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Doctoral Degree Programs School of Computer and Information Science

Nova Southeastern University

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NOVA SOUTHEASTERN UNIVERSITY
The School of Computer and Information Sciences

Doctoral Degree Programs

Computer Information Systems

Computer Science

Computing Technology in Education

Information Science

Information Systems

**The School of Computer and Information Sciences (SCIS)
Nova Southeastern University
3100 SW 9th Avenue
Fort Lauderdale, Florida 33315-3025**

**800-986-2247, Ext. 2000
(954) 262-2000
E-mail: scisinfo@scis.nova.edu
Web Site: <http://www.scis.nova.edu>**

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 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.

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.

October 7, 1997

In Brief:

The School of Computer and Information Sciences and Nova Southeastern University

A major force in educational innovation, the School of Computer and Information Sciences is distinguished by its ability to offer both traditional and nontraditional choices in educational programs and formats that enable professionals to pursue advanced degrees without career interruption. Programs are timely yet provide the student with an enduring foundation for professional growth. The School has over 900 students from across the U.S. and other countries. It has been awarding graduate degrees since 1980.

The School offers programs leading to: the M.S. in computer information systems, computer science, computing technology in education, and management information systems; the Ed.S. in computing technology in education; the Ph.D. in computer information systems, computer science, information systems, and information science; and the Ph.D. or Ed.D. in computing technology in education. Combined master's–doctoral and Ed.S.–doctoral degree programs are available.

The School offers master's degree programs in the evening on the campus or online via the Internet. Master's programs require 36 credit-hours for graduation and may be completed in 18 months. To earn the degree in 18 months, the student must enroll in two courses per term. Terms are 12 weeks long and there are four terms each year. Master's terms start in September, January, April, and July.

The Ed.S. program requires 37 credit-hours beyond the master's for graduation. Doctoral programs require 64 credit-hours beyond the master's degree for graduation. Ed.S. and doctoral students (depending on the program) may take one of two formats: *cluster* or *institute*. 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 take place in March, June, September, and December. Institute students attend weeklong institutes in January and July at the University at the start of each five-month term. Clusters and institutes bring together students and faculty for participation in courses, workshops, seminars, and dissertation counseling. Between meetings, students work on assignments and projects, and participate in online activities.

The School of Computer and Information Sciences pioneered online graduate education and has been offering programs with an online component since 1983. Online activities require use of a computer and modem from home or office, or while traveling. Students may participate in online activities or online courses from anywhere in the U.S. or outside the U.S. where Internet access is available. Online interactive learning methods, used throughout the instructional sequence, facilitate frequent interaction with faculty, classmates, and colleagues. Online instruction and interaction include a wide variety of sophisticated techniques such as the real-time electronic classroom, online forums, online submission of assignments for review by faculty, electronic mail, the electronic library, World Wide Web pages to access course material, announcements, etc., and use of the Internet and the World Wide Web for research.

Located on a beautiful 232 acre campus in Fort Lauderdale, Nova Southeastern University (NSU) has approximately 16,000 students and is the largest private, independent institution of higher education in Florida. It ranks twenty-fifth in the size of its post baccalaureate programs among the 1,560 public and private universities in the U.S. with graduate and professional programs and tenth among private universities. In addition to the School of Computer and Information Sciences, NSU has an undergraduate college and graduate schools of medicine, dentistry, pharmacy, allied health, optometry, law, psychology, education, business, oceanography, and social and systemic studies. To date, the institution has produced approximately 50,000 alumni. NSU has enjoyed full accreditation by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS) since 1971. SACS is recognized by the U.S. Department of Education as 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:

- 37 college presidents and chancellors
- 100 college vice presidents, provosts, deans, and department chairs
- 65 school superintendents in 16 states, including nine of the nation's largest school districts
- hundreds of college and university faculty members nationwide
- over 100 high-ranking U.S. military officers, including admirals and generals; business presidents, vice presidents, executives, middle managers, and researchers at companies such as American Express, Ameri-First Bank, AT&T, Bellcore, General Electric, GTE, Harris Corporation, IBM, Lenox China, Motorola, Nortel, Racal Datacom, BellSouth, Westinghouse, and William Penn Bank

Degrees and Programs of The School of Computer and Information Sciences

Master of Science (M.S.)

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

Educational Specialist (Ed.S.)

Computing Technology in Education

Doctor of Philosophy (Ph.D.)

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

Doctor of Education (Ed.D.)

