Information Systems Project Management (3 credits)

Life-cycle models/paradigms. Project planning and risk analysis. Project control including work breakdown structures, project scheduling, activities, and milestones. Software cost-estimation techniques/models. Software quality assurance and metrics for software productivity and quality. Inspections, walkthroughs, and reviews. Approaches to team organization. Configuration management. Automated project management tools. Software maintenance. Information system security. Procurement of software services and systems. Management of operational systems. Legal/ethical issues associated with CIS and software.

MCIS 623 Legal and Ethical Aspects of Computing (3 credits)

Building on a foundation in classical ethics, we examine the impact of the computer and the Internet on our society. Topics covered include ethical decision making; professional codes; whistle-blowing; computer crime; copyrights, patents and intellectual property; privacy; and risk management. Students will analyze case studies and write a research paper.

MCIS 625 Computer Graphics (3 credits)

Principles and concepts of computer graphics useful to information managers. Topics include an introduction to raster graphics, concepts of 2-D and 3-D graphics, modeling, rendering, graphic file formats, color, graphical user interfaces and virtual reality, and the graphical presentation of information.

MCIS 630 Database Systems (3 credits)

Methodologies and principles of database analysis and design are presented. Conceptual modeling and specifications of databases, database design process and tools, functional analysis and methodologies for database design, entity relationship model and advanced semantic modeling methods are discussed. Topics include theories of database systems, including the architectures of database systems, logical and physical database organizations, data models for database systems (network, hierarchical, relational, and object-oriented model), relational algebra and calculus, query languages, normal forms, null values and partial information, relational database design utilizing dependencies, view design and integration, concurrency control, query optimization, client-server database applications, distributed databases, object-oriented databases, and the current research and development trends of database analysis, design, modeling, and applications.

MCIS 631 Database Systems Project (3 credits)

The techniques of database management systems are applied to practical projects. Prerequisite: MCIS 630.

MCIS 645 Software Engineering (3 credits)

The development of software-intensive systems; software quality factors; software engineering principles; system life-cycle models and paradigms; requirements definition and analysis; behavioral specification; software design; implementation; software testing techniques; verification and validation; system evolution; software project management. This course is only for students in the CIS master's program.

MCIS 650 Data Communications Networks (3 credits)

This course covers the technical concepts of data networks, network components, associated network technologies, and data communications protocols. Specification, design, testing, managing, and updating of data networks from legacy systems through high-speed networks are discussed. Network components, guided and unguided media, as well as routing and high-speed switching systems are studied. This course examines the relationship of computer applications to network architecture and subsystems. Current network and data communication topics are presented, as well as future trends.

MCIS 651 Project in Data Communications Networks (3 credits)

Students pursue a project, research study, or implementation in data communications networks. Prerequisite: MCIS 650.

MCIS 652 Computer Security (3 credits)

Concepts and applications of system and data security. Topics include risks and vulnerabilities, policy formation, controls and protection methods, database security, encryption, authentication technologies, host-based and network-based security issues, personnel and physical security issues, issues of law and privacy. Areas of particular focus include secure network design, implementation and transition issues, and techniques for responding to security breaches.

MCIS 654 Electronic Commerce on the Internet (3 credits)

The combination of the computer and the Internet have created an incredible "market space". We will examine the foundation, operation and implications of the Internet economy. Topics include Internet technologies, online market mechanisms, interactive customers, knowledge-based products, smart physical products and services, pricing in the internet economy, online auctions and e-marketplaces, digital governance, policies for the internet economy and an outlook for the new economy. Students will participate in an Internet shopping experience, analyze a company that focuses on e-commerce and write a research paper.

MCIS 661 Object-Oriented Applications (3 credits)

Principles and concepts of the object-oriented paradigm and object-oriented programming languages. Notation and techniques for the analysis, design, and implementation of object-oriented systems. Mechanisms for reuse, including composition, inheritance, design patterns, and application frameworks. The use of object-oriented methods in common applications.

MCIS 665 Client-Server Computing (3 credits)

Concepts and principles of client-server architecture, protocols, networks, and distributed computing are presented. The focus of this course is on distributed application design and implementation. Topics include inter-process communication, the role of the GUI and front-end development tools, middleware, multi-tier architectures, distributed objects, and database interaction. Discussions include the various relationships between client-server computing and business processes. Migration from legacy systems is considered along with concerns for meeting customer requirements.

MCIS 670 Artificial Intelligence and Expert Systems (3 credits)

Covers the theory and practice of artificial intelligence and knowledge-based expert systems. Topics discussed include knowledge representation and inference, heuristic and adversary search, genetic algorithms, machine learning, neural computing, reasoning under uncertainty, symbolic programming using Lisp, logic programming using Prolog, and expert systems. Examples from current application areas such as robotics, planning, machine vision, natural language processing, and intelligent agents are used to reinforce the concepts.

MCIS 671 Decision Support Systems (3 credits)

This course examines concepts of decision support in both automated and non-automated environments. The focus is on application of decision theory, analytical modeling, and simulation techniques to solve organizational problems. Group Decision Support Systems, Executive Information Systems, and Expert Systems are also discussed. Case studies of existing systems are used to reinforce concepts discussed in class. A major component of the course is a project entailing the design, implementation, and evaluation of a Decision Support System. Emphasis is placed on the technical aspects of decision support systems.

MCIS 680 Human-Computer Interaction (3 credits)

Focuses on the dynamics of human-computer interaction (HCI). Provides a broad overview of HCI as a sub-area of computer science and explores user-centered design approaches in information systems applications. Addresses the user interface and software design strategies, user experience levels, interaction styles, usability engineering, and collaborative systems technology. Students will perform formal software evaluations and usability tests.

MCIS 681 Multimedia Systems (3 credits)

Introduction to multimedia systems. Definition of terms and concepts related to multimedia. Trends in the development and the use of multimedia. Tools, techniques, and guidelines facilitating the planning, design, production, and implementation of multimedia products.

MCIS 682 Project in Information Systems (3 credits)

Students pursue a project, research study, or implementation under the supervision of a faculty member.

MCIS 688 Continuing Thesis in Computer Information Systems (1.5 credits)

Students who have not completed the thesis by the end of the second thesis registration must register for continuing thesis. This allows the student to receive faculty and administrative advice and support related to the thesis. Prerequisite: Completion of second thesis registration.

MCIS 691 Special Topics in Computer Information Systems (3 credits)

This seminar focuses on the professor's current research interests. Requires consent of course professor and program director.

MCIS 699 Master's Thesis in Computer Information Systems (3 credits)

The student develops a framework within which research will be conducted and offers evidence of qualifications to pursue the research. Concepts and theories underlying the student's thesis research are articulated, the problem is clearly stated, specific, measurable goals are specified, a literature review is presented, the methods of conducting research are delineated, and strategy to achieve the goal is given. Registration for MCIS 699 must be repeated for three more credits, for a total of six thesis credits. Prerequisite: Completion of eight courses.

Master of Science (M.S.) in Computer Science

This program offers a course of study leading to the master of science (M.S.) in computer science. It is designed to give students a thorough knowledge of the field and to provide an enduring foundation for future professional growth. The program blends theory and practice into a learning experience that develops skills applicable to complex real-world problems. Its formats offer full-time students the opportunity to earn the master's degree in 12 months and working professionals the opportunity to earn the degree in 18 months while remaining in their current positions. The curriculum is consistent with recommendations for a model curriculum in computer science as outlined by the Association of Computing Machinery (ACM).

Program-Specific Admission Requirements (See pp. 12-13 for general admission requirements.)

This program is designed for students with undergraduate majors in computer science, engineering, mathematics, or physics and who have completed courses or have equivalent experience in data structures and algorithms, assembly language, computer architecture, structured programming in a modern high-level language, systems software (compilers or operating systems), calculus (differential and integral calculus), and discrete mathematics. An applicant who does not have an adequate background may be required to take one or more of the following 500-level graduate courses during the first two terms of the student's program. These are in addition to the required 36 credit hours of courses at the 600 level. Courses at the 500 level, when required, must be completed prior to taking courses at the 600 level; however,

some exceptions may be permitted by the program director. Students must earn a B or better in 500-level courses. Grades for 500-level courses are not included in the student's GPA. MCIS 501 is prerequisite to MCIS 503.

MCIS 500 Assembly Language and Architecture	MCIS 502 Mathematics in Computing
MCIS 501 Java Programming Language	MCIS 503 Data Structures and Algorithms

Early Admission into the Doctoral Program

This option provides the opportunity for master's students in computer science to earn the Ph.D. in computer science or computer information systems in a shorter time. In addition to the requirements specified in the section General Information on Master's Degree Programs, the student must have completed and passed CISC 610 (Programming Languages), CISC 615 (Design and Analysis of Algorithms), CISC 630 (Compiler Design Theory), and CISC 640 (Operating Systems Theory and Design).

The Curriculum for the M.S. in Computer Science

Core courses and electives are listed below. The student may substitute up to two electives in lieu of two core courses. Students who wish to take an additional elective in lieu of a core course must request approval from the program office prior to registration. If the thesis option is elected, two courses may be omitted. Plans for the thesis option must be made with the program office. A student wishing to register for CISC 691, Project in Computer Science, must first obtain the approval of the faculty member who would supervise the project.

Core Courses:

CISC 610 Programming Languages
 CISC 615 Design and Analysis of Algorithms
 CISC 630 Compiler Design Theory
 CISC 640 Operating Systems Theory and Design
 CISC 650 Data Communications Networks
 CISC 660 Database Management Systems
 CISC 665 Client-Server Computing
 CISC 670 Artificial Intelligence
 CISC 680 Software Engineering
 CISC 681 Interactive Computer Graphics
 CISC 683 Object-Oriented Design
 CISC 685 Human-Computer Interaction

Electives:

CISC 620 Modeling and Simulation
 CISC 622 Numerical Analysis
 CISC 631 Language Theory and Automata
 CISC 632 Compiler Implementation
 CISC 644 Operating Systems Implementation
 CISC 647 Advanced Computer Architecture
 CISC 651 Project in Data Communications Networks
 CISC 654 Computer Security
 CISC 661 Database Management Systems Implementation
 CISC 663 Object-Oriented Database Systems
 CISC 682 Software Engineering Implementation
 CISC 688 Continuing Thesis in Computer Science
 CISC 690 Special Topics in Computer Science
 CISC 691 Project in Computer Science
 CISC 699 Master's Thesis in Computer Science

Course Descriptions for the M.S. in Computer Science

CISC 610 Programming Languages (3 credits)

Formal languages and language hierarchies, syntactic and semantic specification, abstract machines and corresponding languages, context-free languages, abstraction, modularity, and program structure. Fundamental programming language concepts. Analysis of imperative, object-oriented, and declarative language paradigms. Several programming languages will be analyzed.

CISC 615 Design and Analysis of Algorithms (3 credits)

Topics include sorting, algorithms for tree structures, dynamic programming, greedy methods, advanced data structures, divide and conquer, graph algorithms, arithmetic operations, algorithms for parallel computers, matrix operations, string/pattern matching, network problems, approximation algorithms, and NP-completeness.

CISC 620 Modeling and Simulation (3 credits)

Use of logical and mathematical models to represent and simulate events and processes as well as computer, information, and communications systems. Introduction to computer modeling techniques and discrete-event simulation. Model development and testing. Output and problem analysis. Application of techniques to a multiprocessor system model and an Ethernet model. Examination of development programs such as GPSS, SIMULA, and SIMSCRIPT.

CISC 622 Numerical Analysis (3 credits)

Introduction to error analysis, iterative methods, eigenvalue problems, integration and differentiation by computer, interpolation, and ill-conditioned problems.

CISC 630 Compiler Design Theory (3 credits)

Language theory will be applied to the design of a compiler for a high-level language. Parsing, syntax analysis, semantic analysis, and code generation. Other areas of the compilation process will be covered, such as storage allocation, symbol table management, searching and sorting, and optimization.

CISC 631 Language Theory and Automata (3 credits)

Introduction to formal grammars, Backus-Naur notation. The formal theory behind the design of a computer language is studied. The corresponding types of automata that may serve as recognizers and generators for a language will be described.

CISC 632 Compiler Implementation (3 credits)

Design, implementation, and testing of a compiler for a high-level language. The project will utilize state-of-the-art compiler generation tools, including parser generators and code-generator generators. Prerequisite: CISC 630.

CISC 640 Operating Systems Theory and Design (3 credits)

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, and memory and file system management.

CISC 644 Operating Systems Implementation (3 credits)

Implementation and testing of operating system designs. Prerequisite: CISC 640.

CISC 647 Advanced Computer Architecture (3 credits)

Organizational structures of computer systems and subsystems. Topics include processor organization, memory organization, virtual memory, microarchitecture, I/O controllers and processors, architectures for complex instruction set computers (CISC) and reduced instruction set computers (RISC), performance evaluation, multiprocessors, and parallel architectures.

CISC 650 Data Communications Networks (3 credits)

The concepts of communication protocols, network and protocol architectures, switching techniques, topology, internetworking, network design and analysis methods are covered from the computer science perspective. Detailed technical examination of network components, guided and unguided media, switching, and routing are conducted. Network architectural topics include software and conceptual models, error detection and prevention systems, transfer and routing protocols, congestion and flow control, and current and future applications.

CISC 651 Project in Data Communications Networks (3 credits)

Students pursue a project, research study, or implementation in data and computer communications. Prerequisite: CISC 650.

CISC 654 Computer Security (3 credits)

Theory and principles of information security and data protection. Topics include formal models for computer security, secure operating systems, mechanisms for mandatory and discretionary access controls, distributed secure system architectures, encryption and authentication, integrity models and mechanisms, secure protocols and vulnerability analysis.

CISC 660 Database Management Systems (3 credits)

Principles of database management systems. Topics include concepts of database architectures such as three-schema architectures, logical and physical data organizations, data models for database systems (network model, hierarchical model, relational model, and object-oriented model), relational algebra and calculus, query languages, design theory for relational databases, functional dependencies and normal forms, null values and partial information, semantic data modeling, transaction management and concurrency control, index schema, file structures and access methods, query systems and query optimization, view management, client-server database architectures, distributed databases, object-oriented databases, logic-based databases, and the current research and development trends of database systems.

CISC 661 Database Management Systems Implementation (3 credits)

Techniques of database management will be applied to practical projects. Prerequisite: CISC 660.

CISC 663 Object-Oriented Database Systems (3 credits)

Object-oriented data models and other data models with semantic extensions such as functional data models, object-oriented database query model and languages, object-oriented database schema evolution and modification, version management and control, object data storage structure (clustering and indexing), query processing and transaction management, authorization mechanism and security, integrating object-oriented programming and databases, and applications of object-oriented databases. Prerequisite: CISC 660 or equivalent.

CISC 665 Client-Server Computing (3 credits)

This course presents the concepts and design of client-server and distributed systems. Protocols, inter-process communication principles, language issues, system architecture, concurrency, distributed resource management are among the topics discussed. The role of standards in client-server development and distributed systems is discussed, along with middleware, distributed objects, and applications.

