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VII

GRADUATE ENROLLMENT AND PROGRAMS

Introduction

Over the past decade, NJIT's graduate programs have developed rapidly. This was part of a plan designed to achieve national standing as a research university. As Table 7.1 indicates, graduate enrollment grew by nearly 175% (from 1,078 to 2,964) between 1981 and 1988, with some decline occurring in the following year. The most dramatic increase was in the full-time student population, which grew nearly eightfold between 1981 and 1989.

The plan recognized that a strong full-time student body is key to a high quality graduate division. It makes possible academic offerings of significant breadth and depth and provides critical support for faculty research. This is in no way intended to minimize the importance of the part-time students who for many years comprised almost the total graduate enrollment. By serving large numbers of these students, NJIT performs a critical function for industry. Table 7.2 lists NJIT's graduate programs, indicating those added in the last five years by an asterisk.

During the early 1980s, graduate students

Table 7.1
Graduate Full-Time and Part-Time Enrollment
Fall 1981 – Fall 1991

Fall	Full-Time #	Full-Time %	Full-Time % change	Part-Time #	Part-Time %	Part-Time % change	Total #	Total %	Total % change
1981	167	15.49	34.68	911	84.51	1.22	1,078	100.00	5.27
1982	269	22.38	61.08	933	77.62	2.41	1,202	100.00	11.50
1983	393	24.23	46.10	1,229	75.77	31.73	1,622	100.00	34.94
1984	486	28.72	23.66	1,206	71.28	-1.87	1,692	100.00	4.32
1985	721	34.01	48.35	1,399	65.99	16.00	2,120	100.00	25.30
1986	923	38.46	28.02	1,477	61.54	5.58	2,400	100.00	13.21
1987	1,245	45.64	34.89	1,483	54.36	.41	2,728	100.00	13.67
1988	1,321	44.57	6.10	1,643	55.43	10.79	2,964	100.00	8.65
1989	1,337	45.26	1.21	1,617	54.74	-1.58	2,954	100.00	-.34
1990*	887	32.69	-33.66	1,826	67.31	2.93	2,713	100.00	-8.16
1991	760	30.15	-1.43	1,761	69.85	-3.56	2,521	100.00	-7.08

Percent: Percent of graduate enrollment

Percent Change: Percentage change between current year and prior year

* Effective in 1990, the definition of a full-time graduate student's course load changed from a minimum of nine credits to a minimum of twelve credits

Table 7.2

Graduate Degrees offered by NJIT

Master's Degrees

M.S. in Applied Chemistry
Dept.: Chemical Engineering, Chemistry and Environmental Science

M.S. in Applied Mathematics
Dept.: Mathematics
Options: Applied Mathematics
Computational Methods
Analysis
Probability and Statistics

M.S. in Applied Science
Dept.: Interdisciplinary
Directed by: Applied Science Committee
Options: Biology
Chemistry
Mathematics
Physics

M. of Architecture
Dept.: School of Architecture
Options: Building Sciences
Community and Urban Design
History and Theory

M.S. in Architectural Studies
Dept.: School of Architecture
Options: Building Sciences
Community and Urban Design
History and Theory

*M.S. in Biomedical Engineering
Dept.: Interdisciplinary
Directed by: Biomedical Engineering Committee

M.S. in Chemical Engineering
Dept.: Chemical Engineering, Chemistry, and Environmental Science

M.S. in Civil Engineering
Dept.: Civil and Environmental Engineering
Options: Construction Engineering
Construction Management
Environmental Engineering
Geotechnical Engineering
Structural Engineering
Urban and Transportation Engineering

M.S. in Computer Science
Dept.: Computer and Information Science
Options: Computer Systems, Communications and Networking
Software Engineering
Database Engineering
Computer and Information Systems Management
Artificial Intelligence
Graphics and Image Processing
Computer Algorithms and Theory of Computing
Systems Analysis, Simulation and Modeling
Numerical Computation

M.S. in Electrical Engineering
Dept.: Electrical and Computer Engineering
Options: Biomedical Systems
Communications Systems
Computer Architecture
Networking
Microprocessor Applications
Computer Systems: VLSI Design
Control Systems
Microwave and Antenna Engineering
Fiber Optics Engineering
Optical Engineering
Power Systems
Reliability
Optoelectronics Solid-State Devices
Solid-State Circuits
Thin-Film Materials and Devices
Solid-State Materials, Devices, and Sensors
Applied Superconductivity
VLSI Circuit Design

M.S. in Engineering Science
Dept.: Interdisciplinary
Directed by: Engineering Science Program
Options: Materials Science
Hazardous and Toxic Wastes
Environmental Planning

*M.S. in Environmental Science
Dept.: Chemical Engineering, Chemistry, and Environmental Science
Options: Toxics
Environmental Science

M.S. in Industrial Engineering
Dept.: Mechanical and Industrial Engineering

M.S. in Interdisciplinary Studies
Dept.: Interdisciplinary
Directed by: Committee on Interdisciplinary Studies