Computing Technology in Education

Graduate Certificate Program in Information Resources Management (IRM)

Florida Teacher Certification/Recertification Courses in Computer Science

Application for Admission

Applications should be submitted at least three months before the anticipated starting term. Students who wish to matriculate in a shorter amount of time must contact the SCIS admissions office by telephone to begin the process. Copies of transcripts are acceptable for unofficial early review. Students applying late may be granted provisional acceptance pending completion of the application process. To obtain information or application forms, contact:

The School of Computer and Information Sciences
Nova Southeastern University
3100 SW 9th Avenue
Fort Lauderdale, FL 33315-3025
800-986-2247, Ext. 2000 or (954) 262-2000
E-mail: scisinfo@scis.nova.edu
Web Site: <http://www.scis.nova.edu>

Applicants must satisfy the program-specific admission requirements described in the individual program sections of this brochure and must meet the requirements and submit the documents specified below:

1. An earned master's degree from a regionally accredited institution with an appropriate major.
2. A completed application and application fee.
3. Official transcripts of all graduate and undergraduate work. A graduate G.P.A. of at least 3.25.
4. Three letters of recommendation.
5. Score report of the Graduate Record Examination (G.R.E.) or a comprehensive portfolio of appropriate work experience and credentials.
6. Proficiency in the English language is a prerequisite for graduate study at the School of Computer and Information Sciences. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL). A minimum TOEFL score of 550 is required for admission. (The score must be no more than two years old.) Test results must be sent directly to The School of Computer and Information Sciences from TOEFL/TSE Services, P.O. Box 6151, Princeton, NJ, 08541-7100, USA; phone: (609) 771-7100; fax: (609) 771-7500.

7. 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 of 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). See the SCIS Catalog for additional information regarding international student requirements.

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 a letter of recommendation. 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 before advancement to degree status.

Orientation and Advisement Program

New doctoral students must attend an additional day for orientation on the campus at their first cluster or institute meeting. The orientation includes introductions to the program office staff and faculty, computer requirements and connections, software tools that enhance the educational process, and UNIX and the Internet. The orientation also includes dissertation counseling and library services (on-campus and online). Advisement is conducted regularly by the student's program office with the assistance of the faculty.

Online Computing Resources

SCIS students are given computer accounts and are required to use NSU's computing resources. SCIS graduate students must have an Internet Service Provider (specific requirements are provided by the program office). Students may gain access to the University's computing resources from computer laboratories on the campus and from off-campus locations such as homes, offices, or on-the-road while traveling using either an IBM-compatible PC or an Apple/Macintosh computer and a modem. The student may participate in the online component of the program from anywhere in the U.S. or outside the U.S. where Internet access is available. All students will be given an orientation and individual counseling on computer requirements and online access. Students must be registered in order to use the University's computing facilities.

Program Formats and Term Dates

Terms for each doctoral program are five months long. During the first two years of the program, the student completes two three-credit core courses and one four-credit project course each term. In the third year, the student registers for the dissertation at twelve credits per term. Students who do not complete the dissertation by the end of the third year must register for continuing dissertation services until they have satisfied the dissertation requirement. Doctoral residence is defined as continuous enrollment for two consecutive terms at a minimum of twelve credit-hours per term. This requirement is normally satisfied during the third year of the doctoral program when the student registers for the dissertation.

Depending on the program, students may select one of two formats: *cluster* or *institute*. 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 week-long 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 for participation in courses, workshops, and dissertation counseling. Between meetings, students work on assignments and projects, and participate in online activities that facilitate frequent interaction with faculty, classmates, and colleagues. The online component includes a wide variety of techniques such as the real-time electronic classroom, online forums, online submission of assignments for review by faculty, electronic mail, the electronic library, World Wide Web pages to access course material, announcements, and other information, and use of the Internet and the World Wide Web for research.

The Dissertation

The dissertation is the most important requirement for the doctoral degree. Each student is expected, with the help and approval of an advisor, 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 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.

Each doctoral student is given a copy of the School's Dissertation Guide, and students are given the opportunity to attend presentations at clusters and institutes on the dissertation process, research methodology, and writing for publication.

Research and Statistics Courses

The School offers several subject courses and companion project courses related to the research process: (1) Research Methodology (RES D 700/800); (2) Introduction to Statistics (RES D 701); and (3) Advanced Statistics (RES D 702). Students in the *computing technology in education* program are required to take RES D 700/800. Students in other programs may be required by their advisors or by academic review committees to take one or more of these courses. RES D course descriptions are provided in a separate section of this brochure.

