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# Doctor of Science in Computer Science 1986-88 Catalog

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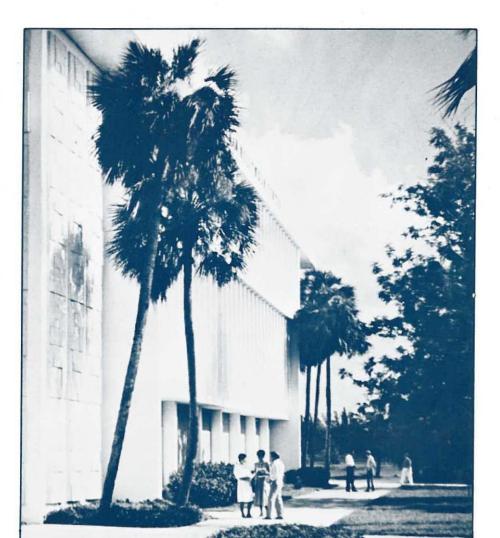
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# NOVA UNIVERSITY

# **Doctor of Science in Computer Science**

### **Computer-Based Program for Computer Professionals**

1986-88 Catalog



# **Doctor of Science in Computer Science**

### **Computer-Based Program** for Computer Professionals

1986-88 Catalog

#### Published, November 1986

Policies and programs set forth herein become effective September 1, 1986. The regulations and requirements herein, including fees, are necessarily subject to change without notice at any time at the discretion of the Nova University administration.

Nova University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award bachelor's, master's, educational specialist, and doctoral degrees. Nova University admits students of any race, color, and national and ethnic origin.



Now entering its third decade, Nova University is beginning to see the impact that its graduates are having on the institutions within our society. Many of the University's programs are missionoriented, designed to improve the performance of professionals, and evidence is being collected that indicates that Nova alumni are having a strong, positive effect on the institutions in which they are employed.

Independent education must continue to be responsive and adaptable to the varying needs of potential students if it is to represent a true alternative to the tax-supported sector. Nova University is committed to maintaining quality while it is meeting these needs.

Abraham S. Fischler

President, Nova University

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## **Doctor of Science in Computer** Science

Computer-Based Program for Computer Professionals

### The Program Offered

The Department of Computer Science offers a program to professionals working in a computer, education, or information center. This program capitalizes on the computer-based delivery system to combine formal instruction, independent study, and applied research into an integrated program of study designed to be completed in approximately four years.

### **Philosophy and Mission**

The program embodies a commitment to provide quality graduate education and is designed exclusively for professionals and educators who are employed. The field-based delivery system was developed as the most appropriate means for offering the program. The most salient aspect of the field-based approach is that there is no oncampus residency requirement - it does not force the professionals to leave the very positions and responsibilities for which they are seeking advanced preparation. On the contrary, the field-based approach allows for the integration of study and practice. Program participants, who are steeped in the day-to-day problems, issues, and conditions of the computer field, use their knowledge and experience to examine critically the "real world" efficacy of theory and practice presented through formal instruction and learned through independent study. And because of their status as professionals they have the opportunity (and are required) to submit to the test of reality newly acquired knowledge and competencies, through direct application within their own institutions or systems.

The significance of this mixing of theory and practice is summed up in the following point: in most traditional doctoral programs, the ability to perform as an outstanding professional is assumed to be a consequence of earning the degree. At Nova University it is a condition of earning the degree.



Doctoral students attending seminar

#### Doctor of Science in Computer Science Program Description

The Department of Computer Science offers a graduate program leading to the degree of doctor of science (Sc.D.) in computer science. This program is designed to produce a computer scientist with knowledge in all major areas of computer science as well as one who is capable of solving a problem of substance in the field. Each major area will consist of lectures given by leading computer scientists in the field, and a research project to be completed by the end of the course. The research activities will be part of industry and University sponsored programs.