CISC 670 Artificial Intelligence (3 credits)

Covers the theory and practice of artificial intelligence and knowledge-based expert systems. Topics discussed include knowledge representation and inference using predicate calculus, heuristic and adversary search, genetic algorithms, machine learning, neural computing, reasoning under uncertainty, symbolic programming using Lisp, logic programming using Prolog, and expert systems. Development and implementation of algorithms for intelligent systems is emphasized. Examples from current application areas such as robotics, planning, machine vision, natural language processing, and intelligent agents are used to reinforce the concepts.

CISC 680 Software Engineering (3 credits)

The development of software-intensive systems; software quality factors; software engineering principles; system life-cycle models; requirements definition and analysis; behavioral specification; software design; implementation; software testing techniques; verification and validation; system evolution; software project management. This course is only for students in the computer science master's program.

Course Descriptions for the M.S. in Computing Technology in Education

MCTE 615 The Internet (3 credits)

The Internet and online information systems associated with the evolving information superhighway. This course emphasizes the development of effective online skills so that bibliographic, full-text, graphical, and numerical information can be accessed in an efficient manner. It also addresses skills and approaches required to teach about the Internet.

MCTE 625 Survey of Courseware (3 credits)

State-of-the-art, content-rich courseware, across the grades, subjects, and platforms, will be explored and evaluated for educational value. Methods for integrating these programs into the curriculum will be discussed. Tutorials, drill and practice, instructional games, simulations, tests, and reference programs are included.

MCTE 628 Instructional Systems Design (3 credits)

This course develops practical instructional systems design competencies appropriate for the development of computer-assisted instruction applications. Students will experience both theory and best practices from the areas of education and training as they develop and acquire instructional systems design skills and knowledge.

MCTE 630 Database Systems (3 credits)

This course covers fundamentals of database architecture, database management systems, and database systems. Principles and methodologies of database design, and techniques for database application development.

MCTE 645 Integrated Applications (3 credits)

This course provides experience with the multiple roles of electronic spreadsheets, databases, and graphs in teaching, learning, and the management of instruction. Using an integrated software package, these tools will be used to develop and reinforce skills in organizing, problem solving, generalizing, predicting, decision making, and hypothesizing.

MCTE 650 Computer Networks (3 credits)

provides a framework for understanding computer network functionality, characteristics, and configurations. Topics include network topologies, protocols, and architectures; emerging trends in network technologies and services; and the role of ISDN (Integrated Services Digital Network) and ATM (Asynchronous Transfer Mode) in the educational environment. Strategies for network planning, implementation, management, and security. Recent advances in standardization, internetworking, and deployment of LANs (local area networks), MANs (metropolitan area networks), and WANs (wide area networks).

MCTE 660 Multimedia Systems (3 credits)

Introduction to multimedia systems. Recent advances and future trends in learning technology and educational computing are examined. Definition of terms and concepts related to multimedia. Trends in the development and the use of multimedia. Tools, techniques, and guidelines facilitating the planning, design, production, and implementation of multimedia products.

MCTE 661 Online Learning Environments (3 credits)

The course explores research trends in the area of online learning. Student will explore the requirements needed for successful online learning and teaching. Topics investigated may include the process of teaching and learning in an OLE, evaluating effective courseware and online communications technologies, integration of technology into OLEs, working with online classroom dynamics, addressing the needs of the online student, making the transition to online teaching, promoting the development of an online learning community, comparing Learning Management Systems (LMSs), and investigating emerging trends in e-learning and e-training in industry settings.

MCTE 670 Learning Theory and Computer Applications (3 credits)

Students will explore learning theories and how learning is achieved when instruction is presented from a computer-based paradigm. The course will emphasize the computer as a learning device that can be used in an effective manner to model learning theories associated with behaviorism, cognitivism, and human information processing.

MCTE 680 Human-Computer Interaction (3 credits)

Explores the field of human-computer interaction (HCI). Investigates the design and usability of educational-related technology. Explores how design practices are integrated with human factors, principles, and methods. Other issues explored may include user experience levels, interaction styles, usability engineering, Web design, and future research. Students will perform formal software evaluations and usability tests.

MCTE 688 Continuing Thesis in Computing Technology in Education (1.5 credits)

Students who have not completed the thesis by the end of the second thesis registration must register for continuing thesis. This allows the student to receive faculty and administrative advice and support related to the thesis. Prerequisite: Thesis registrations.

MCTE 690 Research Methodology (3 credits)

This course is an introduction to research, statistical analysis, and decision making. Close attention is paid to data types, data contributions, the identification of variables, and descriptive data presentation techniques. Students are introduced to both parametric and nonparametric data analysis procedures including independent and dependent sample t-tests, chi-square analysis, and simple analysis of variance. Hypothesis testing and the use of statistical software packages are emphasized.

MCTE 691 Master's Project in Computing Technology in Education (3 credits)

This course is the capstone of the program. Each student will develop a comprehensive technology-based project using an environment of choice. Its purpose is to allow students the opportunity to further pursue topics or areas in which they have considerable interest. Each project will be closely mentored by faculty.

MCTE 695 Special Topics in Computing Technology in Education (3 credits)

This seminar focuses on the professor's current research interests. Requires consent of course professor and program director.

MCTE 699 Master's Thesis in Computing Technology in Education (3 credits)

The student develops a framework within which research will be conducted and offers evidence of qualifications to pursue the research. Concepts and theories underlying the student's thesis research are articulated, the problem is clearly stated, specific, measurable goals are specified, a literature review is presented, the methods of conducting research are delineated, and strategy to achieve the goal is given. Registration for MCTE 699 must be repeated for three more credits, for a total of six thesis credits. Prerequisite: Completion of eight courses.

Master of Science (M.S.) in Management Information Systems

This program offers a course of study leading to the master of science (M.S.) in management information systems. It focuses on the application of information system concepts to the collection, retention, and dissemination of information for management planning and decision making. The program blends theory and practice into a learning experience that develops skills applicable to complex real-world problems. Its formats offer full-time students the opportunity to earn the master's degree in 12 months and working professionals the opportunity to earn the degree in 18 months while remaining in their current positions. In addition, a specialization in electronic commerce is offered.

Program-Specific Admission Requirements (See pp. 12–13 for general admission requirements.)

This program is designed for students with undergraduate majors in management information systems, computer information systems, business administration, or a related field, and having knowledge and significant experience in computer applications. Experience with the Internet is preferred. Students who cannot demonstrate competence in programming in a high-level language such as C, C++, or Java must take MMIS 501 Introduction to Java Programming. This course is in addition to the required 36 credit hours at the 600 level. MMIS 501 must be completed prior to taking courses at the 600 level; however, some exceptions may be permitted by the program director. Students must earn a B or better in MMIS 501. Grades for 500-level courses are not included in the student's GPA.

Early Admission into the Doctoral Program

This option provides the opportunity for master's students in management information systems to earn the Ph.D. in information systems in a shorter time. In addition to the requirements specified in the section General Information on Master's Degree Programs, the student must have completed and passed MMIS 610 (Survey of Computer Languages), MMIS 620 (Management Information Systems), MMIS 626 (Client–Server and Distributed Computing), MMIS 630 (Database Systems), and MMIS 660 (Systems Analysis and Design).

The Curriculum for the M.S. in Management Information Systems

Core courses and electives are listed below. The student may substitute up to two electives for two core courses. Students who wish to take an additional elective in lieu of a core course must request approval from the program office prior to registration. If the thesis option is elected, two courses may be omitted. Plans for the thesis option must be made with the program office. A student wishing to register for MMIS 682, Project in Management Information Systems, must obtain the approval of the faculty member who would supervise the project.

Core Courses:

MMIS 610 Survey of Computer Languages
MMIS 620 Management Information Systems
MMIS 621 Information Systems Project Management
MMIS 626 Client–Server and Distributed Computing
MMIS 630 Database Systems
MMIS 642 Data Warehousing
MMIS 653 Telecommunications and Computer Networking
MMIS 654 Electronic Commerce on the Internet
MMIS 660 Systems Analysis and Design
MMIS 661 Object-Oriented Applications
MMIS 671 Decision Support Systems
MMIS 680 Human-Computer Interaction

Electives:

MMIS 611 Computer Structures and Algorithms Using COBOL
MMIS 615 Quantitative Methods
MMIS 623 Legal and Ethical Aspects of Computing
MMIS 625 Computer Graphics
MMIS 631 Database Systems Project
MMIS 640 System Test and Evaluation
MMIS 652 Computer Security
MMIS 670 Artificial Intelligence and Expert Systems
MMIS 681 Multimedia Systems
MMIS 682 Project in Management Information Systems
MMIS 688 Continuing Thesis in MIS
MMIS 691 Special Topics in MIS
MMIS 699 Master's Thesis in MIS

The M.S. with Specialization in Electronic Commerce (Required Courses):

MMIS 620 Management Information Systems
MMIS 623 Legal and Ethical Aspects of Computing
MMIS 626 Client–Server and Distributed Computing
MMIS 630 Database Systems
MMIS 653 Telecommunications and Computer Networking
MMIS 652 Computer Security
MMIS 654 Electronic Commerce and the Internet
MMIS 655 Electronic Commerce Applications
MMIS 656 Web Design Technologies
MMIS 657 Electronic Commerce Applications Software
MMIS 658 Electronic Commerce Project
MMIS 660 Systems Analysis and Design
MMIS 680 Human–Computer Interaction

Course Descriptions for the M.S. in Management Information Systems

MMIS 501 Introduction to Java Programming (3 credits)

This course is an introduction to the Java programming language. The course will include an introduction to the concepts of object-oriented programming and will show how Java supports this programming paradigm. You will learn about the Java environment and will write both applets (programs that execute in a Web browser) and applications (stand alone program). In addition to learning about basic language statements, you will also learn how Java provides support for such diverse applications as Web pages, multimedia, educational, etc.

MMIS 610 Survey of Computer Languages (3 credits)

A study of high-level languages, fourth-generation languages, and command languages used in the development of software for management information systems. The logical and physical structure of programs and data. Concepts of structured programming. Data structures, file management, and their use in problem solving. Students will complete a variety of high-level language computer programs.

MMIS 611 Computer Structures and Algorithms Using COBOL (3 credits)

Data and file structure concepts, data record format and file organization, sequential vs. random file access methods, tree-based file structure and search techniques, indexing and data clustering, multiway sort/merge and sort algorithms, input/output blocking and buffering. The student will design and implement programs in COBOL.

MMIS 615 Quantitative Methods (3 credits)

An introduction to the basic quantitative tools needed to support problem solving and decision making in the information systems environment. Heavy emphasis is placed on the application of these tools in a case-based, real-world environment.

MMIS 620 Management Information Systems (3 credits)

The application of information system concepts to the collection, retention, and dissemination of information for management planning and decision making. Issues such as personnel selection, budgeting, policy development, and organizational interfacing are discussed. Conceptual foundations and planning and development of management information systems. The role of MIS in an organization and the fit between the system and the organization.

MMIS 621 Information Systems Project Management (3 credits)

Practical examination of how projects can be managed from start to finish. Life-cycle models and paradigms, Life-cycle phases. Project planning and risk analysis. Project control including work breakdown structures, project scheduling, activities, and milestones. Software cost estimations techniques/models. Software quality assurance and metrics for software productivity and quality. Inspections, walkthroughs, and reviews. Approaches to team organization. Documentation and configuration management. Automated project management tools. Software maintenance. Procurement of software services and systems.

MMIS 623 Legal and Ethical Aspects of Computing (3 credits)

Building on a foundation in classical ethics, we examine the impact of the computer and the Internet on our society. covered include ethical decision making; professional codes; whistle-blowing; computer crime; copyrights, patents and intellectual property; privacy; and risk management. Students will analyze case studies and write a research paper.

MMIS 625 Computer Graphics (3 credits)

Principles and concepts of computer graphics useful to information managers. Topics include an introduction to raster graphics, concepts of 2-D and 3-D graphics, modeling, rendering, graphic file formats, color, graphical user interfaces and virtual reality, and the graphical presentation of information.

MMIS 626 Client-Server and Distributed Computing (3 credits)

Included in this course are a wide range of issues, methods, techniques, and case examples for developing and managing client-server and distributed systems. These include client-server development using RAD methodologies, transaction process monitors, types of aboveware and middleware, middleware standards (DCE, RPC, and CORBA), managing client-server environments, software installation and distribution, electronic mail architectures in client-server systems, evaluation of vendor strategies, issues in selecting client-server products, legacy system migration issues, interoperability, scalability, network and security concerns, the emerging desktop standards, the role of network computers and thin clients, and the emergence of the Web as an extension of the client-server environment.

MMIS 630 Database Systems (3 credits)

The application of database concepts to management information systems. Design objectives, methods, costs, and benefits associated with the use of a database management system. Tools and techniques for the management of large amounts of data. Database design, performance, and administration. File organization and access methods. The architectures of database systems, data models for database systems (network, hierarchical, relational, and object-oriented model), client-server database applications, distributed databases, and object-oriented databases.

MMIS 631 Database Systems Project (3 credits)

The techniques of database management systems will be applied to practical projects. Prerequisite: MMIS 630.

MMIS 640 System Test and Evaluation (3 credits)

An analysis of the verification and validation process. Methods, procedures, and techniques for integration and acceptance testing. Reliability measurement. Goals for testing. Testing in the small and testing in the large. Allocation of testing resources. When to stop testing. Test case design methods. Black box software testing techniques including equivalence partitioning, boundary-value analysis, cause-effect graphing, and error guessing. White box software testing techniques including statement coverage criterion, edge coverage criterion, condition coverage criterion, and path coverage criterion. Test of concurrent and real-time systems.

MMIS 642 Data Warehousing (3 credits)

This course includes the various factors involved in developing data warehouses and data marts: planning, design, implementation, and evaluation; review of vendor data warehouse products; cases involving contemporary implementations in business, government, and industry; techniques for maximizing effectiveness through OLAP and data mining.

MMIS 652 Computer Security (3 credits)

Concepts and principles of system and data security. Risk assessment, evaluation of vulnerabilities, policy formation, control and protection methods. Review and evaluation of security models. Issues in physical, system, network, database and application security. Protection methods of encryption, authentication technologies, and access control are used to examine host-based and network-based security issues. Management of security, policy formulation, security personnel and issues of law and legal protection of privacy. System design and network design for security and techniques for combating security breaches.

MMIS 653 Telecommunications and Computer Networking (3 credits)

This course provides a framework for understanding telecommunications fundamentals and computer network functionality, characteristics, and configurations. Topics include wire-free and wire-based communications; network topologies, protocols, and architectures; emerging trends in network technologies and services; and the role of ISDN (Integrated Services Digital Network) and ATM (Asynchronous Transfer Mode) in the corporate environment. Strategies for network planning, implementation, and management are introduced. Recent advances in standardization, internetworking, and deployment of LANs (local area networks), MANs (metropolitan area networks), and WANs (wide area networks) are examined.

MMIS 654 Electronic Commerce on the Internet (3 credits)

The combination of the computer and the Internet have created an incredible "market space". We will examine the foundation, operation and implications of the Internet economy. Topics include Internet technologies, online market mechanisms, interactive customers, knowledge-based products, smart physical products and services, pricing in the internet economy, online auctions and e-marketplaces, digital governance, policies for the internet economy and an outlook for the new economy. Students will participate in an Internet shopping experience, analyze a company that focuses on e-commerce and write a research paper.