Grade Requirements and Time Limitations

Students must maintain a cumulative grade point average of at least 3.0 for the duration of their program. Students are required to complete requirements for the doctorate within seven years from the date of their first registration.

Independent Study

Students wishing to take a course or project as an independent study must first appeal to the program office. If the program office agrees, it will attempt to obtain the agreement of a faculty member to supervise the independent study and will then provide its decision to the student.

Cross-Registration

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

Library Services

The University library system has more than 500,000 volume equivalents. The Einstein Library, on the Main Campus, houses the University's major collection of books and journals in the humanities and sciences. Its more than 162,000 volume equivalents can be searched through the library's online catalog. Also, more than 25 specialized indexes in CD-ROM format are available as well as dial-up access to the online catalog and to First Search. The Einstein Library is equipped to perform online literature searches using DIALOG information databases. Reference librarians will assist the students in structuring searches.

The library is a member of SEFLIN and FLIN, cooperative library networks that speed access to materials from other institutions throughout Florida. The Einstein Library has also been named a cooperating library of the Foundation Center in New York, giving students access to a special collection for grants and foundation research.

Through the Distance Library Services Office, students off campus have access to books, journal articles, Educational Resource Information Center (ERIC) documents, interlibrary loans, database searches, and reference librarians specializing in research services to remote student locations. Students may call the DLS Office to request materials 24 hours a day, use E-mail, fax, or regular mail. To contact the DLS Office by phone, call 800-541-6682 (automated attendant—enter number for *General Student Services* and follow the menu) or (954) 262-7388. 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.

Many services may be obtained by accessing the DLS's online Electronic Library including access to the library's catalog and periodical holdings, holdings of other libraries, and online databases/information services. The online student will be able to request materials and gain access to a librarian. DLS provides students with books and photocopies of periodical articles via U.S. mail. Students must be registered in order to use the University's library services.

Also, for distance students, the University has made possible the use of many local libraries. The SCIS Admissions Office provides information to new students about libraries in their geographical area that are included in this arrangement and the procedures to follow.

Tuition and Fees (Rates effective starting July 1, 1997. Rates are subject to change.)

Tuition	\$3925 per term
Application Fee.....	\$50 non-refundable
Registration Fee	\$30 non-refundable
Late Registration Fee	\$100 non-refundable
Reinstatement Fee.....	\$50 non-refundable
Graduation Fee.....	\$65
Finance Charge for Installment Payment.....	\$50
Continuing Dissertation Services	\$1475 per term
Continuing Services	\$395 per Incomplete (I) grade per term
Continuing Services	\$395 (leave of absence with online privileges per term)

Financial Aid

The Office of Student Financial Aid administers the University's financial aid programs of grants, loans, scholarships, and student employment, and provides professional financial advisors to help students plan for the most efficient use of their financial resources for education. Underlying the awarding of financial assistance is the philosophy that students have a responsibility for contributing from earnings and savings toward their education. Financial aid resources serve to supplement the student's financial resources.

In order to qualify for financial aid, a student must be admitted into a University program, must be a U.S. citizen or a U.S. immigrant, and must plan on registering for a minimum of six credit hours per term. **A prospective student who requires financial assistance should apply for financial aid while a candidate for admission.** 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. For financial aid information or application forms, call (954) 262-4031 or 800-522-3243.

Tuition Payment Policy

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.
2. *Installment Payment by the Student.* The student may elect an installment payment plan which requires three payments spread over the first 90 days of the term. The first payment, due at registration, includes all fees, 50% of the tuition, plus a \$50 deferment fee. The second payment, due sixty days from the beginning of the term, shall equal 25% of the tuition. The third payment, due ninety days from the beginning of the term, shall equal 25% of the tuition. The first payment must be made by check, money order, or credit card. At the time of registration, the student must submit post-dated checks or credit card authorizations for the second and third installments.
3. *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.
4. *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% of the tuition, plus a \$50 deferment fee. The second payment, due five weeks after the end of the term, shall equal 50% of the tuition. To secure this plan, the student must provide, at registration, a post-dated check or credit card authorization for the deferred portion.
5. *Financial Aid Award.* If a student has received an official financial aid award letter and all documents have been completed, then the student may register without payment. If a student's application for financial aid is still being processed at the time of registration, then the student must register using the installment payment option described above.

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 Registrar. All post-dated 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.