The major areas offered over the four year program are -

- · Theory and principles of programming
- Network design and data communications
- Software engineering
- Operating systems
- Compilers, language theory, and automata
- Artificial intelligence and expert systems
- Database management systems and distributed databases
- Modeling, simulation, and mathematical programming

### Admissions

The computer science doctoral program has been designed for students with a graduate degree in computer science, engineering, mathematics, or physics. Applicants for the doctor of science degree in computer science should have a graduate major in one of the above areas or a related area and must meet the following requirements:

- A master's degree, granted by an accredited institution representing completion of a course of study which fulfills prerequisites for doctoral work in the area of computer science.
- 2. A 3.25 graduate grade point average on a grading scale of 4.0 (A).
- The intellectual capacity and motivation to pursue doctoral work as determined by credentials and an interview. The applicant's official transcripts must be submitted directly from the degreegranting institution.
- 4. Satisfaction of graduate prerequisites in:
  - a. Structured programming
  - b. Data communications
  - c. Operating systems
  - d. Compilers
  - e. Databases
  - f. Modeling and simulation

Students not satisfying these prerequisites will be required to make up the appropriate deficiencies in the master's program before being admitted to the doctoral program.

A special year will be offered at the master's level for students not meeting the full requirements for the doctoral program. The preyear consists of the eight core courses of the master of science in computer science. Upon successful completion of the first year in the doctoral program, the master of science in computer science will be awarded.

### **Fees and Tuition Policy**

The application must be accompanied by a \$30 check made payable to Nova University. This is a nonrefundable, one-time fee. The tuition may be paid once a year or by the semester. The tuition for each year is \$5250. Semester payments are \$2625 each. Students who must continue beyond four years, go into Continuing Services at a reduced tuition rate of \$1000 per semester. A registration fee of \$30 is charged each term.



Nova's mainframe computer serves the university

Eighty hours of computer time are provided for each core course. Additional hours are billed at the rate of \$10.00 per hour including phone charges. The hours of online operation are between 6 p.m. and 7 a.m. daily and all day weekends. In addition, all other courseware materials necessary to complete the program are included. Materials include study guides, reading assignments, computer protocols and user codes written assignments, and examinations.

Students must purchase their own textbooks and cover the cost of their own lodging and travel expenses for the seminars.

#### Refunds

A student paying tuition prior to the start of the first semester session, and notifying the Department of Computer Science of withdrawal from the program before the first semester session, will be entitled to a full refund of all monies paid, with the exception of the \$30 non-refundable application fee.

If an application is rejected, the applicant will be refunded all monies paid except the non-refundable application fee.

### **Financial** Aid

Nova University offers a comprehensive program of financial aid to assist students in meeting educational expenses. Financial aid is available to help cover direct educational costs such as food, clothing, and transportation. The primary responsibility for paying for education rests with the student and his or her family. Financial aid is available to "fill the gap" between the cost of education and the amount the family can reasonably be expected to contribute.

In order to qualify and remain eligible for financial aid, students must be accepted for admission into a University program; eligible for continued enrollment; a United States citizen, national or permanent resident; and making satisfactory academic progress toward a stated educational objective in accordance with the University's policy on satisfactory progress for financial aid recipients.

For information on sources of aid and for application forms, please contact: Nova University, Office of Student Financial Planning and Resources, 3301 College Avenue, Parker Building, Room 351, Ft. Lauderdale, FL 33314 305-475-7410.

### **V.A. Benefits**

Nova University's academic programs are approved by the State of Florida, Department of Education, State Approving Agency for Veterans Training, for veterans educational benefits. The V.A. representative will assist veterans in applying for benefits. A V.A. student must attain and maintain satisfactory progress as determined by the program director each evaluation period (e.g. sixmonth term). He/she also must meet any skill or technical requirements of his/her particular program. Each V.A. student who, at the end of any evaluation period, has not attained and maintained satisfactory progress will be placed on academic probation for the next evaluation period. Should the student not attain and maintain satisfactory progress by the end of the probationery period (one sixmonth term), the student's V.A. educational benefits will be terminated for unsatisfactory progress.

A student whose V.A. educational benefits have been terminated for unsatisfactory progress may petition the school to be recertified after one six-month term has elapsed. The school may recertify the student for V.A. educational benefits only if there is a reasonable likelihood that the student will be able to attain and maintain satisfactory progress for the remainder of the program.