MMIS 655 Electronic Commerce Applications (3 credits)

This course describes the components necessary to implement EDI. It considers the use of eCommerce by small and medium enterprises (SMEs) as well as by governments and community groups. Topics covered include: traditional electronic payment systems, Internet-based payment systems, virtual organizations, virtual communities, electronic markets, call centers, electronic service delivery, eCommerce use by government, and eCommerce use by small business.

MMIS 656 Web Design Technologies (3 credits)

Topics include: aligning electronic business models with Web site designs, planning a Web site, understanding the principles and elements of effective Web site design, using Web development and design tools, and evaluating Web site effectiveness.

MMIS 657 Electronic Commerce Application Software (3 credits)

This course examines application software for business-to-business and business-to-consumer eCommerce. Studied are several eCommerce application software tools, and transaction processing software tools specific to business-to-business transaction exchange, Electronic Data Interchange (EDI) and Electronic Funds Transfer (EFT).

MMIS 658 Electronic Commerce Project (3 credits)

This project course integrates all the knowledge accumulated through the previous courses. The class focuses on best practices as demonstrated through case studies. Working in teams, students develop a comprehensive electronic commerce system. Students may enroll in this class only after completing all of the electronic commerce specialization courses.

MMIS 660 Systems Analysis and Design (3 credits)

Analysis of requirements for information systems. Elicitation/fact-finding, problem analysis, decomposition, and the requirements document. Concepts, methods, techniques, and tools for systems analysis, modeling and simulation, and prototyping. Structured and object-oriented analysis. Role of the systems analyst in the organization. Gaining user commitment and fulfilling user needs. Concepts, tools, and techniques for systems design. Design principles, quality factors, decomposition of complex systems, and modularization techniques. Design methods such as object-oriented and function-oriented design. Comparison of analysis and design techniques.

MMIS 661 Object-Oriented Applications (3 credits)

Principles and concepts of the object-oriented paradigm and object-oriented programming languages. Notation and techniques for the analysis, design, and implementation of object-oriented systems. Mechanisms for reuse, including composition, inheritance, design patterns, and application frameworks. The use of object-oriented methods in common applications.

MMIS 670 Artificial Intelligence and Expert Systems (3 credits)

Theory and practice of artificial intelligence and knowledge-based expert systems. Topics include knowledge representation and inference, heuristic search, genetic algorithms, machine learning, neural computing, reasoning under uncertainty, and expert systems. Symbolic programming using Lisp and logic programming using Prolog. Examples from current application areas such as robotics, planning, machine vision, natural language processing, and intelligent agents are used to reinforce the concepts.

MMIS 671 Decision Support Systems (3 credits)

This course examines concepts of decision support in both automated and non-automated environments. The focus is on application of decision theory, analytical modeling, and simulation techniques to solve organizational problems. Group Decision Support Systems, Executive Information Systems, and Expert Systems are also discussed. Case studies of existing systems are used to reinforce concepts discussed in class. A major component of the course is a project entailing the design, implementation, and evaluation of a Decision Support System.

MMIS 680 Human-Computer Interaction (3 credits)

The dynamics of human-computer interaction (HCI). Provides a broad overview and offers specific background relating to user-centered design approaches in information systems applications. Areas to be addressed include the user interface and software design strategies, user experience levels, interaction styles, usability engineering, and collaborative systems technology. Students will perform formal software evaluations and usability tests.

MMIS 681 Multimedia Systems (3 credits)

Introduction to multimedia systems. Definitions of terms and concepts related to multimedia. Trends in the development and the use of multimedia. Tools, techniques, and guidelines facilitating the planning, design, production, and implementation of multimedia products.

MMIS 682 Project in Management Information Systems (3 credits)

Students are assigned a project that involves part or all of the system development cycle and gain experience in analyzing, designing, implementing, and evaluating information systems. Prerequisite: Prior consent of course professor.

MMIS 688 Continuing Thesis in Management Information Systems (1.5 credits)

Students who have not completed the thesis by the end of the second thesis registration must register for continuing thesis. This allows the student to receive faculty and administrative advice and support related to the thesis. Prerequisite: Completion of second thesis registration.

MMIS 691 Special Topics in Management Information Systems (3 credits)

This seminar focuses on the professor's current research interests. Requires consent of course professor and program director.

MMIS 699 Master's Thesis in Management Information Systems (3 credits)

The student develops a framework within which research will be conducted and offers evidence of qualifications to pursue the research. Concepts and theories underlying the student's thesis research are articulated, the problem is clearly stated, specific, measurable goals are specified, a literature review is presented, the methods of conducting research are delineated, and strategy to achieve the goal is given. Registration for MMIS 699 must be repeated for three more credits, for a total of six thesis credits. Prerequisite: Completion of eight courses.

Doctoral Degree Programs

General Information on Doctoral Degree Programs

Application for Admission (See Admissions under the section General Information on Graduate Programs)

Admission decisions are made on a rolling basis. Before an application can be considered reviewable by the Admissions Committee, the following items must be received by the admissions office: application form, application fee, essay, summary of professional experience, at least two of the required three evaluation forms, and at least all graduate transcripts (unofficial copies are acceptable pending receipt of official transcripts). To ensure evaluation for the desired starting term, reviewable applications must be received at least one month prior to the start of that term. Late applications that cannot be processed in time for the desired starting term will be considered for the next term.

Applicants must meet the general requirements, submit the items specified below, and must also satisfy the program-specific admission requirements contained in the individual program sections of this catalog. Detailed instructions for the preparation and mailing of admissions materials are contained in the school's admission forms. Admission forms, brochures, and this catalog may be downloaded from the school's Web site: www.scis.nova.edu.

1. An earned master's degree from a regionally accredited institution with an appropriate major (see program-specific admission requirements). Alternatively, SCIS master's students may apply for early admission into the doctoral program in the same program major (see description in this catalog).
2. Application form, application fee, and essay.
3. Official transcripts of all graduate and undergraduate education. The graduate GPA must be at least 3.25.
4. Evaluation forms from three individuals who are familiar with your academic and/or professional capabilities and are able to assess your intellectual abilities, maturity, and motivation. Forms from family members or individuals who are unable to evaluate your academic or professional background are unacceptable.
5. Summary of Professional Experience.
6. Proficiency in the English language is a prerequisite for graduate study at the Graduate School of Computer and Information Sciences. Doctoral students are expected to write numerous papers and a dissertation. Grammatical errors, spelling errors, and writing that does not express ideas clearly will affect a student's grades and the completion of his or her degree. The faculty will not provide remedial help concerning grammatical errors or other writing problems. Applicants who are unable to write correctly and clearly are urged to seek remedial help before enrolling in any of the school's programs.

Additional Admission Requirements for International Doctoral Students

1. The application fee must be in U.S. dollars.
2. International students who do not live in the United States but only travel to the United States to attend four cluster weekends a year, or two institute weeks a year, can travel to the United States on tourist visas and need not apply for an I-20.
3. Requirements for campus-based students only: The university will not enroll any campus-based student who has not been approved initially, or approved for transfer, by the Immigration and Naturalization Services (INS) to attend Nova Southeastern University. The INS requires that all students on an F-1 student visa must enroll full time and attend the main campus only. All students holding J-1 or F-1 visas are required to carry medical insurance. Students on J-1 visas are required to secure an affidavit of support, from an agency or government who will be the financial sponsor, stating that they have a sufficient amount of money to support themselves for the duration of their study. Students on F-1 visas need an affidavit of support and a notarized/attested financial statement proving that they have a sufficient amount of money to support themselves for one academic year (generally nine months). Non-degree or provisional admission status is not considered a basis for the issuance of an I-20. After applicants receive a written offer of admission, the I-20 will be provided, upon request, to those who have verified financial support and require an F-1 student visa. International students must enter the United States on a valid student or other visa. Nonresident aliens currently in the United States must have a valid student or nonimmigrant visa (except B1/B2 visa) for enrollment in the university. Students sponsored by the United States government or their home government are required to enter the United States on a J-1 (exchange visitor's) visa. For additional information regarding international students, contact the university's International Student Advising Service at (954) 262-7240 or 800-541-6682, ext. 7240; fax: (954) 262-7265.
4. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL). A minimum test score of 550 is required for applicants taking the written examination. A minimum test score of 213 is required for applicants taking the computer-based examination. (Scores must be no more than two years old.) Test results must be sent directly to the Graduate School of Computer and Information Sciences from TOEFL/TSE Services, P.O. Box 6153, Princeton, NJ, 08541-6153, USA; (609) 771-7100; fax: (609) 771-7500, www.toefl.org.
5. The applicant must have a university-level education at least equivalent to a regionally-accredited United States master's degree in a related field (see program-specific admission requirements) with an equivalent GPA of at least 3.25. To enable SCIS to determine these equivalencies, the applicant must have his or her degree evaluated by an agency that is a member of the National Association of Credential Evaluation Services (NACES). For more information about evaluation agencies you may contact the SCIS Office of Admissions.

Provisional or Conditional Admission

A degree-seeking applicant who has missing documents but appears to be acceptable based on documents received by SCIS may be offered *provisional admission*. Official admission will be granted upon receipt and acceptability of the remaining required documents. Examples of missing documents are an official transcript and an evaluation form. All missing documents must be submitted by the end of the student's first term. An applicant who has not met all admission requirements may be given *conditional admission* if sufficient evidence exists to suggest the ability to perform successfully in the program. A student with conditional status must remove stated deficiencies as specified in the acceptance letter.

Early Admission into the Doctoral Program

This option provides the school's M.S. students the opportunity to earn the doctorate in a shorter time (see p. 13 for requirements).

Orientation and Advisement Program

New doctoral students must attend an orientation day on the campus in Fort Lauderdale at their first cluster or institute meeting. The orientation includes introductions to the program office staff, computer requirements, online access, software tools that enhance the educational process, library services, registration support, and financial aid counseling. The school's Web site provides an extensive online "help" system including downloadable software and documents. Students are offered dissertation counseling throughout the program. Advisement is provided by the program office and the faculty.

Program Formats and Term Dates

Terms for the doctoral program are five months long. During the first two years of the program, most students complete two three-credit core or elective courses and one four-credit project course each term. After the completion of all courses and 40 credit hours with a GPA of at least 3.0, the student registers for the dissertation at 12 credits per term for two terms. Students who have not completed the dissertation after registrations for Dissertation I and Dissertation II

must register for Continuing Dissertation until they have satisfied the dissertation requirement. Doctoral residence is defined as continuous enrollment for two consecutive terms at a minimum of 10 credit hours per term.

Depending on the program, students may select one of two formats: *cluster* or *institute*. Computer information systems and computer science are offered in cluster format only. Computing technology in education, information science, and information systems are offered in both cluster and institute formats. Cluster students attend four cluster meetings per year, held quarterly over an extended weekend (Friday, Saturday, and half-day Sunday) at the university. Cluster terms start in March and September. Cluster weekends are held in March, June, September, and December. Institute students attend a weeklong institute twice a year at the university. Institutes are held in January and July at the start of each five-month term. Clusters and institutes bring together students, faculty, and staff members for participation in courses, dissertation counseling (individual and group), special lectures, and ample opportunity for student-faculty and student-student interaction. Students are required to attend all of their scheduled cluster or institute class sessions.

Between on-campus meetings, students work on assignments and projects, and participate in online activities that facilitate frequent interaction with the faculty and with other students. The online component involves use of World Wide Web pages to access course materials, announcements, the Electronic Library, and other information. Online activities may include forums using threaded discussion boards, chatrooms, email, and electronic classroom sessions. In addition, the school provides a system that enables the student to submit assignments online in multimedia formats and to receive his or her professor's online reviews of assignments in the same formats. Students are provided NSU computer accounts but must obtain their own Internet service providers and use their own computer systems.

Grade Requirements and Time Limitations

See the section General Information on Graduate Programs.

Independent Study and Directed Independent Study

A student wishing to take an existing course or project on an independent study basis must obtain written approval from the faculty member responsible for the course and then forward a request to the program office for final approval. A student interested in conducting study or research under the supervision of a faculty member in areas not normally covered in regular courses may request approval by a faculty member and the program office to register for directed independent study. A contract for independent study or directed independent study must be prepared by the student and must include an assignment timeline. The contract must be approved by the mentoring faculty member and the program director. See the course description for directed independent study for more information.

The Dissertation

The dissertation is the most important requirement for the doctoral degree. Each student is expected, with the approval of a faculty adviser, to select an appropriate topic of sufficient scope to satisfy the requirements for the dissertation. Although registration for dissertation credits typically occurs at or near the end of completion of the course requirements, students are encouraged to learn about the dissertation process as early as possible and to begin talking with faculty members about potential research topics early in the program. The dissertation must be an original work and must represent a significant extrapolation from a base of solid experience or knowledge in the student's area of concentration. Dissertation results must, in a significant way, advance knowledge, improve professional practice, or contribute to understanding in the field of study. Results must be of sufficient strength to distill from the work a paper worthy of publication in a journal or conference proceedings, or to use the work as the basis of a textbook or monograph. Although publication is not a requirement for completing the doctorate, students are encouraged to submit their dissertation research for publication. Doctoral students must follow the policies, procedures, and formatting requirements contained in the *SCIS Dissertation Guide*. Students may attend campus presentations on the dissertation process, research methodology, and writing for publication.

Evaluation of Dissertation Progress

Each student is evaluated on a number of occasions regarding his or her dissertation progress. The purpose of such evaluation is to provide students with relevant and timely feedback concerning their overall performance in the dissertation process and to serve as a screening procedure. Failure to demonstrate the ability to complete a dissertation or to maintain satisfactory progress on the dissertation may result in review by the Academic Review Committee and possible probation or dismissal from the doctoral program. Each student must demonstrate proficiency in the use of the English language in all work submitted during the dissertation process. Grammatical errors, spelling errors, and writing that does not express ideas clearly will not be tolerated and may result in the rejection of dissertation work. The faculty will not provide remedial help concerning grammatical errors or other writing problems that students might have. Students who are unable to write correctly and clearly are urged to obtain remedial help.

DCIS 720 Human-Computer Interaction (3 credits)

Issues relating to effective human-computer interaction are presented. Basic elements, procedures, tools, and environments contributing to the development of successful user interfaces are explored. User interface design principles, guidelines, and methodologies are reviewed. Other topics include multidisciplinary dynamics of human-computer interaction as a field of study, current and projected developments in HCI research, and usability engineering.

DCIS 730 Information Security (3 credits)

Study of the theory, mechanisms, and implementation of information security and data protection. Topics include formal models for computer security, secure operating systems, mechanisms for mandatory and discretionary controls, distributed secure system architectures, encryption and authentication, access control, integrity models and mechanisms, and programming and vulnerability analysis. An emphasis will be placed on current issues, future directions, and research areas.