Doctoral Degree Programs

Ph.D. Program in Computer Information Systems

This program offers a course of study leading to the degree of Doctor of Philosophy (Ph.D.) in Computer Information Systems. It is offered in the cluster format which combines traditional and nontraditional instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. (For more information, see the section *Program Formats and Term Dates* presented earlier.) The program is especially well-suited to professionals in business, government, industry, or education who are involved with research, design, implementation, management, evaluation, utilization, or teaching of computer information systems. 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.

Program-Specific Admission Requirements (See pp. 2–3 for general admission requirements.)

This program is designed for the student with a master's degree in computer information systems, computer science, or a closely 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, NSU master's students may be admitted into the combined master's–doctoral degree program (see the SCIS catalog).

The Curriculum for the Ph.D. in Computer Information Systems

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

Core Courses (3 credits each) (Select eight of these)

DCIS 720 Human–Computer Interaction
DCIS 730 Operating Systems
DCIS 740 Data Communications and Computer Networking
DCIS 750 Database Systems
DCIS 760 Artificial Intelligence and Expert Systems
DCIS 770 Software Engineering
DCIS 780 Multimedia Systems
DCIS 790 Special Topics in Computer Information Systems
DCIS 791 Client/Server Computing
DISS 710 Decision Support Systems
DISS 755 Project Management
DISS 770 Information Policy
RESD 700 Research Methodology

Project Courses (4 credits each) (Select four of these)

DCIS 820 Project in Human–Computer Interaction
DCIS 830 Project in Operating Systems
DCIS 840 Project in Data Communications and Computer Networking
DCIS 850 Project in Database Systems
DCIS 860 Project in Artificial Intelligence and Expert Systems
DCIS 870 Project in Software Engineering
DCIS 880 Project in Multimedia Systems
DCIS 890 Project in Special Topics in Computer Information Systems
DCIS 891 Project in Client/Server Computing
DISS 810 Project in Decision Support Systems
DISS 855 Project in Project Management
DISS 870 Project in Information Policy
RESD 800 Project in Research Methodology

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 nontraditional instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. (For more information, see the section *Program Formats and Term Dates* presented earlier.) 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. 2-3 for general admission requirements.)

This program is designed for the student with a master's degree in computer science, or a closely related area. 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.

The Curriculum for the Ph.D. in Computer Science

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

Core Courses (3 credits each) (Select eight of 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
- CISD 780 Pattern Languages for Program Design
- CISD 790 Special Topics in Computer Science
- CISD 791 Genetic Algorithms
- CISD 792 Computer Graphics
- CISD 793 Human-Computer Interaction
- CISD 794 Knowledge Discovery in Databases

Project Courses (4 credits each) (Select four of these)

- 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 880 Pattern Languages for Program Design
- CISD 890 Project in Special Topics in Computer Science
- CISD 891 Project in Genetic Algorithms
- CISD 892 Project in Computer Graphics
- CISD 893 Project in Human-Computer Interaction
- CISD 894 Project in Knowledge Discovery in Databases

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 traditional and nontraditional instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. (For more information, see the section *Program Formats and Term Dates* presented earlier.) 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 training. The program is especially well-suited to educators, educational administrators, and trainers working in the public or private sector. 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 his or her degree preference (Ph.D. or Ed.D.) at any time during the program. The difference between these degrees is a name difference only. Most 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. 2–3 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.

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

The program requires 64 credit-hours of which 40 are required courses and projects and 24 are for the dissertation. Most students take two core courses and one project course per term during the first two years and register for the dissertation in the third year. Courses in the program are listed below. Students are required to take the core course and project course in research methodology (RESD 700/800).

Core Courses (3 credits each) (Select eight of these)

- DCTE 720 Human–Computer Interaction
- DCTE 730 Seminar in Online Learning Environments
- DCTE 740 Telecommunications and Computer Networks
- DCTE 745 Multimedia Systems
- DCTE 747 Learning Theory and Computer Applications
- DCTE 750 Applied Database Systems
- DCTE 770 Courseware Design and Development
- DCTE 790 Special Topics in Computing Technology in Education
- DISC 725 Structure of Library Information Systems
- DISC 735 Organization of Information
- DISS 770 Information Policy
- RESD 700 Research Methodology

Project Courses (4 credits each) (Select four of these)

- DCTE 820 Project in Human–Computer Interaction
- DCTE 830 Project in Online Learning Environments
- DCTE 840 Project in Telecommunications and Computer Networks
- DCTE 845 Project in Multimedia Systems
- DCTE 847 Project in Learning Theory and Computer Applications
- DCTE 850 Project in Applied Database Systems
- DCTE 870 Project in Courseware Design and Development
- DCTE 890 Project in Special Topics in Computing Technology in Education
- DISC 825 Project in Structure of Library Information Systems
- DISC 835 Project in Organization of Information
- DISS 870 Project in Information Policy
- RESD 800 Project in Research Methodology

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 which combine traditional and nontraditional instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. (For more information, see the section *Program Formats and Term Dates* presented earlier.) 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 education, business, government, industry, or in a library or information center environment. 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. 2–3 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.