### **International Students**

International Students are required to:

- 1. Submit a completed application form and a non-refundable \$30.00 application fee.
- Submit all college level transcripts, in Official English translation (applicable to non-English transcripts only), to Nova University for evaluation. If Nova University is unable to evaluate the transcripts, it will be necessary for you to forward the official transcripts, in Official English translation to:

World Education Services, Inc. P.O. Box 745, Old Chelsea Station New York, New York 10011

A copy of the evaluation must be forwarded to Nova University

- 3. Submit a financial letter from either a bank stating the amount in U.S. currency available to you while you are attending Nova University and/or a notarized letter from a sponsor stating that he/she will pay for your living and tuition expenses while you are attending Nova University. The letter must cover any dependents that will be residing with you in the United States.
- 4. Submit satisfactory scores on the Test of English as a Foreign Language (T.O.E.F.L.). Nova University requires a minimum of 550 on the exam. If you have not taken the T.O.E.F.L. or have received an unsatisfactory score, you will be required to take Nova University's Intensive English Program's Test of English. Failure to receive satisfactory scores on the Intensive English exam means that you will be required to complete additional study in the Intensive English program prior to enrolling in University classes. The I-20 form can be issued only after all of the above requirements have been met and you are formally accepted to the University.

For further information, please contact Bonnie Matalon, International Student Advisor, at (305) 475-7413.

#### **Student Conduct and Rights**

Students are expected to comply with the legal and ethical standards of Nova University. Academic dishonesty and nonacademic misconduct are subject to disciplinary action. Specific instances of misconduct include, but are not limited to cheating, plagiarism, knowingly furnishing false information to the University, and forging or altering University documents or academic credentials.

The institution reserves the right to require a student to withdraw at any time for misconduct as described above. It also reserves the right to impose probation or suspension on a student whose conduct is determined to be unsatisfactory.

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

### **Grading** System

Instructional personnel in the doctor of science in computer science program assign grades of PASS, NO PASS, and INCOMPLETE for courses and PASS, NO PASS, and UNACCEPTABLE for projects. Course grades are assigned by the national lecturer responsible for that course and project grades are assigned by the project evaluator.

A PASS indicates the student has satisfied all course, seminar, or project requirements.

An INCOMPLETE for a seminar indicates the student has attended the seminar but has failed to meet all requirements. However, it is reasonable to expect that the participant will be able to satisfy the requirements. An INCOMPLETE must be made up by the date stipulated in the Policy and Procedures Manual. If this is not done, it becomes a NO PASS.

A NO PASS indicates that a student has attempted to complete all requirements in the course but has failed to do so. Any student receiving a NO PASS must repeat the course.

A grade of UNACCEPTABLE means the project needs revision. When a project receives a "U" on the second revision, a NO PASS is assigned and the student must begin a new project on a new topic. Students who receive two NO PASSES will be terminated from the program and may not be readmitted.

Students who require more than four years to complete the program come under the jurisdiction of the Office of Continuing Services (OCS). This office assists such students in obtaining needed advice and counseling for completing the program.

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

#### **Graduation Requirements**

The requirements for the doctor of science degree in computer science are –

To attend four seminars each year of the four-year program. Seminars are conducted on Saturdays. Preseminar study materials are provided to each student by the University. Seminars are held every three months in several geographical areas. The program will be available in major urban areas and all 16 seminars will be available in these major urban areas.

The completion of 68 semester hours of graduate credit of which 48 semester hours are required major courses.

All requirements must be completed within seven (7) years of the student's regional start date.



Staff members are dedicated to helping students

### **Program Format**

During the first 3 years, the student will select six major courses of seven credits each, or a total of 42 credits. Each course will take six months to complete.

For each course, the student will attend two regional seminars, develop a proposal for a project (2 credits), and implement the project (2 credits).

- At the first seminar, each student will select a research project.
- During the first 3 months, each student will develop the project, under the supervision of a computer scientist advisor.
- At the second seminar, the student will give a formal presentation of his/her project.
- During the next three months, the student will implement his/her projects.
- A formal examination will be given for each course as part of the first seminar of each subsequent course.

#### Format of activities (first 3 years):

#### ACTIVITY

#### CREDITS

Course	3
Applied Research and Development Project	2
Project Implementation	2

Major course: 6 months, 7 credits

### The Fourth Year:

During the last year, the student will work on his/her dissertation. The last year will be divided in two blocks of six months.