DCIS 735 Knowledge Management (3 credits)

Knowledge management (KM) is said to promote innovation, improve efficiency and effectiveness, and provide a sustainable competitive advantage in today's global environment. This course examines computer-based systems for supporting KM. Principles of developing systems for KM are explored. System architectures, tools and techniques, and their use in capturing, storing, locating, evaluating, disseminating, and using information and knowledge are examined. Topics will include techniques for indexing, searching, retrieving, and displaying information from knowledge bases. Investigation of the issues in the application of knowledge management to organizational learning and decision making is included. Application of these principles and techniques through the use of rapidly evolving information/communication technologies is studied in the context of their impact on organizations.

DCIS 740 Data Communications and Computer Networking (3 credits)

Recent advances and new applications in the expanding field of telecommunications and computer networks are examined. The technical fundamentals, architecture, and design of computer networks are described. Strategies, tools, and techniques for network planning, implementation, management, maintenance, and security are delineated. Topics include the OSI Model, TCP/IP, transmission media, network operating systems, topologies, configurations, protocols, and performance characteristics. Trends in standardization, internetworking, downsizing, and the development of networks are explored. The emphasis of the material for this class will be in the analysis, design, development, and management of network systems. The theory behind each component will be presented while exploring the design and development of data and computer networks.

DCIS 750 Database Systems (3 credits)

Theory and principles of databases and their management. Design, implementation, and traditional and nontraditional applications of database management systems. An emphasis will be placed on current issues, future directions, and research topics.

DCIS 760 Artificial Intelligence and Expert Systems (3 credits)

Theory of, and major approaches to, artificial intelligence. Topics include knowledge representation, heuristic search, artificial neural networks, machine learning, intelligent agents, and knowledge-based systems.

DCIS 770 Software Engineering (3 credits)

Covers advanced topics in the development of software-intensive systems, system life cycles, requirements definition and analysis, behavioral specification, design, implementation, verification and validation, system evolution, and project management. An emphasis will be placed on current issues, future directions, and research topics.

DCIS 780 Multimedia Systems (3 credits)

A course in advanced systems covering both theoretical and practical issues in designing multimedia systems. Topics include introduction to multimedia systems, compression techniques, synchronization, user interface issues, storage, video indexing and retrieval techniques, operating system support for digital audio and video, as well as network and transport protocols for multimedia. Emphasis on current design issues, research topics, software implementation, and discussion of future directions.

DCIS 790 Special Topics in Computer Information Systems (3 credits)

Covers advanced topics in areas of current research interest in computer information systems. May include topics such as client-server computing, distributed database systems, advanced computer graphics, object-oriented technology, the integration of networks and operating systems, and parallel computation. Topics will vary depending on student and faculty interest.

DCIS 791 Distributed Systems (3 credits)

Students are expected to contribute to the expansion of the client-server and distributed system paradigms. Topics include the components of client-server and distributed systems architecture, operating systems, networking, interprocess communication, user interface, middleware, distributed objects, groupware, security, and software development. The role of standards in client-server and distributed systems development is discussed, including a detailed study of protocols. Development of the client-server computing-model and the application to business process reengineering. Migration from legacy systems is considered along with project development and management. The emphasis of the material for this class will be in the analysis, design, development, and management of client-server and distributed systems. The theory behind each component will be presented while exploring the design and development of client-server and distributed systems.

DCIS 810 Project in Decision Support Systems (4 credits)

Students advance their knowledge through the completion of a research paper or project in the area of decision support systems. Some topics of current interest include model management, investigation of decision support aids, knowledge-based systems and intelligent systems, group DSS, and distributed DSS.

DCIS 820 Project in Human-Computer Interaction (4 credits)

Students produce a research paper or project on a current topic in HCI. Some topics of current interest include interface quality and evaluation, computer system and computer interface architecture, user and task analysis, advancements in usability engineering, Internet-based user interface design issues, legal and ethical aspects of computing, speech interfaces, agent technology, handheld and wearable technology, and computer-supported cooperative work.

DCIS 830 Project in Information Security (4 credits)

Students pursue a research project or implementation on a current topic in information security and assurance. Topics of current interest include secure operating systems and networks, intrusion detection, cryptographic theory and applications, vulnerability analysis, and malicious code detection.

DCIS 835 Project in Knowledge Management (4 credits)

Students pursue a research study, project, or implementation in knowledge management.

DCIS 840 Project in Data Communications and Computer Networking (4 credits)

Students will advance their data communications and computer networking knowledge through the completion of a research paper or project. Some topics of current interest include protocol development and comparisons, the relationship between networks and applications, QoS, network operating systems, and security.

DCIS 850 Project in Database Systems (4 credits)

Students pursue a research study on a current topic in database systems or complete a database-oriented development project. Some areas of current interest include object-oriented database systems, extended relational DBMS, federated or heterogeneous database systems, high-performance parallel database systems, and advanced conceptual logic database modeling.

DCIS 860 Project in Artificial Intelligence and Expert Systems (4 credits)

Students pursue a research or development project in artificial intelligence. Some topics of current interest are artificial life, learning technologies (including symbol learning, neural networks, and genetic algorithms), intelligent agents, natural language processing, deep domain models in expert systems, vision, speech recognition, handwriting recognition, and parallel and distributed artificial intelligence.

DCIS 870 Project in Software Engineering (4 credits)

Students pursue a research project in a current topic in software engineering or complete a software engineering development project. Some topics of current interest include object-oriented analysis and design, software/system life cycles, reusability, specification, and verification.

DCIS 880 Project in Multimedia Systems (4 credits)

Students pursue a research study or project on a current topic in multimedia systems applicable to their field of study.

DCIS 890 Project in Special Topics in Computer Information Systems (4 credits)

Students pursue a research study, project, or implementation related to DCIS 790.

DCIS 891 Project in Distributed Systems (4 credits)

Students will advance their client-server/distributed systems knowledge through the completion of a research paper or project. Some topics of current interest include distributed object technology, QoS middleware, operating systems, and groupware.

DCIS 910 Dissertation I (12 credits)

The student develops a framework within which doctoral research will be conducted and offers evidence of qualifications to pursue the research. Prerequisite: Satisfactory completion of all course work.

DCIS 915 Dissertation II (12 credits)

Concepts and theories underlying the student's doctoral research are articulated, the problem is clearly stated, specific, measurable goals are specified, a thorough literature review is presented, the methods of conducting the research are delineated, and a strategy to achieve the goal is given. Prerequisite: Dissertation I.

DCIS 920 Continuing Dissertation (6 credits)

Students who have not completed the dissertation by the end of Dissertation II must register for Continuing Dissertation each term in order to receive faculty and administrative advice and support related to the dissertation. Prerequisite: Dissertation II.

DCIS 1200 Directed Independent Study (3 credits or 4 credits)

Involves directed readings, research, and creative activities under the supervision of a faculty member. A contract for the independent study must be prepared by the student, include an assignment timeline, and be approved by the mentoring faculty member and the program director. NOTE: In special situations, a student may be granted permission to take a regular numbered course on an independent study basis. In such cases, the same conditions would apply but the course number would reflect the regular numbered course.

Ph.D. Program in Computer Science

This program offers a course of study leading to the degree of doctor of philosophy (Ph.D.) in computer science. It is offered in the cluster format, which combines traditional and online instruction to give professionals the opportunity to pursue graduate study while continuing to work in their current positions. The program is especially well suited to those in industry, education, or government who are involved with one of the many areas of computer science. It provides research-oriented professionals with knowledge in the major areas of computer science and the ability to develop creative solutions to substantive real-world problems. Each student must complete eight courses, four projects, and a dissertation.

Program-Specific Admission Requirements (See pp. 25–26 for general admission requirements.)

This program is designed for the student with a master's degree in computer science, or a closely related field. The applicant should satisfy graduate prerequisites or have equivalent experience in programming languages, data communications and computer networks, operating systems, compilers, database management systems, theory of computation, design and analysis of algorithms, and computer architecture. Alternatively, SCIS master's students may apply for early admission into the Ph.D. program. (For details, see the section General Information on Master's Degree Programs and description of individual master's programs.)

The Curriculum for the Ph.D. in Computer Science

The program requires 64 credit hours, of which 40 are for courses and 24 are for the dissertation. Most students take two core/elective courses and one project course per term during the first two years and register for the dissertation in the third year. Core/elective courses, project courses, and dissertation registrations are listed below:

Core Courses (three credits each) (All students must take these.)

CISD 700	Theory and Principles of Programming
CISD 730	Operating Systems
CISD 740	Data Communications and Computer Networking
CISD 750	Database Management Systems
CISD 760	Artificial Intelligence
CISD 770	Software Engineering

Elective Courses (three credits each) (Select two of these.)

CISD 790	Special Topics in Computer Science (offered on various subjects; may take up to two of these)
CISD 792	Computer Graphics
CISD 794	Knowledge Discovery in Databases

Project Courses (four credits each) (Select four of these. Must be taken concurrently with, or following completion of, the corresponding core course.)

CISD 800	Project in Theory and Principles of Programming
CISD 830	Project in Operating Systems
CISD 840	Project in Data Communications and Computer Networking
CISD 850	Project in Database Management Systems
CISD 860	Project in Artificial Intelligence
CISD 870	Project in Software Engineering
CISD 890	Project in Special Topics in Computer Science
CISD 892	Project in Computer Graphics
CISD 894	Project in Knowledge Discovery in Databases

Dissertation Registrations

CISD 910	Dissertation I (12 credits)
CISD 915	Dissertation II (12 credits)
CISD 920	Continuing Dissertation (6 credits)

Course Descriptions for the Ph.D. in Computer Science

CISD 700 Theory and Principles of Programming (3 credits)

Covers advanced topics in areas of current research interest in programming languages, semantics, visual languages, and compiler design for contemporary systems and applications.

CISD 730 Operating Systems (3 credits)

Recent advances in the theory and practice of state-of-the-art methods in the structure and development of operating systems. Topics include operating system architectures, object-oriented operating systems, distributed operating systems, real-time issues, performance, and software engineering issues in the development of an operating system. An emphasis will be placed on current issues, future directions, and research topics.

CISD 740 Data Communications and Computer Networking (3 credits)

Study of data communications and network theory, design, and implementation. Topics include network architectures, transmission encoding, direct-link networks, switching, routing, network analysis, network algorithms, internetworking, addressing, name services, security, data compression, congestion control, and high-speed networking. An emphasis will be placed on current issues, future directions, and research topics.

CISD 750 Database Management Systems (3 credits)

Theory and principles of databases and their management. Design, implementation, and traditional and nontraditional applications of database management systems.

CISD 760 Artificial Intelligence (3 credits)

Theory and practice of artificial intelligence and knowledge-based expert systems including issues in knowledge representation, search, heuristics, learning techniques, tools, languages, and programming techniques. Current issues, future directions, and research topics will be explored.

CISD 770 Software Engineering (3 credits)

Covers advanced topics in areas of current research interest in the development of software-intensive systems. Topics include metrics, requirements definition, development life cycles, software engineering processes, reuse, formal methods, verification and validation, and project management.

CISD 790 Special Topics in Computer Science (3 credits)

Covers advanced topics in areas of current research interest in computer science. May include topics in advanced computer architecture, artificial intelligence, distributed database management systems, advanced computer graphics, object-oriented technology, and parallel computation. Topics will vary depending on student and faculty interest. Depending on interest, several special-topics courses may be offered concurrently.

CISD 792 Computer Graphics (3 credits)

This course will focus on algorithms and techniques that have emerged in the past several years. Topics include basic and advanced modeling and rendering methods, volume and scientific visualization techniques, visual programming languages and environments, and computer animation.

CISD 794 Knowledge Discovery in Databases (3 credits)

This course will study a number of emerging technical approaches to knowledge discovery in databases such as data clustering and summarization, algorithms for learning classification and characteristic rules, finding dependency networks, analyzing changes, detecting anomalies, and their applications. Current issues, future directions, and research topics will be explored.

CISD 800 Project in Theory and Principles of Programming (4 credits)

The mathematics of algorithms and the specification of design are the basis for the project to illustrate the benefits of structured models, quantitative documentation, and logical assertions for the interpretation and structure of computer programs. The projects include the use of modern languages to demonstrate the abstract structures necessary for application and system development.

CISD 830 Project in Operating Systems (4 credits)

Students pursue a research project or implementation on a current topic in operating systems. Implementation projects may involve constructing a portion of an operating system, simulating the behavior of key components, performance studies of existing systems, creation of a concurrent programming environment to model parallel hardware and software. Research papers may investigate current topics such as open systems, distributed systems, massive parallelism, object-oriented operating systems, and real-time operating systems.

CISD 840 Project in Data Communications and Computer Networking (4 credits)

A research report, design, implementation, or simulation is the focus of a student project. Topics of current interest include routing, security, internetworking, and network or transport layer protocol design.

CISD 850 Project in Database Management Systems (4 credits)

Students pursue a research study on a current topic in database systems or complete a database-oriented development project. Some areas of current interest include object-oriented database systems, extended relational DBMS, deductive and logic-based expert database systems, federated or heterogeneous database systems, other high-performance parallel database systems, and advanced conceptual logic database modeling.

CISD 860 Project in Artificial Intelligence (4 credits)

Students pursue a research or development project in artificial intelligence. Topics of current interest are artificial life, learning technologies (including symbol learning, neural networks, and genetic algorithms), intelligent agents, natural language processing, deep domain models in expert systems, vision, speech recognition, handwriting recognition, and parallel and distributed artificial intelligence.

CISD 870 Project in Software Engineering (4 credits)

A research report or implementation is the focus of a student project. Topics of current interest are metrics, formal methods, development life cycles, reuse, object-oriented analysis and design and software engineering for distributed systems.

CISD 890 Project in Special Topics in Computer Science (4 credits)

Students pursue a research study, project, or implementation related to the Special Topics in Computer Science course.

CISD 892 Project in Computer Graphics (4 credits)

Students pursue a research or implementation project on a current topic in computer graphics. Topics of interest include basic and advanced modeling and rendering methods, volume and scientific visualization techniques, visual programming languages and environments, computer animation, and virtual reality.

CISD 894 Project in Knowledge Discovery in Databases (4 credits)

Students pursue a research project or implementation on a current topic in knowledge discovery in databases. The research process for the project includes searching the literature, dissecting the existing methodologies for knowledge discovery in databases, and developing a new approach for knowledge discovery in databases.

CISD 910 Dissertation I (12 credits)

The student develops a framework within which doctoral research will be conducted and offers evidence of qualifications to pursue the research. Prerequisite: Satisfactory completion of all course work.

CISD 915 Dissertation II (12 credits)

Concepts and theories underlying the student's doctoral research are articulated, the problem is clearly stated, specific, measurable goals are specified, a thorough literature review is presented, the methods of conducting the research are delineated, and a strategy to achieve the goal is given. Prerequisite: Dissertation I.

CISD 920 Continuing Dissertation (6 credits)

Students who have not completed the dissertation by the end of Dissertation II must register for Continuing Dissertation each term in order to receive faculty and administrative advice and support related to the dissertation. Prerequisite: Dissertation II.