The Curriculum for the Ph.D. in Information Science

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

Core Courses (3 credits each) (Select eight of these)

- DCTE 720 Human-Computer Interaction
- DCTE 730 Seminar in Online Learning Environments
- DCTE 740 Telecommunications and Computer Networks
- DCTE 745 Multimedia Systems
- DCTE 747 Learning Theory and Computer Applications
- DCTE 750 Applied Database Systems
- DISC 725 Structure of Library Information Systems
- DISC 735 Organization of Information
- DISC 790 Special Topics in Information Science
- DISS 755 Project Management
- DISS 770 Information Policy
- RESD 700 Research Methodology

Project Courses (4 credits each) (Select four of these)

- DCTE 820 Project in Human-Computer Interaction
- DCTE 830 Project in Online Learning Environments
- DCTE 840 Project in Telecommunications and Computer Networks
- DCTE 845 Project in Multimedia Systems
- DCTE 847 Project in Learning Theory and Computer Applications
- DCTE 850 Project in Applied Database Systems
- DISC 825 Project in Structure of Library Information Systems
- DISC 835 Project in Organization of Information
- DISC 890 Project in Special Topics in Information Science
- DISS 855 Project in Project Management
- DISS 870 Project in Information Policy
- RESD 800 Project in Research Methodology

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 which combine traditional and nontraditional instruction to provide professionals the opportunity to pursue graduate study while continuing to work in their current positions. (For more information, see the section *Program Formats and Term Dates* presented earlier.) 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. 2–3 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.

The Curriculum for the Ph.D. in Information Systems

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

Core Courses (3 credits each) (Select eight of these)

DCIS 720 Human–Computer Interaction
DCIS 730 Operating Systems
DCIS 750 Database Systems
DCIS 760 Artificial Intelligence and Expert Systems
DCIS 780 Multimedia Systems
DCIS 791 Client/Server Computing
DCTE 730 Seminar in Online Learning Environments
DISS 710 Decision Support Systems
DISS 724 The System Development Process
DISS 740 Telecommunications and Computer Networks
DISS 755 Project Management
DISS 770 Information Policy
DISS 790 Special Topics in Information Systems
RESD 700 Research Methodology

Project Courses (4 credits each) (Select four of these)

DCIS 820 Project in Human–Computer Interaction
DCIS 830 Project in Operating Systems
DCIS 850 Project in Database Systems
DCIS 860 Project in Artificial Intelligence and Expert Systems
DCIS 880 Project in Multimedia Systems
DCIS 891 Project in Client/Server Computing
DCTE 830 Project in Online Learning Environments
DISS 810 Project in Decision Support Systems
DISS 825 Project in The System Development Process
DISS 840 Project in Telecommunications and Computer Networks
DISS 855 Project in Project Management
DISS 870 Project in Information Policy
DISS 890 Project in Special Topics in Information Systems
RESD 800 Project in Research Methodology

Course Descriptions

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)

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, advanced human-computer interfaces such as speech and handwriting, 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, 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.

CISD 780 Pattern Languages for Program Design (3 credits)

A method of system development and reuse by abstracting the interrelationships with object-oriented technology from existing, proven systems, to create a design language from the coarse-grained macro logical schema to the fine-grained framework code. The method uses problem and solution analysis to create a concrete prototype language. Current issues, future directions, and research topics will be explored.

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, parallel computation. Topics will vary depending on student and faculty interest. Depending on interest, several special topics courses may be offered concurrently. Since the content will vary, students may request permission to attend more than one special topics course.

CISD 791 Genetic Algorithms (3 credits)

Explores genetic algorithms in depth, including string based genetic algorithms, genetic programming, and evolutionary programming. Architectural and performance issues in the use of evolutionary computation will be stressed.