The first 6 months, the student will work on a dissertation proposal (10 credits), as well as attending the seminars for the seventh major course.

The last 6 months, the student will work on his/her final dissertation (10 credits), as well as attending the seminars for the eighth major course.

Format of activities (fourth year):

CREDITS	
3	
10	

First 6 months, 13 credits

ACTIVITY	CREDITS
Course	3 /
Final Dissertation	10

Last 6 months, 13 credits

The eight major courses offered over the four year program are -

1. Theory and principles of programming

2. Network design and data communications

3. Software engineering

4. Operating systems

5. Compilers, language theory, and automata

6. Artificial intelligence and expert systems

7. Database management systems and distributed databases

8. Modeling, simulation, and mathematical programming

### Seminar Format

Seminars will be conducted on Saturday, every three months, according to the following format:

8:00 a.m.	Examination	Saturday morning
9:00 a.m.	Speaker	
12:00 Noon	Lunch Break	
1:00 p.m.	Questions/Answers	
1:30 p.m.	Course Structure	Saturday afternoon
2:30 p.m.	Break	Savaraaj artorrioon
3:00 p.m.	Lecture	
5:00 p.m.	Dinner Break	Saturday evening
6:30 p.m.	Project Presentation	B
8:00 p.m. 10:00 p.m.	Project Alternatives	

Seminar Format, 14 hours

### **Applied Research and Development Project**

Each major course includes an applied research and development project.

At the first seminar, projects will be proposed and discussed. During the first 3 months of the course, the students will participate in online discussions with their advisors and colleagues. Each project will be fully documented and result in a formal presentation at the second seminar.

At the second seminar, the proposed project will be formally presented and become part of the seminar's proceedings.

### **Project Implementation**

For each course, the students will be required to implement their projects.

Each project will be fully documented and implemented in a computer form and transmitted to the student's advisor, who in turn, will test, analyze, and validate the project.

### Dissertation

The last year, the student will be required to pass a qualifying exam and present a dissertation representing 20 credits.

### Withdrawal

Students who wish to withdraw from the program – either temporarily or permanently – must inform the Admissions Office in writing to be eligible for allowable refunds. Students who give written notice of their intent to withdraw prior to a seminar will not be assessed for that or subsequent courses until they are formally readmitted. Students who withdraw and reenter are assessed a readmission fee of \$10 and are subject to the prevailing tuition rate.

Since some seminars are offered only once at a particular site, students are advised that failure to attend a seminar when it is offered in their region may result in some logistical difficulties in making up the missed seminar at a later date. For this reason, students are urged to maintain continuous enrollment.

### Readmission

Individuals on withdrawal who wish to be readmitted must complete a readmission form and be approved for readmission by the Admissions Committee of the Department of Computer Science.

## **Course Descriptions**

#### **CIS 700 Theory and Principles of Programming**

The mathematics of algorithm and programming construction will be presented, demonstrating the latest advances in structured programming, modular programming, and concurrent programming. The structures of modern languages will be analyzed in terms of ease of use, program development, correctness, reliability, and integrity. **Prerequisite: CIS 610.** 

#### CIS 710 Modeling, Simulation, and Mathematical Programming

The design of a mathematical model will be presented, analyzing the techniques of model development and simulation using General Purpose Simulation Systems (GPSS), Systems Dynamics (DYNAMO), and Mathematical Programming Techniques (IMSL). **Prerequisite: CIS 620.** 

#### CIS 720 Compilers, Language Theory, and Automata

The design of a compiler will be presented, analyzing its structure in terms of the data types and program structures to be compiled: modules, classes, and abstract data types. The concept of parallelism in compilation techniques will also be presented. **Prerequisites: CIS 630, CIS 631, CIS 632.** 

#### **CIS 730 Operating Systems**

The design of a computer operating system will be presented, analyzing its structure in terms of its control functions: multiprogramming, multiprocessing, real-time, time-sharing, and networking. The UNIX\* Operating System will serve as a model for operating system development. Arrays and networks of microprocessors will also be studied. **Prerequisites: CIS 640, CIS 644.** 