CISD 1200 Directed Independent Study (3 credits or 4 credits)

Involves directed readings, research, and creative activities under the supervision of a faculty member. A contract for the independent study must be prepared by the student, include an assignment timeline, and be approved by the mentoring faculty member and the program director. NOTE: In special situations, a student may be granted permission to take a regular numbered course on an independent study basis. In such cases, the same conditions would apply but the course number would reflect the regular numbered course

Ph.D./Ed.D. Program in Computing Technology in Education

This program offers a course of study leading to the degree of doctor of philosophy (Ph.D.) or doctor of education (Ed.D.) in computing technology in education. It is offered in both cluster and institute formats, which combine on-campus and online instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. This program addresses: (1) the use of computing technologies to improve cognition; (2) the development, management, and evaluation of computing systems that support the educational process; and (3) the role of computing and other advanced technology in education and training. The program is especially well suited to educational administrators, college faculty members, directors of academic computing, teachers of all grades, district and building technology administrators, industry and armed forces trainers, and instructional system designers and developers. It provides technology-oriented professionals with the knowledge and ability to develop creative solutions to substantive real-world problems. Each student must complete eight courses, four projects, and a dissertation. A student may declare a degree preference (Ph.D. or Ed.D.) at any time during the program. The difference between these degrees is a name difference only. Many of the courses in the program have been approved for teacher certification in computer science (grades K–12) or recertification by Florida's Bureau of Teacher Certification. They may be taken as part of the degree program or independently.

Program-Specific Admission Requirements (See pp. 25–26 for general admission requirements.)

This program is designed for the student with a master's degree in education, training and learning, instructional design, information systems, educational leadership, or a closely related field. The candidate must have a significant amount of experience using computer applications and the Internet. Alternatively, SCIS master's students may apply for early admission into the Ph.D./Ed.D. program. (For details, see the section General Information on Master's Degree Programs and descriptions of individual master's programs.)

The Curriculum for the Ph.D./Ed.D. in Computing Technology in Education

The program requires 64 credit hours, of which 40 are for courses and 24 are for the dissertation. Most students take two core/elective courses and one project course per term during the first two years and register for the dissertation in the third year. Students are required to take concurrently the core course and project course in Research Methodology (DCTE 700/800). Core courses, elective courses, project courses, and dissertation registrations are listed below:

Core Courses (three credits each) (All students must take these.)

DCTE 700 Research Methodology
DCTE 720 Human–Computer Interaction
DCTE 730 Seminar in Online Learning Environments
DCTE 740 Telecommunications and Computer Networks
DCTE 750 Educational Database Systems
DCTE 760 Instruction Delivery Systems
DCTE 770 Courseware Design and Development

Elective Courses (three credits each) (Select one of these.)

DCTE 747 Learning Theory and Computer Applications
DCTE 790 Special Topics in Computing Technology in Education

Project Courses (four credits each) (Select four of these. Must be taken concurrent with, or following completion of the corresponding core or elective course.)

DCTE 800 Project in Research Methodology (required concurrent with DCTE 700)
DCTE 820 Project in Human–Computer Interaction
DCTE 830 Project in Online Learning Environments
DCTE 840 Project in Telecommunications and Computer Networks
DCTE 847 Project in Learning Theory and Computer Applications
DCTE 850 Project in Educational Database Systems
DCTE 860 Project in Instruction Delivery Systems
DCTE 870 Project in Courseware Design and Development
DCTE 890 Project in Special Topics in Computing Technology in Education

Dissertation Registrations

DCTE 910 Dissertation I (12 credits)
DCTE 915 Dissertation II (12 credits)
DCTE 920 Continuing Dissertation (6 credits)

Course Descriptions for the Ph.D./Ed.D. in Computing Technology in Education

DCTE 700 Research Methodology (3 credits)

An in-depth treatment of the research process from an experimental, developmental, and evaluative perspective is provided. Techniques for planning and designing these types of projects as well as the methodologies for data collection, evaluation, and analysis are examined. Special emphasis is placed on the appropriate choice of methodologies for a variety of problem situations in both business and educational settings. Major emphasis is placed on the development of the proposal stage of research. Corequisite: DCTE 800.

DCTE 720 Human–Computer Interaction (3 credits)

Techniques facilitating effective human–computer interaction are presented. Basic elements, procedures, tools, and environments contributing to the development of a successful user interface are explored. Design principles, guidelines, and methodologies for building, installing, managing, and maintaining interactive systems that optimize user productivity are reviewed. Topics include the multidisciplinary dynamics of human-computer interaction, current and projected developments in HCI research, computer-supported cooperative work, and strategies for implementing and evaluating human–computer dialogues.

DCTE 730 Seminar in Online Learning Environments (3 credits)

This course covers theory and practice involving online learning systems and online communication processes. It explores models of online learning environments (OLEs) as viable alternatives or supplements to traditional campus or building-based learning. Students will investigate the theoretical, conceptual, instructional, and technical framework of implementing and using OLEs in pursuit of lifelong learning. Relevant issues include the technology infrastructure, program development and administration, and most significantly, the Internet as cyberschool.

DCTE 740 Telecommunications and Computer Networks (3 credits)

Recent advances and new applications in the expanding field of telecommunications and computer networks are examined. The technical fundamentals, architecture, and design of computer networks are described. Strategies, tools, and techniques for network planning, implementation, management, maintenance, and security are delineated. Topics include ISDN, ATM, the OSI Model, transmission media, network operating systems, topologies, configurations, protocols, and performance characteristics. Trends in standardization, internetworking, and the development of local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), intranets, and extranets are examined.

DCTE 747 Learning Theory and Computer Applications (3 credits)

Computing technology is assuming an increasingly dominant role in instructional delivery. In this course, students explore learning theories and how learning is achieved when instruction is presented from a computer–based paradigm. The course examines the value of the computer as a learning device to model learning theories associated with behaviorism, cognitivism, and human information processing. An emphasis will be placed on current issues, future directions, and research topics.

DCTE 750 Educational Database Systems (3 credits)

Techniques for determining database requirements and managing organizational data resources are examined. Strategies for designing database management systems applications that satisfy specific requirements are presented. Components and architecture of the relational data model are analyzed. Methods for creating and implementing object-oriented information systems are explored. Topics include object-oriented languages, the user interface, databases and expert systems, distributed computing, and the advantages and drawbacks of commercially available DBMS tools and products.

DCTE 760 Instruction Delivery Systems (3 credits)

This course provides opportunity for independent, creative, innovative exploration and development in teaching and learning in the Age of Communications. Course content combines experiential learning based in the asynchronous student forum with related scholarly pursuit. Synchronous and asynchronous delivery systems in buildings and in cyberspace will enable the best possible matches between societal needs and instruction delivery. The purpose of this course is to reengineer education to meet the needs of society, to use any and all technology to devise the best possible learning experiences for learners of all ages.

DCTE 770 Courseware Design and Development (3 credits)

This course deals with the analysis, design, development, implementation, and evaluation (ADDIE) of technology-based, content and multimedia-intensive, interactive courseware. The product may be constructed with an authoring system or a state-of-the-art, visual-programming language. It may be accessed from a floppy disk, a zip disk or a CD-ROM and may be read through a browser or a run-time program.

DCTE 790 Special Topics in Computing Technology in Education (3 credits)

This course introduces state-of-the-art topics in emerging fields relevant to the program. Topics may cover theory, practice, development, experimentation, assessment, or application. Several special topics courses may be offered concurrently.

DCTE 800 Project in Research Methodology (4 credits)

This course will focus on the collection and analysis of data collected from experimental, developmental, and evaluative studies. Emphasis will be placed on the application of tools and techniques appropriate to the scenario and data type collected. The logical development of decisions based on the data analysis in terms of predefined hypotheses and/or project goals and objectives will be discussed. Major emphasis is placed on the development of the report stage of research. Corequisite: DCTE 700.

DCTE 820 Project in Human-Computer Interaction (4 credits)

Students produce a research paper or project on a current topic in HCI. Some topics of current interest include interface quality and evaluation, computer system and computer interface architecture, user and task analysis, advancements in usability engineering, Internet-based user interface design issues, legal and ethical aspects of computing, speech interfaces, agent technology, handheld and wearable technology, and computer-supported cooperative work.

DCTE 830 Project in Online Learning Environments (4 credits)

Students will produce original work that is grounded in theory and practice on a relevant issue in OLE research. Students will be encouraged to submit their work for potential presentation at conferences or for possible publication related to educational technology and online learning research.

DCTE 840 Project in Telecommunications and Computer Networks (4 credits)

Students pursue a research study, project, or implementation in telecommunications and computer networks.

DCTE 847 Project in Learning Theory and Computer Applications (4 credits)

Students pursue a research study, project, or implementation in learning theory and computer applications.

DCTE 850 Project in Educational Database Systems (4 credits)

Students pursue a research study, project, or implementation in educational database management systems.

DCTE 860 Project in Instruction Delivery Systems (4 credits)

The goal of the project is for each student to prepare a publishable, scholarly article and a public presentation within the area of instruction delivery systems. In addition, participants will serve as editorial board members to sharpen their critical evaluation skills.

DCTE 870 Project in Courseware Design and Development (4 credits)

It is recommended that students enroll in 770 and 870 concurrently. The combined courses require the production of an entire courseware package, alpha testing for functionality and beta testing for effectiveness with the target population. The evaluation processes coupled with reflections on the instructional design process and plans for future modifications make for a highly satisfactory professional learning experience.

DCTE 890 Project in Special Topics in Computing Technology in Education (4 credits)

The goal of the project is to extend the learning experience of the accompanying 790 course. Procedures for implementation are subject to the discretion of the course professor.

DCTE 910 Dissertation I (12 credits)

The student develops a framework within which doctoral research will be conducted and offers evidence of qualifications to pursue the research. Prerequisite: Satisfactory completion of all course work.

DCTE 915 Dissertation II (12 credits)

Concepts and theories underlying the student's doctoral research are articulated, the problem is clearly stated, specific, measurable goals are specified, a thorough literature review is presented, the methods of conducting the research are delineated, and a strategy to achieve the goal is given. Prerequisite: Dissertation I.

DCTE 920 Continuing Dissertation (6 credits)

Students who have not completed the dissertation by the end of Dissertation II must register for Continuing Dissertation each term in order to receive faculty and administrative advice and support related to the dissertation. Prerequisite: Dissertation II.

DCTE 1200 Directed Independent Study (3 credits or 4 credits)

Directed readings, research, and creative activities under the supervision of a faculty member. A contract for the independent study must be prepared by the student, include an assignment timeline, and be approved by the mentoring faculty member and the program director. (In special situations, a student may be granted permission to take a regular numbered course on an independent study basis. In such cases, the same conditions would apply but the course number would reflect the regular numbered course.)

Ph.D. Program in Information Science

This program offers a course of study leading to the degree of doctor of philosophy (Ph.D.) in information science. It is offered in both cluster and institute formats that combine traditional and online instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. The program focuses on information organization and retrieval, which have evolved into issues of enormous importance in light of the continued rapid developments in computing technology. The program is especially well suited to professionals working in a library or information center environment in education, business, government, or industry. It provides research- and technology-oriented professionals the knowledge and ability to develop creative solutions to substantive real-world problems in information science. Each student must complete eight courses, four projects, and a dissertation.

Program-Specific Admission Requirements (See pp. 25–26 for general admission requirements.)

This program is designed for the student with a master's degree in information systems, information science, library science, computer education, or a closely related area. The candidate must have a significant amount of experience using computer applications and the Internet. Alternatively, SCIS master's students may apply for early admission into the Ph.D. program. (For details, see the section General Information on Master's Degree Programs and descriptions of individual master's programs.)

The Curriculum for the Ph.D. in Information Science

The program requires 64 credit hours, of which 40 are for courses and 24 are for the dissertation. Most students take two core/elective courses and one project course per term during the first two years and register for the dissertation in the third year. Core/elective courses, project courses, and dissertation registrations are listed below:

Core Courses (three credits each) (All students must take these.)

- DCTE 720 Human–Computer Interaction
- DISC 725 Online Information Systems
- DISC 735 Knowledge Management
- DCTE 740 Telecommunications and Computer Networks
- DISS 770 Information Policy
- DISS 780 Multimedia Systems

Elective Courses (three credits each) (Select two of these.)

- DCTE 700 Research Methodology (DCTE 800 must be taken concurrently)
or DISS 700 Research Methodology
- DCTE 730 Seminar in Online Learning Environments
- DCTE 750 Educational Database Systems
- DISS 755 Information Security
- DISC 790 Special Topics in Information Science (offered on various subjects)

Project Courses (four credits each) (Select four of these. Must be taken concurrent with, or following completion of, the corresponding core or elective course.)

- DCTE 800 Project in Research Methodology (must be taken concurrent with DCTE 700)
or DISS 800 Project in Research Methodology (must be taken concurrent with DISS 700)
- DCTE 820 Project in Human–Computer Interaction
- DISC 825 Project in Online Information Systems
- DCTE 830 Project in Online Learning Environments
- DISC 835 Project in Knowledge Management
- DCTE 840 Project in Telecommunications and Computer Networks
- DCTE 850 Project in Educational Database Systems
- DISS 855 Project in Information Security
- DISS 870 Project in Information Policy
- DISS 880 Project in Multimedia Systems
- DISC 890 Project in Special Topics in Information Science

Dissertation Registrations

DISC 910 Dissertation I (12 credits)

DISC 920 Continuing Dissertation (6 credits)

DISC 915 Dissertation II (12 credits)

Course Descriptions for the Ph.D. in Information Science

DCTE 700 Research Methodology (3 credits)

An in-depth treatment of the research process from an experimental, developmental, and evaluative perspective is provided. Techniques for planning and designing these types of projects, as well as the methodologies for data collection, evaluation, and analysis are examined. Special emphasis is placed on the appropriate choice of methodologies for a variety of problem situations in both business and educational settings. Major emphasis is placed on the development of the proposal stage of research.

DCTE 720 Human-Computer Interaction (3 credits)

Techniques facilitating effective human-computer interaction are presented. Basic elements, procedures, tools, and environments contributing to the development of a successful user interface are explored. Design principles, guidelines, and methodologies for building, installing, managing, and maintaining interactive systems that optimize user productivity are reviewed. Topics include the multidisciplinary dynamics of human-computer interaction, current and projected developments in HCI research, computer-supported cooperative work, and strategies for implementing and evaluating human-computer dialogues.

DISC 725 Online Information Systems (3 credits)

The evolution, design, and structure of online information systems. Principles, concepts, and techniques for information retrieval. Topics include the methodology of the search process, bibliometrics, the World Wide Web, user interface design and considerations, hypermedia, and related technologies, as well as information standards. Trends in system enhancements, use of online services for information retrieval, electronic document delivery, electronic publishing, and end-user training and support. Problems and issues associated with electronic information access and delivery.

DCTE 730 Seminar in Online Learning Environments (3 credits)

This course explores the emergence of online learning environments (OLEs) as viable alternatives or supplements to traditional classroom instruction. Students will investigate the theoretical, conceptual, instructional, and technical framework of implementing and using OLEs to support the learning paradigm. The basic technology and pedagogical implications of OLEs will be explored, including issues such as learning communities and learning technologies, the Internet and the Web, online electronic performance systems, asynchronous/synchronous communication tools, methods of instruction and online tools to support learning and instruction, design of OLEs, faculty and learner considerations, and evaluation of OLEs.