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 793 Human–Computer Interaction (3 credits)

This course stresses the importance of good interfaces and the relationship of user interface design to human–computer interaction. Design principles, guidelines, and methodologies for building, installing, managing, and maintaining interactive systems that optimize user productivity are discussed and reviewed. Other topics include the efficient transfer of information between humans and machines, graphics, implementation and evaluation of human–computer dialogues, the multidisciplinary dynamics of human–computer interaction, current and projected developments in HCI research, and tradeoffs and consequences of interface design.

CISD 794 Knowledge Discovery in Databases (3 credits)

The 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 in this course. 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 project or implementation on a current topic 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.

CISD 870 Project in Software Engineering (4 credits)

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

CISD 880 Project in Pattern Languages for Program Design (4 credits)

Students pursue a research study, project or implementation on pattern languages for program design.

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

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

CISD 891 Project in Genetic Algorithms (4 credits)

An in-depth examination and application of biologically motivated computing to a real world problem. A typical project will include a thorough review of the literature to determine the state of the art and the implementation of a prototype system that applies the principles of genetic algorithms, genetic programming, classifier systems, or evolutionary computation.

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 893 Project in Human-Computer Interaction (4 credits)

Students complete a research paper or project that investigates a current topic in HCI, such as HCI modeling, interface quality and evaluation, computer graphics, prototyping, computer system and interface architecture, usability engineering, interface toolkits, HCI education, computer-supported cooperative work, and groupware applications.

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.

Computer Information Systems

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 the multidisciplinary dynamics of human-computer interaction as a field of study, current and projected developments in HCI research and usability engineering.

DCIS 730 Operating Systems (3 credits)

An in-depth treatment of advanced and newly developed topics in operating systems. Topics may range from state-of-the-art operating system functionality to advanced distributed computing techniques.

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 ISDN and ATM, the OSI Model, transmission media, network operating systems, topologies, configurations, protocols, and performance characteristics. Trends in standardization, internetworking, downsizing, and the development of local area networks (LANs), wide area networks (WANs), metropolitan area networks (MANs), and enterprise-wide networks are explored.

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)

Covers the 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.

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 to be covered 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.

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. Depending on interest, several special topics courses may be offered concurrently. Since the content will vary, students may request permission to attend more than one special topics course.

DCIS 791 Client/Server Computing (3 credits)

Students are expected to contribute to the expansion of the Client/Server (C/S) paradigm. Topics include the components of C/S architecture, security, networking aspects, interprocess communication (RPC), role of the GUI and front-end development tools (from screen scrapers to ICASE), middleware (2-tier and 3-tier) and back-end concerns. The role of standards in C/S development is discussed including (DCE, CORBA, ODBC, COM, and OLE) along with object-oriented aspects of C/S and distributed computing. 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 concerns for meeting customer requirements (TQM, QFD, etc.).

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 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.

DCIS 830 Project in Operating Systems (4 credits)

The student may elect to do an implementation or write a research paper. 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 and distributed operating system components. Research papers may investigate current topics such as UNIX, MACH, OS/2, CORBA, windows/NT, open systems, distributed computing massive parallelism, object-oriented operating systems, and real-time operating systems.

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

Students pursue a research project, implementation, or simulation study on a current topic in data communications and/or computer networking. Some topics of current interest are client/server computing, internetworking, network management, ONC, DCE, DME, TCP/IP, OSI, and ISDN.

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, deductive and logic-based expert systems, federated or heterogeneous database systems, other 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 project or implementation on a current topic 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 study 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. 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 video conferencing and groupware.

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

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

DCIS 891 Project in Client/Server Computing (4 credits)

The student must address and solve a significant problem that results in a final report of publishable quality.

Computing Technology in Education

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 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 that include, but are not limited to these issues: 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.

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 745 Multimedia Systems (3 credits)

A course in advanced systems covering both theoretical, practical, and applied issues in designing and evaluating multimedia systems. Tools, techniques, and guidelines facilitating the planning, design, production, and implementation of multimedia projects are delineated. Topics to be covered include introduction to multimedia systems, compression techniques, synchronization, user interface issues, storage, digital audio and video, as well as networking issues related to multimedia. Trends in the development and use of multimedia to support instruction, learning, and research are described.

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 Applied 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 770 Courseware Design and Development (3 credits)

Explores the concepts and principles that underlie the design and development of courseware in education and training and implements the findings in the development of prototype materials. Students will become immersed in two important issues for successful functioning in the technological society of the 21st century: instructional design and team productions.