#### **CIS 740 Network Design and Data Communications**

The analysis of network design and data communications will be presented, illustrating the present protocols linking different microcomputers to a host of computers using local networks. **Prerequisites: CIS 650, CIS 651.** 

## CIS 750 Database Management Systems and Distributed Databases

The design of relational databases will be presented, analyzing the interface between a database, its applications, and other utility programs: screen formatting, report generation, graphic display, and statistical analysis. **Prerequisites: CIS 660, CIS 661, CIS 662.** 

\*UNIX is a trademark of AT&T & Bell Laboratories

#### **CIS 760 Artificial Intelligence and Expert Systems**

The analysis of nondeterministic solutions to problems will be presented, using concepts developed in LISP, PROLOG, OPS5, and other specialized programming languages. The concept of knowledge bases will be developed. **Prerequisite: CIS 670.** 

#### **CIS 770 Software Engineering**

The design and implementation of a software system will be presented, analyzing the techniques of software integration, automatic program development, and application program generation. **Prerequisites: CIS 680, CIS 682.** 

#### **CIS 800 Theory and Principles of Programming Project**

The mathematics of algorithm and program construction are the basis for this project. The project illustrates the benefits of applying structured programming, of using program documentation, and of using program assertion to produce correct programs.

Current projects include the use of a modern language (C, Modula, Ada) to demonstrate the benefits of its structures on program development. Each program is designed as a general purpose unit that will become part of an industry or University sponsored program. **Prerequisite: CIS 700.** 

#### CIS 810 Modeling, Simulation, and Mathematical Programming Project

The mathematics of model representation and systems analysis are at the center of this project. From the design of a model to its analysis, each phase of a simulation model is analyzed.

Current projects use the techniques of discrete events simulation, mathematical programming, statistical precision, and systems analysis to study the performance of an industrial system.

#### CIS 820 Compilers, Language Theory, and Automata Project

Data structures and program constructs available in modern languages (C, Modula, Ada) are at the center of this project on compilers.

Current projects compare the current tools available for compiler construction to achieve the proper level of performance and reliability. **Prerequisite: CIS 720.** 

#### **CIS 830 Operating Systems Project**

This project analyzes the benefits of using a high level language (C, Modula, or Ada) in implementing an operating system.

Current projects compare the traditional methods (writing an operating system in assembly language) and assess the advantages and disadvantages of replacing assembly languages by modern languages. **Prerequisite: CIS 730.** 

#### **CIS 840 Network Design and Data Communications Project**

Current projects consist in a team effort to implement a Local Area Network at Nova University. Other projects include the analysis and implementation of academic delivery systems via satellite communication. **Prerequisite: CIS 740.** 

#### CIS 850 Database Management Systems and Distributed Databases Project

Relational databases are at the center of this project. From the logical design of databases to their physical implementation, each phase of a database project is analyzed.

Current projects analyze the tools available to interface database management systems within the UNIX environment. **Prerequisite: CIS 750.** 

#### **CIS 860 Artificial Intelligence and Expert Systems Project**

This project consists in the implementation of an expert system dealing with Nova's course delivery system. Other projects include programming using the C-language of a manufacturing robot. **Prerequisite: CIS 760.** 

#### **CIS 870 Software Engineering Project**

Good engineering practices are the basis for this project. From program specifications to program delivery, each phase of the program development is analyzed.

Current projects compare the current tools available in program development to achieve the proper level of program verification, reliability, and testing while keeping the project on target. **Prerequisite: CIS 770.** 

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### Faculty

Students are taught by nationally recognized authorities drawn from major universities and other institutions across the country. They are hired as national lecturers on the basis of their subject expertise, teaching ability, and professional recognition. National lecturers travel to each regional area to conduct the sessions for each of the required seminars. Students are also taught by Nova University's resident faculty. This faculty is responsible for the online interaction with the students throughout their academic program.

#### DOCTOR OF SCIENCE IN COMPUTER SCIENCE – STAFF

Phillip M. Adams, Sc.D. Professor of Computer Science

Barry A. Centini, Ph.D. Associate Professor of Information Sciences

Jacques C. Levin, Ph.D. Professor of Computer Science John A. Scigliano, Ed.D. Dean, Center for Computer-Based Learning

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Tomlinson Rauscher, Ph.D. Xerox Corporation Rochester, New York

Karl L. Zinn, Ph.D. University of Michigan Ann Arbor, Michigan

## **About Nova University**



Nova University was chartered by the State of Florida in 1964. Numerous graduate programs offer master's, educational specialist, and doctoral degrees, and postgraduate education. Nova College offers undergraduate education, and The University School, a demonstration school, serves children from preschool through high school. In addition, nondegree, continuing education, and certificate programs are available.