DISC 735 Knowledge Management (3 credits)

Principles of knowledge management and their use in locating, evaluating, disseminating, and using information and knowledge. Application of these principles and techniques through the use of rapidly evolving information/communication technologies is delineated in the context of a flexible and responsive organizational structure. This nexus, which can promote innovation, improve efficiency and effectiveness, and provide a sustainable competitive advantage in today's global environment, is outlined.

DCTE 740 Telecommunications and Computer Networks (3 credits)

Recent advances and new applications in the expanding field of telecommunications and computer networks are examined. The technical fundamentals, architecture, and design of computer networks are described. Strategies, tools, and techniques for network planning, implementation, management, maintenance, and security are delineated. Topics include ISDN, ATM, the OSI Model, transmission media, network operating systems, topologies, configurations, protocols, and performance characteristics. Trends in standardization, internetworking, and the development of local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), intranets, and extranets are examined.

DCTE 747 Learning Theory and Computer Applications (3 credits)

Computing technology is assuming an increasingly dominant role in instructional delivery. In this course, students explore learning theories and how learning is achieved when instruction is presented from a computer-based paradigm. The course examines the value of the computer as a learning device to model learning theories associated with behaviorism, cognitivism, and human information processing. An emphasis will be placed on current issues, future directions, and research topics.

DCTE 750 Educational Database Systems (3 credits)

Techniques for determining database requirements and managing organizational data resources are examined. Strategies for designing database management systems applications that satisfy specific requirements are presented. Components and architecture of the relational data model are analyzed. Methods for creating and implementing object-oriented information systems are explored. Topics include object-oriented languages, the user interface, databases and expert systems, distributed computing, and the advantages and drawbacks of commercially available DBMS tools and products.

DISS 755 Information Security (3 credits)

Security policies, models, and mechanisms for secrecy, integrity, and availability. Topics will include threats to information systems, information security policies and management issues, the evaluation of secure information systems, encryption and authentication, network security, requirements analysis, and the practical problems that have to be solved in order to make those technologies workable in a networked environment. Emphasis on current issues, future directions, and research areas.

DISS 770 Information Policy (3 credits)

Information technology's dramatic global impact on society, government, and the economy has given rise to complex legal, regulatory, and policy issues. This course explores issues ranging from the consequences of information commodification to the impact of privacy concerns, e-commerce, information ownership (patents/copyrights/trademarks), social equity, crime, free speech,

telecommunications, national security, international trade, etc. All have immediate relevance to the IT workplace. While U.S. policy issues serve as the framework for the course, the U.S. experience is compared and contrasted to policy developments worldwide.

DISS 780 Multimedia Systems (3 credits)

Advanced systems covering theoretical and practical issues in designing multimedia systems. Topics include introduction to multimedia systems, compression techniques, synchronization, user interface issues, storage, video indexing and retrieval techniques, operating system support for digital audio and video, as well as network and transport protocols for multimedia. An emphasis will be placed on current design issues, research topics, software implementation, and discussion of future directions.

DISC 790 Special Topics in Information Science (3 credits)

Advanced topics in areas of current research interest in information science. May include topics such as the virtual library, network security, the emerging national information infrastructure (NII), Internet issues, and design/implementation of information system services and applications. Topics will vary depending on student and faculty interest.

DCTE 800 Project in Research Methodology (4 credits)

This course will focus on the collection and analysis of data collected from experimental, developmental, and evaluative studies. Emphasis will be placed on the application of tools and techniques appropriate to the scenario and data type collected. The logical development of decisions based on the data analysis in terms of predefined hypotheses and/or project goals and objectives will be discussed. Major emphasis is placed on the development of the report stage of research.

DCTE 820 Project in Human-Computer Interaction (4 credits)

Students produce a research paper or project on a current topic in HCI. Some topics of current interest include interface quality and evaluation, computer system and computer interface architecture, user and task analysis, advancements in usability engineering, Internet-based user interface design issues, legal and ethical aspects of computing, speech interfaces, agent technology, handheld and wearable technology, and computer-supported cooperative work.

DISC 825 Project in Online Information Systems (4 credits)

Students pursue a research study, project, or implementation in online information systems.

DCTE 830 Project in Online Learning Environments (4 credits)

Students pursue a research study, project, or implementation in online learning environments.

DISC 835 Project in Knowledge Management (4 credits)

Students pursue a research study, project, or implementation in knowledge management.

DCTE 840 Project in Telecommunications and Computer Networks (4 credits)

Students pursue a research study, project, or implementation in telecommunications and computer networks.

DCTE 847 Project in Learning Theory and Computer Applications (4 credits)

Students pursue a research study, project, or implementation in learning theory and computer applications.

DCTE 850 Project in Educational Database Systems (4 credits)

Students pursue a research study, project, or implementation in educational database management systems.

DISS 855 Project in Information Security (4 credits)

Students will pursue a research project or implementation on a current topic in information security and assurance. Topics: security-related applications and systems, vulnerability analysis, information security policies and management issues, security audits, and secure e-commerce.

DISS 870 Project in Information Policy (4 credits)

Students pursue a research study, project, or implementation in information policy.

DISS 880 Project in Multimedia Systems (4 credits)

Students pursue a research study or project on a current topic in multimedia systems applicable to their field of study.

DISC 890 Project in Special Topics in Information Science (4 credits)

Students pursue a research study, project, or implementation in special topics in information science.

DISC 910 Dissertation I (12 credits)

The student develops a framework within which doctoral research will be conducted and offers evidence of qualifications to pursue the research. Prerequisite: Satisfactory completion of all course work.

DISC 915 Dissertation II (12 credits)

Concepts and theories underlying the student's doctoral research are articulated, the problem is clearly stated, specific, measurable goals are specified, a thorough literature review is presented, the methods of conducting the research are delineated, and a strategy to achieve the goal is given. Prerequisite: Dissertation I.

DISC 920 Continuing Dissertation (6 credits)

Students who have not completed the dissertation by the end of Dissertation II must register for Continuing Dissertation each term in order to receive faculty and administrative advice and support related to the dissertation. Prerequisite: Dissertation II.

DISC 1200 Directed Independent Study (3 credits or 4 credits)

Directed readings, research, and creative activities under the supervision of a faculty member. A contract for the independent study must be prepared by the student, include an assignment timeline, and be approved by the mentoring faculty member and the program director. (In special situations, a student may be granted permission to take a regular numbered course on an independent study basis. In such cases, the same conditions would apply but the course number would reflect the regular numbered course.)

Ph.D. Program in Information Systems

This program offers a course of study leading to the degree of doctor of philosophy (Ph.D.) in information systems. It is offered in both cluster and institute formats that combine traditional and online instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. The program is especially well suited to professionals working in areas such as information system planning, systems analysis and design, project management, information system administration, or software engineering. It provides technology-oriented professionals with the knowledge and ability to develop creative solutions to substantive real-world problems in information systems. Each student must complete eight courses, four projects, and a dissertation.

Program-Specific Admission Requirements (See pp. 25–26 for general admission requirements.)

This program is designed for the student with a master's degree in information systems, information science, computer science, or a related area. The applicant should satisfy graduate prerequisites or have equivalent experience in information systems, programming languages, database systems, systems analysis and design, data communications and networks, and computer architecture. Alternatively, SCIS master's students in information systems may apply for early admission into the Ph.D. program. (See the section General Information on Master's Degree Programs and description of individual master's programs for details.)

The Curriculum for the Ph.D. in Information Systems

The program requires 64 credit hours, of which 40 are for courses and 24 are for the dissertation. Most students take two core/elective courses and one project course per term during the first two years and register for the dissertation in the third year. Core/elective courses, project courses, and dissertation registrations are listed below:

Core Courses (three credits each)

All students must take the following four courses:

- DISS 710 Decision Support Systems
- DISS 720 Human–Computer Interaction
- DISS 725 The System Development Process
- DISS 750 Database Systems

All students must take one of the following courses:

- DISS 740 Telecommunications and Computer Networks
- DISS 791 Client–Server Computing

Elective Courses (three credits each) (Select three of these.)

- DISS 700 Research Methodology
- DISS 740 Telecommunications and Computer Networks (if not taken as a core course)
- DISS 755 Information Security
- DISS 770 Information Policy
- DISS 780 Multimedia Systems
- DISS 790 Special Topics in Information Systems (offered on various subjects)
- DISS 791 Client–Server Computing (if not taken as a core course)

Project Courses (four credits each) (Select four of these. Must be taken concurrent with, or following completion of, the corresponding core or elective course.)

- DISS 800 Project in Research Methodology
- DISS 810 Project in Decision Support Systems
- DISS 820 Project in Human–Computer Interaction
- DISS 825 Project in the System Development Process
- DISS 840 Project in Telecommunications and Computer Networks
- DISS 850 Project in Database Systems
- DISS 855 Project in Information Security
- DISS 870 Project in Information Policy
- DISS 880 Project in Multimedia Systems
- DISS 890 Project in Special Topics in Information Systems
- DISS 891 Project in Client–Server Computing

Dissertation Registrations

- DISS 910 Dissertation I (12 credits)
- DISS 915 Dissertation II (12 credits)
- DISS 920 Continuing Dissertation (6 credits)

Course Descriptions for the Ph.D. in Information Systems

DISS 700 Research Methodology (3 credits)

This course generally covers advanced topics in areas of current research interest in information systems. It presents an in-depth treatment of the research process from an experimental, developmental, and evaluative perspective. Techniques for planning and designing these types of research projects, as well as the methodologies for data collection, evaluation, and analysis are examined. Special emphasis is placed on the appropriate choice of methodologies for a variety of problem situations in both business and educational settings. Major emphasis is placed on the development of the proposal stage of research carried out in conjunction with the student's dissertation.

DISS 710 Decision Support Systems (3 credits)

Structure, functions, capabilities, and limitations of decision support systems (DSS) are discussed. Development tools and techniques for constructing DSS are investigated. The focus is on automatic support for decision making and organizational problem solving. Topics include decision theory, modeling and simulation, decision support system architecture, group decision support systems, knowledge-based expert systems, and intelligent systems.

DISS 720 Human-Computer Interaction (3 credits)

Issues relating to effective human-computer interaction are presented. Basic elements, procedures, tools, and environments contributing to the development of successful user interfaces are explored. User interface design principles, guidelines, and methodologies are reviewed. Other topics include the multidisciplinary dynamics of human-computer interaction as a field of study, current and projected developments in HCI research, and usability engineering.

DISS 725 The System Development Process (3 credits)

System life-cycle models, application development strategies, and feasibility assessment. Techniques, methods, and tools for the analysis and specification of information systems. Design principles including abstraction, modularity, encapsulation, information hiding, and reusability. Quality factors. Contemporary design methods and tools, including object-oriented design and function-oriented design. Study of the verification and validation process. Integration and acceptance testing. Reliability measurement. Software testing techniques. Test of concurrent and real-time systems. Techniques for managing hardware, software, communications, distributed applications, multimedia systems, and end-user computing. Approaches to project planning, managing change and innovation, and facilitating computer and communications security.

DISS 740 Telecommunications and Computer Networks (3 credits)

Advances and new applications in telecommunications and computer networks. Technical fundamentals, architecture, and design of computer networks. Strategies, tools, and techniques for network planning, implementation, management, maintenance, and security. Topics include ISDN, ATM, the OSI Model, transmission media, network operating systems, topologies, configurations, protocols, and performance characteristics. Trends in standardization, internetworking, and the development of local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), intranets, and extranets.

DISS 750 Database Systems (3 credits)

Theory and principles of databases and their management. Design, implementation, and traditional and nontraditional applications of database management systems. Emphasis will be placed on current issues, future directions, and research topics.

DISS 755 Information Security (3 credits)

A study of security policies, models, and mechanisms for secrecy, integrity, and availability. Topics include threats to information systems, information security policies and management issues, the evaluation of secure information systems, encryption and authentication, network security, requirements analysis, and the practical problems that have to be solved in order to make those technologies workable in a networked environment. Emphasis on current issues, future directions, and research areas.

DISS 770 Information Policy (3 credits)

Information technology's dramatic global impact on society, government, and the economy has given rise to complex legal, regulatory, and policy issues. This course explores issues ranging from the consequences of information commodification to the impact of privacy concerns, e-commerce, information ownership (patents/copyrights/trademarks), social equity, crime, free speech, telecommunications, national security, international trade, etc. All have immediate relevance to the IT workplace. While U.S. policy issues serve as the framework for the course, the U.S. experience is compared and contrasted to policy developments throughout the world.

DISS 780 Multimedia Systems (3 credits)

Advanced systems covering theoretical and practical issues in designing multimedia systems. Topics include introduction to multimedia systems, compression techniques, synchronization, user interface issues, storage, video indexing and retrieval techniques, operating system support for digital audio and video, as well as network and transport protocols for multimedia. An emphasis will be placed on current design issues, research topics, software implementation, and discussion of future directions.

DISS 790 Special Topics in Information Systems (3 credits)

Covers advanced topics in areas of current research interest in information systems. May include topics such as client-server computing, distributed database systems, advanced computer graphics, object-oriented technology, the integration of networks and operating systems, ATM-based networks (asynchronous transfer mode), computer and network security, and parallel computation. Topics will vary depending on student and faculty interest.

DISS 791 Client–Server Computing (3 credits)

Emphasis on the information systems approach to client-server and distributed systems analysis, design, and management. The theory behind each component will be presented while exploring the impact it has on the business of managing information. Topics include the components of client-server and distributed systems architecture, operating systems, networking, interprocess communication, user interface, middleware, distributed objects, security, and the software development process. The role of standards in client-server and distributed systems development is discussed, including a detailed study of protocols. Also included are the various relationships between client-server computing and business process reengineering, workflow automation, and groupware. Migration from legacy systems is considered along with project development and management.

DISS 800 Project in Research Methodology (4 credits)

Focuses on the collection and analysis of data collected from experimental, developmental, and evaluative studies. Emphasis will be placed on the application of tools and techniques appropriate to the scenario and data type collected. The logical development of decisions based on the data analysis in terms of predefined hypotheses and/or project goals and objectives will be discussed. Major emphasis is placed on the development of the report stage of research.

DISS 810 Project in Decision Support Systems (4 credits)

Completion of a research paper or project in the area of decision support systems. Some topics of current interest include comparisons of decision support aids, the relationship between decision support systems and expert systems, DSS hardware and software, group DSS, distributed DSS and data communications, and human problem solving through DSS.

DISS 820 Project in Human–Computer Interaction (4 credits)

Students produce a research paper or project on a current topic in HCI. Some topics of interest include interface quality and evaluation, computer system and computer interface architecture, Internet–based user interface design issues, legal and ethical aspects of computing, speech interfaces, and computer–supported cooperative work.

DISS 825 Project in the System Development Process (4 credits)

Students pursue a research study, project, or implementation in the system development process.

DISS 840 Project in Telecommunications and Computer Networks (4 credits)

Students pursue a research study, project, or implementation in computer networks and telecommunications.

DISS 850 Project in Database Systems (4 credits)

Students pursue a research study on a current topic in database systems or complete a database–oriented development project. Some areas of current interest include object–oriented database systems, extended relational DBMS, federated or heterogeneous database systems, high-performance parallel database systems, and advanced conceptual logic database modeling.