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

Covers advanced topics in areas of current research interest in computing technology in education. May include topics in areas such as distance education, learning theory, adaptive devices, CD-ROM development, artificial intelligence and expert systems, adult literacy, computer graphics, and distributed database systems. Topics will vary depending on student and faculty interest. Depending on interest, several special topics courses may be offered concurrently. Since the content will vary, students may request permission to take more than one special topics course.

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

Students pursue a research study, project or implementation in human-computer interaction.

DCTE 730 Project in Online Learning Environments (4 credits)

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

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

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

DCTE 845 Project in Multimedia Systems (4 credits)

Students pursue a research study, project or implementation on a current topic in multimedia systems. Some areas of current interest include design and implementation of interactive multimedia applications, hypermedia systems, distributed multimedia, multimedia and education, multimedia authoring, video conferencing, and groupware issues with multimedia.

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 Applied Database Systems (4 credits)

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

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

Requires the production of an entire courseware package. It is necessary to have a representative target population for purposes of beta testing the resulting product. The product should accommodate a range of learning styles. It must be submitted with development charts, a narrative explaining the roles taken at different times by team members, a review of the literature, and fully-functional, intuitively used software. The inclusion of a management system is totally optional. However, the management component comes after the development and must not detract from software use. Additional teaching aids developed may be included.

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

Students pursue a research study, project or implementation on special topics in computing technology in education.

Information Science

DISC 725 Structure of Library Information Systems (3 credits)

The evolution, design, and structure of online information systems are examined. Principles, concepts, and techniques for online information retrieval are described. Topics include the methodology of the search process, bibliometrics, the Internet, the user interface, hypertext and hypermedia, CD-ROM and related technologies, and standardization. Case studies highlighting the planning, implementation, and management of online information systems are discussed. Trends in system enhancements, the use of remote online services for information retrieval, electronic document delivery, electronic publishing, and end-user training are reviewed. Problems and issues associated with electronic information access and delivery are noted.

DISC 735 Organization of Information (3 credits)

Techniques for information acquisition, organization, management and dissemination in an integrated electronic networked environment are presented. Guidelines for the implementation of innovative information technologies to expedite research and instruction are examined. Approaches for using the Internet to facilitate the provision of library services are delineated.

DISC 790 Special Topics in Information Science (3 credits)

Covers 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. Depending on interest, several special topics courses may be offered concurrently. Since the content will vary, students may request permission to attend more than one special topics course.

DISC 825 Project in Structure of Library Information Systems (4 credits)

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

DISC 835 Project in Organization of Information (4 credits)

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

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.

Information Systems

DISS 710 Decision Support Systems (3 credits)

Principles and techniques relating to decision-making, systems modeling, and support. Topics include decision theory, simulation, decision support system architecture, constructing a decision support system, executive information systems, and expert systems to support decision-making in information systems. An emphasis will be placed on current issues, future directions, and research topics.

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)

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.

DISS 755 Project Management (3 credits)

A detailed study of various aspects of information systems project management focusing both on current and emerging practices and techniques. Topics include technical, cost, and schedule project planning and control; performance measures and metrics; technical team building; information technology support of teams, and process control. An emphasis will be placed on current issues, future directions, and research topics.

DISS 770 Information Policy (3 credits)

The enormity of change accompanying the information technology (IT) revolution can be measured by the number and complexity of fundamental policy questions related to the appropriate use of IT. This course explores existing debates and emerging policy issues. Topics include the economic and social issues surrounding the commodification of information, marketplace pricing of information, freedom of access to information vs. individual privacy, security and integrity of information in the electronic environment (including encryption), protection of the intellectual property rights of information producers vs. fair use of information, telecommunications policy and its relationship to information policy, IT and international competitiveness, privatization of government (public sector) information and related pricing, the role of information in national security/defense, and the flow of information across international borders with implications not just for national policies, but for national sovereignty. Although emphasis will be from a U.S. national policy perspective, the concerns are similar in countries and societies around the globe. An overarching question will be what is the appropriate role of government in establishing such policies in this new age?

DISS 790 Special Topics in Information Systems (3 credits)

Cover 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. Depending on interest, several special topics courses may be offered concurrently. Since the content will vary, students may request permission to attend more than one special topics course.

DISS 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 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 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 855 Project in Project Management (4 credits)

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

DISS 870 Project in Information Policy (4 credits)

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

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.

Research and Statistics

RESD 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.