From the beginning, the University has distinguished itself by its innovative outlook, its unique programs that provide both traditional and nontraditional choices in educational programs, and its research in many fields aimed at solving the problems of immediate concern to mankind. The Nova University campus is located on a 200-acre site west of Fort Lauderdale, Florida, at 3301 College Avenue in the town of Davie.

## **Nova University Degree Offerings**

DOCTORAL AND PROFESSIONAL DEGREES Doctor of Arts (D.A.) in: Information Science Training and Learning Technology Doctor of Business Administration (DRA) in. **Business** Administration Doctor of Business Administration--International Management (D.B.A.-I.M.) in: **Business Administration--**International Management Doctor of Education (Ed.D.) in: Computer Education Early and Middle Childhood Higher Education Leadership in Adult Education School Administration Vocational, Technical, Occupational Education Juris Doctor (J.D.) in: I.aw Doctor of Philosophy (Ph.D.) in: Child Clinical/Applied Developmental Psychology Clinical Psychology Oceanography Doctor of Psychology (Psy.D.) in: Clinical Psychology Doctor of Public Administration (D.P.A.) in: Public Administration Doctor of Science (D.Sc.) in: Computer Science Human Resource Management

#### SPECIALIST DEGREES

Educational Specialist (Ed.S.) in: Computer Applications Computer-Based Learning Computer Education Computer Studies Education (23 majors) School Psychology

MASTER'S DEGREES Master of Accounting (M.Ac.) in: Accounting Executive Master of Business Administration in Banking (M.B.A.--Ex.) in: **Business Administration** Master of Business Administration (MRA) in. **Business** Administration Master of International Business Administration (M.I.B.A.) in: International Business Administration Master of Public Administration (M.P.A.) in: Public Administration Master of Science (M.S.) in: Child and Youth Care Administration **Coastal Zone Management Computer** Application Computer-Based Learning **Computer Science Computer Studies** Counseling Psychology Criminal Justice Education (23 majors) Health Education Health Services Administration Human Resource Management Human Services International Economics and Finance Learning Resources Marine Biology Microcomputer Applications in Management School Guidance Speech and Language Pathology **Telecommunications Management** 

#### BACHELOR'S DEGREES

Bachelor of Science (B.S.) in: Accounting Administrative Studies Business Administration Community Psychology Computer Engineering Computer Information Systems Computer Science Computer Systems Elementary Education General Psychology Legal Studies Organizational Psychology Professional Management Secondary Education The provisions set forth in this bulletin are not to be regarded as an irrevocable contract between the student and Nova University. The regulations and requirements herein, 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 the discovery of the fraud, and the student is not entitled to any credit for work which he 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 University will be considered receivable and will be collected.

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

Any Nova University student has the right to inspect and review his/her educational record. The policy of the University is <u>not</u> 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 also has the right to petition Nova University to amend or correct any part of his/her educational record which he/she believes to be 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 Director of Student Services, Nova University, Parker Building, 3301 College Avenue, Fort Lauderdale, Florida 33314. A schedule of fees and a listing of the types and locations of educational records is contained in this policy.

Nova University does not discriminate on the basis of handicap, sex, race, religion, national or ethnic origin in admission, access or employment for any of its programs and activities. The University Registrar and Director of Personnel have been designated as student and employee coordinators, respectively, to assure compliance with the provisions of the applicable laws and regulations relative to non-discrimination. Nova University programs are approved by the coordinator for Veterans Approval, State of Florida, Department of Education, for veterans' educational benefits.

The school is authorized under Federal Law to enroll nonimmigrant alien students.

The Nova University general policies on Student Relations are on file in the Office of the Registrar.

# NOVA UNIVERSITY

### CENTER FOR COMPUTER SCIENCE

3301 College Avenue Fort Lauderdale, Florida 33314