DISS 855 Project in Information Security (4 credits)

Students pursue a research project or implementation on a current topic in information security: security-related applications and systems, vulnerability analysis, information security policies and management issues, security audits, and secure e-commerce.

DISS 870 Project in Information Policy (4 credits)

Students pursue a research study, project, or implementation in information policy.

DISS 880 Project in Multimedia Systems (4 credits)

Students pursue a research study or project on a current topic in multimedia systems. Some areas of current interest include design and implementation of interactive multimedia applications including interactive television (e.g., video-on-demand, home shopping, voting, and games), hypermedia systems, digital signal processing, network architectures and protocols, multimedia authoring, and videoconferencing and groupware.

DISS 890 Project in Special Topics in Information Systems (4 credits)

Students pursue a research study, project, or implementation in special topics in information systems.

DISS 891 Project in Client–Server Computing (4 credits)

Completion of a research paper or project in Client-Server/Distributed Systems. Some topics of current interest include distributed object technology, QoS middleware, operating systems, information systems management, and groupware.

DISS 910 Dissertation I (12 credits)

The student develops a framework within which doctoral research will be conducted and offers evidence of qualifications to pursue the research. Prerequisite: Satisfactory completion of all course work.

DISS 915 Dissertation II (12 credits)

Concepts and theories underlying the student's doctoral research are articulated, the problem is clearly stated, specific, measurable goals are specified, a thorough literature review is presented, the methods of conducting the research are delineated, and a strategy to achieve the goal is given. Prerequisite: Dissertation I.

DISS 920 Continuing Dissertation (6 credits)

Students who have not completed the dissertation by the end of Dissertation II must register for Continuing Dissertation each term in order to receive faculty and administrative advice and support related to the dissertation. Prerequisite: Dissertation II.

DISS 1200 Directed Independent Study (3 credits or 4 credits)

Involves readings, research, and projects under the supervision of a faculty member. A contract for independent study must be prepared by the student, include an assignment timeline, and be approved by the mentoring faculty member and the program director. NOTE: In special situations, a student may be granted permission to take a regular numbered course on an independent study basis. In such cases, the same conditions would apply but the course number would reflect the regular numbered course.

Faculty and Staff of the Graduate School of Computer and Information Sciences

The Faculty

Gertrude W. Abramson, Ed.D., Columbia University. Professor. Computer-supported education, hypermedia/multimedia, instructional systems design and development, distance learning, instruction delivery systems.

James Cannady, Ph.D., Nova Southeastern University. Assistant Professor. Information security, artificial neural networks, distributed computing, machine learning, artificial intelligence.

Maxine S. Cohen, Ph.D., State University of New York at Binghamton. Associate Professor. Human-computer interaction, multimedia, usability engineering, human factors, database systems, distance education.

Laurie P. Dringus, Ph.D., Nova Southeastern University. Professor. Human-computer interaction, group support systems, usability engineering, online learning environments, learning theory, distance learning.

Timothy J. Ellis, Ph.D., Nova Southeastern University. Assistant Professor. Multimedia design and application, application of database technology to education, online learning environments, adult education.

George K. Fornshell, Ph.D., Nova Southeastern University. Associate Professor. Instructional design, instructional technology, instructional video, streaming media, distance learning, multimedia, authoring tools, human factors.

William L. Hafner, Ph.D., Nova Southeastern University. Assistant Professor. Information storage and retrieval, data warehousing, knowledge management, artificial intelligence, co-operation in computing, group and decision support systems, computer security.

William M. Hartman, Ph.D., Nova Southeastern University. Lecturer. Software engineering, data communications, computer networks, decision support systems, mathematics in computing.

Michael J. Laszlo, Ph.D., Princeton University. Professor. Computer graphics, data structures and algorithms, software engineering, programming.

Jacques Levin, Ph.D., University of Grenoble. Professor. Database management, modeling, distance education, decision support systems, numerical analysis.

Edward Lieblein, Ph.D., University of Pennsylvania. Professor and Dean. Software engineering, object-oriented design, programming languages, automata theory.

Marlyn Kemper Littman, Ph.D., Nova Southeastern University. Professor. Computer networks, ATM, wirefree and wire-based communications, network security, distance learning.

Frank Mitropoulos, M.S., Nova Southeastern University. Instructor. Programming languages, data structures, software engineering, object-oriented design, C, C++, Java.

Sumitra Mukherjee, Ph.D., Carnegie Mellon University. Associate Professor. Artificial intelligence, decision support systems, knowledge-based expert systems, database security, database management, economics of information systems.

Easwar Nyshadham, Ph.D., University of Mississippi. Assistant Professor. Electronic commerce, decision support systems, security, privacy and trust in online environments, economics of information systems.

John Scigliano, Ed.D., University of Florida. Professor. Management information systems, client-server computing, project management, instruction delivery systems.

Greg Simco, Ph.D., Nova Southeastern University. Assistant Professor. Operating systems, data communications, computer networks, client-server computing, distributed systems, systems performance evaluation.

Junping Sun, Ph.D., Wayne State University. Associate Professor. Database management systems, data warehousing, knowledge discovery and data mining.

Steven R. Terrell, Ed.D., Florida International University. Professor. Research methodology and statistics, learning theory, distance education.

Visiting and Adjunct Faculty

Anne Abate, Ph.D.	Ray Albert, Ph.D.	Phyllis Chasser, Ph.D.	Patricia Deubel, Ph.D.
Andre Folleco, Ph.D.	Lee Leitner, Ph.D.	Robert Lipton, Ph.D.	Richard Manning, Ph.D.
Ronald McFarland, Ph.D.	Terry McQueen, D.B.A.	David Metcalf II, Ph.D.	Margaret Thombs, Ph.D.
Steven Zink, Ph.D.			

Teaching Assistants

Mohamad Foustok, M.S. Ellen Scalese, M.Ed.

The Administrative and Technical Staff

Admissions

Clare Singer, B.S., Director ext. 2003, singerc
Nancy Azoulay, B.S., Assistant Director ext. 2026, azoulayn
Richard North, Admissions Representative ext. 2002, rnorth1
Josette Davis, M.S., Admissions Representative ext. 2004, davisjos
Irene Stringer, Coordinator ext. 2001, stringer
Jeffrey Payanis, B.S., Coordinator ext. 2005, payanis
Michelle Casabona, Administrative Secretary ext. 2025, casabona
Arlene Daley, Clerical Assistant, ext. 2008, daleya

Master's Program Office

Eric Ackerman, Ph.D., Director ext. 2063, esa
Karen DiDomizio, B.A., Adviser ext. 2062, didomizi
Elizabeth Koenig, M.S., Adviser ext. 2061, koenige
Lisa Jackson, B.S. Coordinator ext. 2018, lisajack
Kristen Oldberg, Assistant to the Director ext. 2010, oldbergk
Lenora Walkes, Administrative Secretary ext. 2060, walkes

Doctoral Program Office

Diane King, Ph.D., Director ext. 2054, kingdi
Sharon Brown, B.A., Assistant Director ext. 2056, sharonb
Doris Evans, A.A., Coordinator ext. 2052, doris
Niombi Howard, Administrative Assistant ext. 2050, afi
Jeanmarie Pinto, M.S., Adviser ext. 2053, pintoj
Monica Robustelli, Administrative Secretary ext. 2055, robustelli

Network and Software Services

Mark Powell, M.S., Director ext. 2015, powelma
Will Ferri, B.S., Coordinator ext. 2014, ferriw
Theodore Leonard, A.A., Coordinator ext. 2016, theo

Dean's Office

Edward Lieblein, Ph.D., Dean ext. 2034, lieblein
Bellarmin Selvaraj, Ph.D., Director, Research and Planning ext. 2048, selvaraj
Candy L. Fish, M.S., Director of Operations (Acting) ext. 2034, fishc
Barbara Campbell, B.S., Coordinator, Faculty Support ext. 2032, campbelb
Dawn Sawyers, B.S., Receptionist ext. 2031, sawyerda

Finance and Administration

Barbara Edge, M.S., Director ext. 2043, barb
Claudia Chong, Asst. Director (Acting) ext. 2041, chongc
Sylvia Yepes, B.A., Coordinator ext. 2044, yepessil
Raysa Andrade, Assistant to the Director ext. 2040, andrade

Provisions

The provisions set forth in this document are not to be regarded as an irrevocable contract between the student and Nova Southeastern University. Regulations and requirements, including tuition and fees, are necessarily subject to change without notice at any time at the discretion of the administration. The university further reserves the right to require a student to withdraw at any time, as well as the right to impose probation on any student whose conduct is unsatisfactory. Any admission on the basis of false statements or documents is void upon discovery of the fraud, and the student is not entitled to any credit for work that he or she may have done at the university. Upon dismissal or suspension from the university for cause, there will be no refund of tuition and fees. The balance due Nova Southeastern University will be considered receivable and will be collected.

A transcript of a student's academic record cannot be released until all of his or her accounts, academic and nonacademic, are paid.

Any Nova Southeastern University student has the right to inspect and review his or her educational record. The policy of the university is not to disclose personally identifiable information contained in a student's educational record without prior written consent from the student, except: to university officials, to officials of another school in which the student seeks enrollment, to authorized representatives of federal or state agencies, to accrediting organizations, to parents of dependent students, under judicial order, to parties in a health or safety emergency, or when verifying graduation with a particular degree.

A student has the right to petition Nova Southeastern University to amend or correct any part of his or her educational record that he or she believes to be inaccurate, misleading, or in violation of the privacy or other rights of students. If the university decides it will not amend or correct a student's record, the student has a right to a hearing to present evidence that the record is inaccurate, misleading, or in violation of the privacy or other rights of students.

If these rights are violated, a student may file a complaint with the Department of Education. A student may obtain a copy of the Educational Privacy Act policy by requesting it in writing from the Office of the University Registrar, Nova Southeastern University, 3301 College Avenue, Fort Lauderdale, Florida 33314-7796. A schedule of fees and a listing of the types and locations of educational records are contained in this policy.

Nova Southeastern University does not discriminate on the basis of disability, sex, race, religion, or national or ethnic origin in admission, access, or employment for any of its programs and activities. The university registrar and director of human resources have been designated as student and employee coordinators, respectively, to ensure compliance with the provisions of the applicable laws and regulations relative to nondiscrimination.

The school is authorized under federal law to enroll nonimmigrant alien students.

Policies Governing Student Relations

General

Nova Southeastern University has established specific policies, procedures, and guidelines defining its relationship with its students. The term "student" as used in this catalog defines the student, or parents of the student if the student qualifies as a dependent under the provisions of the Internal Revenue Code.

Institutional and Academic Information

Nova Southeastern University and its composite academic units periodically publish bulletins or catalogs describing the university and its academic programs. These bulletins are available to enrolled and prospective students through the various admissions offices associated with the academic units or from the Office of the University Registrar. Each academic unit, group of units, and/or the Office of the University Registrar maintain at least one full-time employee to assist all students in obtaining information.

International Students

International students who intend to reside in the United States and who are required to obtain an I-20 visa must be full-time, degree-seeking students and must attend the main campus in Fort Lauderdale, Florida. For further information, contact the International Student Adviser, Nova Southeastern University, 3301 College Avenue, Fort Lauderdale, Florida 33314-7796, telephone: (954) 262-7240 or toll free 800-541-6682, ext. 7240.

Veterans' Benefits

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

veterans' dependents should contact the Office of the University Registrar, 3301 College Avenue, Fort Lauderdale, Florida 33314-7796, telephone (954) 262-7236 or toll free 800-541-6682, ext. 7236.

Notice of Nondiscrimination

Nova Southeastern University admits students of any race, color, sex, age, nondisqualifying disability, religion or creed, or national or ethnic origin to all the rights, privileges, programs, and activities generally accorded or made available to students at the school, and does not discriminate in administration of its educational policies, admissions policies, scholarship and loan programs, and athletic and other school-administered programs. The Office of the University Registrar is designated as the policy coordinator to ensure compliance with all federal, state, and local laws and regulations relative to nondiscrimination.

Americans with Disabilities Act

Nova Southeastern University complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. No qualified individual with a disability shall be excluded from participation in or be denied the benefits of the services, programs, or activities of the university, or be subjected to discrimination by reason of his or her disability. For additional information on the university ADA policy and obtaining reasonable accommodations, please contact the ADA coordinator of the applicable center or program.

Grievances

When questions about procedures, decisions, or judgments occur, program staff members are available for discussion and possible resolution of differences. Students may also have recourse to more formal avenues of appeal and redress. Grievance procedures regarding academic matters are explained elsewhere in this catalog. Grievance procedures for nonacademic disputes are explained in the NSU student handbook.

Student Publications

Nova Southeastern University, as publisher, bears the legal responsibility for the contents of student publications. In the delegation of editorial responsibility to students, the university provides sufficient editorial freedom for the student publications to maintain their integrity of purpose as vehicles of free inquiry and free expression in the Nova Southeastern University academic community.

The delegated editorial freedom of student editors and managers is subject to corollary responsibilities to be governed by the canons of responsible journalism, such as the avoidance of libel, indecency, undocumented allegations, attacks on personal integrity, and the techniques of harassment and innuendo.

As safeguards for the delegated editorial freedom of student publications, the following provisions are made:

The student press shall be free of censorship and advance approval of copy, and its editors and managers shall be free to develop their own editorial policies and news coverage.

Editors and managers of student publications shall be protected from arbitrary suspension and removal because of student, faculty, administrative, or public disapproval of editorial policy or content. Only for proper and stated causes shall editors and managers be subject to removal, and then by orderly and prescribed procedures.

All university-published and -financed student publications shall explicitly state on the editorial page that the opinions therein expressed are not necessarily those of Nova Southeastern University or of the student body.

Student Participation in University Governance

In furtherance of its commitment to teaching and learning, Nova Southeastern University encourages student participation in institutional decision making. Within each school or center, elected student government bodies provide vehicles for student expression of views and opinions on issues of institutional policy. Officers of the student government are members of the President's Student Advisory Committee, which meets monthly with the president and appropriate senior administrative staff to discuss university matters of general interest to the student body. Additionally, students are regularly appointed to committees, task forces, and ad hoc groups dealing with issues of concern to students, including appointment to each self-study subcommittee.

Code of Student Conduct and Academic Responsibility

Purpose: This code seeks to promote high standards of academic integrity by setting forth the responsibilities of students as members of the university community. Abiding by the code ensures a climate wherein all members of the university community can exercise their rights of membership.

Code of Student Conduct

The university is a community of scholars in which the ideals of freedom of inquiry, freedom of thought, freedom of expression, and freedom of the individual are sustained. However, the exercise and preservation of these freedoms and rights require a respect for the rights of all in the community to enjoy them to the same extent. It is clear that in a community of learning, willful disruption of the educational process, destruction of property, and interference with the orderly process of the university or with the rights of other members of the university cannot be tolerated. Students enrolling in the university assume an obligation to conduct themselves in a manner compatible with the university's function as an educational institution. To fulfill its functions of imparting and gaining knowledge, the university retains the power to maintain order within the university and to exclude those who are disruptive of the educational process.