RESD 701 Introduction to Statistics (3 credits)

This course is designed for students with a limited statistical background and will focus on the fundamental concepts of descriptive and inferential statistics. This will include an introduction to data types and various ways of numerically and graphically describing data sets. The primary focus of the course will be the investigation of the continuous probability distribution and an investigation of its sampling distributions, leading to the development and testing of hypotheses using inferential techniques such as the t-test and the one-way analysis of variance.

RESD 702 Advanced Statistics (3 credits)

This course is a detailed examination of many of the inferential statistical decision making tools common in both education and industry. This will include a look at common parametric procedures such as the analysis of variance, simple linear regression and the factorial analysis of variance as well as nonparametric procedures that employ the chi-square statistic. Emphasis will be placed on using statistical software packages to help aid in data analysis and decision-making. Pre-requisite: RESD 701 or its equivalent.

RESD 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 pre-defined hypotheses and/or project goals and objectives will be discussed. Major emphasis is placed on the development of the report stage of research.

Additional Information

For information on policies and procedures consult the *Graduate Catalog of The School of Computer and Information Sciences*.

Faculty and Staff of The 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.

W. Shane Bruce, Ph.D., Nova Southeastern University. Assistant Professor. Artificial intelligence and machine learning, genetic algorithms, operating systems.

Maxine S. Cohen, Ph.D., State University of New York. Assistant Professor. Human-computer interaction, usability engineering, multimedia, database systems, computer science education.

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

George K. Fornshell, Ph.D., Nova Southeastern University. Associate Professor. Instructional systems development, multimedia, authoring systems, human factors, distance education.

S. Rollins Guild, Ph.D., Nova Southeastern University. Assistant Professor. Mathematical modeling, computer graphics, programming languages, artificial intelligence.

Michael J. Laszlo, Ph.D., Princeton University. Associate Professor. Data structures and algorithms, software engineering, programming, computer graphics.

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, broadband communications, multimedia, telecommunications, emerging technologies.

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

Sumitra Mukherjee, Ph.D., Carnegie Mellon University. Assistant Professor. Database, decision support systems, information systems, network security, artificial intelligence, telecommunications.

Raul Salazar, Ph.D., Nova Southeastern University. Assistant Professor. Multimedia, computer networks, programming languages, computer systems, computer graphics.

John Scigliano, Ed.D., University of Florida. Professor. Online information systems, information systems management, distance education.

Junping Sun, Ph.D., Wayne State University. Associate Professor. Database management systems, object-oriented database systems, artificial neural networks.

Raisa Szabo, M.S., Budapest Technical Institute. Instructor. Computer architecture, artificial intelligence, neural networks, robotics, operations research, concurrent languages.

Steven R. Terrell, Ed.D., Florida International University. Associate Professor. Research methodology and statistics, learning theory, distance education, computer-managed instruction.

***Doctoral Adjunct Faculty:** Dr. Susan Dorchak, Dr. Lee Leitner, Dr. Richard Manning, Dr. Terry McQueen, Dr. Michael Moody, Dr. Maria Petrie, Dr. Greg Simco, and Dr. Steven Zink.

The Administrative and Technical Staff

Jan Bourne, Advisor, Undergraduate and Master's Programs.

Bonnie Bowers, Assistant to the Dean and SCIS Operations Manager.

Sharon Brown, Coordinator for Faculty Support.

Sonya Brown, Receptionist.

Josette Davis, Administrative Secretary, Undergraduate and Master's Programs.

Barbara J. Edge, Assistant Director, CS/CIS Doctoral Programs; SCIS Budget Manager.

Sunnie Ewing, Admissions Representative.

George Gabb, Director, Undergraduate and Master's Programs.

Elizabeth Gutierrez, Clerical Assistant, Undergraduate and Master's Programs.

Kimberly Jaggears, Clerical Assistant, Admissions.

Angela Kowalski, Administrative Assistant, Doctoral Programs.

Rose Lemos, Acting Director, Admissions.

Edward Lieblein, Dean.

Frank Mitropoulos, Director of Computing.

L. Jonathan Peeler, Admissions Representative.

Kevin Richardson, Computing Technology Assistant.

Bellarmin Selvaraj, Director, Research and Evaluation.

Maya Semaan, Assistant Director, IS, ISc, and CTE Doctoral Programs.

Russell Splain, Coordinator, Network and Software Services.

Carol Stern, Administrative Assistant, CS/CIS Doctoral Programs.

Christopher Thomas, Coordinator, Network and Software Services.

Elizabeth Vayda, Coordinator, CS/CIS Doctoral Programs and SCIS Budgets.