In support of this, any violations of the Code of Student Conduct and Academic Responsibility and/or university policies and procedures may result in disciplinary action and/or criminal prosecution. Violations of academic and/or supplementary standards will be handled through the student's academic college, center, or school. Violations of conduct standards, supplementary standards, university policies and/or procedures will be handled by the Office of the Dean of Student Affairs or by the individual academic college, center, or school as appropriate.

Nova Southeastern University Statement of Student Rights and Responsibilities

Nova Southeastern University, as a community of women and men, is committed to furthering scholarship, academic pursuits, and service to our society. As an institution, our purpose is to ensure all students an equal opportunity to fulfill their intellectual potential through pursuit of the highest standards of academic excellence.

Certain rights and obligations flow from membership in any academic community committed to such goals:

- the rights of personal and intellectual freedom, which are fundamental to the idea of a university
- scrupulous respect for the equal rights and dignity of others
- dedication to the scholarly and educational purposes of the university and participation in promoting and ensuring the academic quality and credibility of the institution

Students are responsible for obtaining, learning, and observing the established university and academic center policies as listed in all official publications. In addition, students must comply with the legal and ethical standards of the institution, as well as those of Broward County and the state of Florida. All members of the community should inform the appropriate official of any violation of conduct regulations.

A. Academic Standards

The university expects its students to manifest a commitment to academic integrity through rigid observance of standards for academic honesty. The academic honesty standards include:

1. **Original Work.** (See also the section Student Original Work.) Assignments such as course preparations, exams, texts, projects, term papers, practicums, etc., must be the original work of the student. Original work may include the thoughts and words of another author but, if that is the case, those ideas or words must be indicated in a manner consistent with a university-recognized form and style manual.

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 express part of the assignment. Exams and tests are original work when no unauthorized aid is given, received, or used before or during the course of the examination.

2. **Referencing the Works of Another Author.** All academic work submitted for credit or as partial fulfillment of course requirements must adhere to each center's specific accepted reference manuals and rules of documentation. Standards of scholarship require that the writer give proper acknowledgment when the thoughts and words of another author are used. Students must acquire a style manual approved by their center and become familiar with accepted scholarly and editorial practice in their program. Students' work must comport with the adopted citation manual for their particular center.

At Nova Southeastern University, it is plagiarism to represent another person's work, words, or ideas as one's own without use of a center-recognized method of citation. Deviating from center standards (see above) is considered plagiarism at Nova Southeastern University.

3. **Tendering of Information.** All academic work must be the original work of the student. Giving or allowing one's work to be copied, giving out exam questions or answers, or releasing or selling term papers is prohibited.

4. Acts Prohibited. Students should avoid any impropriety or the appearance thereof, in taking examinations or completing work in pursuance of their educational goals. Violations of academic responsibility include, but are not limited to:
 - Plagiarism
 - any form of cheating
 - conspiracy to commit academic dishonesty
 - misrepresentation
 - bribery in an attempt to gain an academic advantage
 - forging or altering documents or credentials
 - knowingly furnishing false information to the institution
5. Additional Matters of Ethical Concern. Where circumstances are such as to place students in positions of power over university personnel, inside or outside the institution, students should avoid any reasonable suspicion that they have used that power for personal benefit or in a capricious manner.

B. Conduct Standards

1. Students should not interfere with the rights, safety, or health of members of the university community nor interfere with other students' right to learn. Students are expected to abide by all university, center, and program rules and regulations and all local, state, and federal laws. Violations of conduct standards include, but are not limited to
 - a. theft
 - b. vandalism
 - c. disruptive behavior
 - d. possession or use of firearms, fireworks, explosives, or other dangerous substances or items
 - e. possession, transfer, sale, or use of illicit drugs
 - f. appearance in class or on campus under the apparent influence of alcohol or illicit drugs or chemicals
 - g. violations of housing regulations
 - h. violations of university policies and procedures
 - i. any act or conspiracy to commit an act that is harassing or abusive or that invades an individual's right to privacy, including, but not limited to, sexual harassment and abuse against members of a particular racial, ethnic, religious, or cultural group
 - j. threats of or actual damage to property or physical harm to others
 - k. any activity that may be construed as hazing ("hazing" is defined as: any action or situation that recklessly or intentionally endangers the mental or physical health or safety of a student for the purpose of initiation or admission into or affiliation with any organization operating under the sanction of a university)
 - l. failure to pay tuition and fees in a timely manner
2. Students must have authorization from the university to have access to university documents, data, programs, and other types of information and information systems. Any use of the above without authorization is prohibited.

C. Supplementary Standards

Students are expected to comply with the legal and ethical standards of this institution and those of their chosen field of study, including the Code of Ethics for Computer Usage. The university and each center or program may prescribe additional standards for student conduct as would comport with the letter and spirit of this code.

D. Violations

Any violation(s) of any of the academic standards, conduct standards, or supplemental standards may result in a complaint being filed against a student to enforce the Code of Student Conduct and Academic Responsibility. Deans, associate deans, or directors may, in their discretion, immediately suspend students pending a hearing on charges of academic, conduct, or supplemental standards violations. Violations of academic, conduct, or supplemental standards are subject to disciplinary action, including expulsion from the university. Violations of academic standards will be handled through the student's academic college, school, or center. Violations of conduct or supplementary standards will be handled by the Office of the Dean of Student Affairs or by the individual academic college, school, or center.

Sanctions

If the student is found in violation of the Code of Student Conduct and Academic Responsibility and/or university policies and procedures, one or more of the following sanctions may be imposed:

1. **Expulsion:**
Permanent dismissal from the university with no right for future readmission under any circumstances. A student who has been expelled is barred from campus visiting privileges.
2. **Suspension:**
Mandatory separation from the university for a period of time specified in an order of suspension. An application for readmission will not be entertained until the period of separation indicated in the suspension order has elapsed. Readmission is subject to approval of the university. During the period of suspension, the student is barred from campus visiting privileges unless specific permission is granted by the dean of student affairs or designee.
3. **Temporary Suspension:**
Action taken by the dean of student affairs/associate dean of student affairs, which requires a student's temporary separation from the university until a final determination is made of whether or not a student is in violation of the Code of Student Conduct and Academic Responsibility.
4. **Final Disciplinary Probation:**
A disciplinary sanction serving notice to a student that his/her behavior is in flagrant violation of university standards, under which the following conditions exist:
 - a. The sanction is for the remainder of the student's career and may be reviewed by the dean of student affairs no sooner than two regular academic semesters or equivalent after the sanction is imposed.After two semesters in attendance, a student may initiate a request in writing for reduction of the sanction to disciplinary probation, but must also demonstrate reason to substantiate the request.
 - b. Another violation of the Code of Student Conduct and Academic Responsibility will at a minimum result in suspension.
5. **Disciplinary Probation:**
A disciplinary sanction serving notice to a student that her/his behavior is in serious violation of university standards. A time period is indicated during which another violation of the Code of Student Conduct and Academic Responsibility will automatically raise the question of a more severe sanction (suspension or expulsion) if the student is found in violation.
6. **Disciplinary Warning:**
A disciplinary sanction serving notice to a student that her/his behavior has not met university standards. This sanction remains in effect for a designated number of semesters of attendance after which it is expunged from the student's file.
7. **Verbal Warning:**
A verbal warning is a verbal admonition to the student by a university staff member that his/her behavior is inappropriate. A verbal warning will be noted in the student's file for a period of time after which it is expunged from the student's file.
8. **Fines:**
Penalty fees payable to the university for violation of certain regulations with the Code of Student Conduct and Academic Responsibility.
9. **Restitution:**
Payment made for damages or losses to the university, as directed by the adjudicating body.
10. **Restriction or Revocation of Privileges:**
Temporary or permanent loss of privileges, including but not limited to the use of a particular university facility, visitation privileges, and parking privileges.
11. **Termination or Change of Residence Hall Agreement/Accommodation:**
A disciplinary sanction that terminates or changes the Residence Hall Agreement/ Accommodation. This should be accompanied by another form of disciplinary action. It is considered permanent unless lifted by the dean of student affairs/associate dean of student affairs/director of residential life or designee.

12. Counseling Intervention:

When extreme behavior indicates that counseling may be beneficial, the student may be referred to counseling.

13. Other Appropriate Action:

Disciplinary action not specifically outlined above, but approved through the dean of student affairs/associate dean of student affairs or designee.

14. Parent/Legal Guardian Notification:

University personnel may at times of extreme concern for a student's welfare notify parent(s) or legal guardian(s) of a student under 21 years of age in writing or by phone when alcohol or drug violations of university policy occur.

Appeal Process

An appeal of disciplinary action taken by the Office of the Dean of Student Affairs or its designee must be made in writing to the dean of student affairs within 72 hours of the receipt of the written disposition of the hearing. In appealing a disciplinary decision, the appeal must fall into one of the following categories:

1. The student has new evidence that was not available prior to the original hearing.
2. The disciplinary process was not adhered to during the student's hearing.
3. The sanction(s) do not relate appropriately to the violation.

A written decision will be provided by the dean of student affairs within a reasonable amount of time from receipt of the appeal request. The decision of the dean of student affairs will be final. For appeals of disciplinary action taken by individual colleges, centers, or schools, please consult the academic section of this handbook related to this area and/or academic dean or designee.

Policy on Acceptable Use of Computing Resources

This policy provides guidelines for the appropriate and inappropriate use of the computing resources of Nova Southeastern University. It applies to all users of the university's computing resources, including students, faculty members, staff, alumni, and guests of the university. Computing resources include all computers, related equipment, software, data, and local area networks for which the university is responsible, as well as networks throughout the world to which the university provides computer access.

The computing resources of Nova Southeastern University are intended to be used for its programs of instruction and research and to conduct the legitimate business of the university. All users must have proper authorization for the use of the university's computing resources. Users are responsible for seeing that these computing resources are used in an effective, ethical, and legal manner. Users must apply standards of normal academic and professional ethics and considerate conduct to their use of the university's computing resources. Users must be aware of the legal and moral responsibility for ethical conduct in the use of computing resources. Users have a responsibility not to abuse the network and resources, and to respect the privacy, copyrights, and intellectual property rights of others.

In addition to the policy contained herein, usage must be in accordance with applicable university policies (see "Related Policies" listed elsewhere in this policy) and applicable state and federal laws. Among the more important laws are the Florida Computer Crimes Act, the Federal Computer Abuse Amendment Act 1994, the Federal Electronic Communications Privacy Act, and the U.S. Copyright Act. Copies of these laws and the NSU copyright policy may be examined in the Office of Academic Affairs.

Policy violations generally fall into five categories that involve the use of computing resources:

1. For purposes other than the university's programs of instruction and research and the legitimate business of the university
2. To harass, threaten, or otherwise cause harm to specific individuals or classes of individuals
3. To impede, interfere with, impair, or otherwise cause harm to the activities of others
4. To download, post, or install to university computers, or transport across university networks, material that is illegal, proprietary, in violation of license agreements, in violation of copyrights, in violation of university contracts, or otherwise damaging to the institution
5. To recklessly or maliciously interfere with or damage computer or network resources or computer data, files, or other information

Examples (not a comprehensive list) of policy violations related to the above five categories include:

- sending an individual or group repeated and unwanted (harassing) email or using email to threaten someone
- accessing, or attempting to access, another individual's data or information without proper authorization (e.g., using another's computing account and password to look at his/her personal information)
- creating or forwarding or in any way participating in the distribution of electronic chain mail, pyramid schemes, or sending forged or falsified email
- obtaining, possessing, using, or attempting to use someone else's password, regardless of how the password was obtained
- copying a graphical image from a Web site without permission
- posting a university site-licensed program to a public bulletin board
- using illegally obtained licensed data/software, or using licensed data/software in violation of their license or purchase agreements
- releasing a virus, worm, or other program that damages or otherwise harms a system or network
- preventing others from accessing services
- attempting to tamper with or obstruct the operation of NSU's computer systems or networks
- using or attempting to use NSU's computer systems or networks as a means for the unauthorized access to computer systems or networks outside the university
- viewing, distributing, downloading, posting, or transporting child or any other pornography via the Web, including sexually explicit material for personal use that is not required for educational purposes
- using university resources for unauthorized purposes (e.g., using personal computers connected to the campus network to set up Web servers for illegal, commercial, or profit-making purposes)
- violating federal copyright laws or the NSU copyright policy

Inappropriate conduct and violations of this policy will be addressed by the appropriate procedures and agents (e.g., the Office of the Dean, the Office of the Assistant to the President for Academic Affairs, or the Office of Human Resources) depending on the individual's affiliation to the university. In cases where a user violates any of the terms of this policy, the university may, in addition to the other remedies, temporarily or permanently deny access to any and all NSU computing resources, and appropriate disciplinary actions may be taken, up to and including dismissal.

RELATED UNIVERSITY POLICIES:

Student-Related: Code of Student Conduct and Academic Responsibility (in SCIS Graduate Catalog)
Student Handbook

Faculty-Related: Faculty Policy Manual; Employee Handbook

Staff-Related: Employee Handbook

General Policies: Copyright and Patent Policy

Computing Account Security Agreement

Policy on the Use of Material in Web Pages

Policy on the Use of Material in Web Pages

You should assume that materials you find on the Web are protected by copyright law unless a disclaimer or waiver is expressly stated. You may not place such materials on your Web page(s) without the expressed permission of the author/creator of the work or owner of the copyright. (Examples: course materials, graphic images from other Web pages, articles, video, audio, photographs, software, or images scanned from published works.) You may include short quotations of text, provided you identify in an obvious way (e.g., in a footnote) the author and the work from which the quotation is taken. If you want to include something from another Web page in one of your Web pages, then link to it rather than copy it. The occurrence of plagiarism on your Web page is subject to the same sanctions that apply to plagiarism in any other media. Images in the NSU graphics repository may be used on Web pages without permission. Clip art images provided with licensed software may be used if permitted in the license agreement for such software. You may not place any pictures or videos of people on a Web page without the expressed permission of the people in the picture or video. Every person has a right to privacy, which includes the right to restrict the use of his/her own image. In addition, the picture or video may be protected by copyright.

If you have received formal permission to use material owned by another, place the following notice on the page that contains the copied material:

Copyright <year of copyright> by <name of the copyright owner>. Used with permission.

Although a copyright notice is not required to assert your rights to your own original material, you may want to include a minimal notice of copyright in a Web page footer when appropriate. When used, the copyright notice should appear as follows (the symbol © may be used in lieu of “copyright” or immediately after it):

Individual Web pages:

Copyright <year of copyright> <your name>. All Rights Reserved.

Organization Web pages (examples):

Copyright 2001 Cornell Law Review. All Rights Reserved.

Copyright 1997 Nova Southeastern University. All Rights Reserved.

Copyright 1999 Graduate School of Computer and Information Sciences. All Rights Reserved.

Related university policies that also apply to Web pages are as follows:

- Policy on Acceptable Use of Computing Resources
- Copyright and Patent Policy
- Computing Account Security Agreement
- Code of Student Conduct and Academic Responsibility (in SCIS Graduate Catalog)
- Student Handbook
- Faculty Policy Manual
- Employee Policy Manual