M.S. in Management Engineering
Dept.: Mechanical and Industrial Engineering
Options: Engineering Management
Cost Engineering
Environmental Management
Manufacturing Management
Public Utility Management

*M.S. in Management
Dept.: School of Industrial Management

*M.S. in Manufacturing Engineering
Dept.: Interdisciplinary
Directed by: Committee on Manufacturing Engineering
Options: Manufacturing Computer Systems Analysis and Design
Automated Production Systems
System and Product Design
Manufacturing Management Systems
Computer Control of Manufacturing Systems

M.S. in Mechanical Engineering
Dept.: Mechanical and Industrial Engineering

*M.S. in Occupational Safety and Health Engineering
Dept.: Mechanical and Industrial Engineering

*M.S. in Transportation
Dept.: Interdisciplinary
Directed by: Executive Committee for the Interdisciplinary Program in Transportation
Options: Transportation Engineering
Transportation Planning
Transportation Administration

Degree of Engineer

Field: Chemical Engineering
Dept.: Chemical Engineering, Chemistry, and Environmental Science

Field: Civil Engineering
Dept.: Civil and Environmental Engineering

Field: Electrical Engineering
Dept.: Electrical and Computer Engineering

Field: Mechanical Engineering
Dept.: Mechanical and Industrial Engineering

Doctor of Philosophy

Field: Applied Physics (pending approval)
Dept.: Physics

Field: Chemical Engineering
Dept.: Chemical Engineering, Chemistry, and Environmental Science

Field: Civil Engineering
Dept.: Civil and Environmental Engineering

**Field:* Computer Science
Dept.: Computer and Information Science

Field: Electrical Engineering
Dept.: Electrical and Computer Engineering

**Field:* Environmental Science
Dept.: Chemical Engineering, Chemistry, and Environmental Science

Field: Management (with Rutgers)
Dept.: School of Industrial Management

Field: Mathematics (pending approval)
Dept.: Mathematics

Field: Mechanical Engineering
Dept.: Mechanical and Industrial Engineering

**Field:* Transportation
Dept.: Interdisciplinary
Directed by: Executive Committee for the Interdisciplinary Program in Transportation

**Initiated since 1987*

comprised less than 20% of NJIT's total enrollment. By 1987, graduate students accounted for more than one-third of the total enrollment. The goal set in 1985 was to achieve a graduate-to-undergraduate FTE ratio of 1:3 by 1990, principally as a result of growth in the full-time student population. This had been exceeded by 1988, when graduate students accounted for more than thirty percent of the total FTE enrollment. Owing to a concern that the full-time graduate population had become too large relative to the university's total enrollment, efforts were made in recruiting students for Fall 1990 to raise admissions standards, thereby reducing the graduate enrollment by approximately fifteen percent in the last two years.

Consistent with national trends in engineering graduate education, a significant majority of NJIT's full-time graduate students have been foreign nationals. There are many positive aspects to this, not the least of which is the fact that foreign-born engineers are serving growing U.S. human resource needs in technological fields which might otherwise experience shortages. The international students have come principally from four countries: India, Taiwan, Korea and China*. NJIT apparently enjoys a positive reputation in these world markets, strengthened by formal agreements of cooperation with high quality institutions in the People's Republic of China, Korea and the Soviet Union. Many other countries have expressed interest in cooperative agreements, especially in environmental engineering and science.

About twenty percent of the full-time graduate students are U.S. nationals. NJIT has been making efforts to increase this number but must compete with the many employment opportunities in industry for graduating baccalaureate engineers whose part-time graduate education is then frequently subsidized by their employers.

Other trends in graduate enrollment at NJIT worth noting include a steady increase in the enrollment of women, from approximately eight percent of full-time students and fourteen percent of the total in 1981, to approximately twenty percent in each category in 1991. The university has been less successful, however, in enrolling underrepresented minorities at the graduate level. During the same period, among the total graduate population, Blacks and Hispanics increased from just under eight percent to 8.6%. Competition from industry is especially intense for engineers and scientists from underrepresented populations, particularly for those who meet the rigorous academic standards required for graduate study.

Administration of Graduate Programs

The increase in graduate enrollment has had a positive impact on NJIT's ability to recruit faculty and on the array of courses offered, but it has also significantly escalated demands on the administration. A new position, Dean of Graduate Studies, was created and filled in 1988. Owing to illness, however, the dean was unable to assume the full responsibilities essential to the role and resigned at the end of the Spring 1990 semester. This occurred not too long after the dismissal of the Director of the Graduate Division because of violations of university policy of such a nature as to cause the university to call the matter to the attention of the Attorney General, whose office is conducting a criminal investigation. Not surprisingly, the credibility of the graduate programs suffered.

To deal with real problems of structure, to avoid potential problems of financial control, and to better serve the significantly increased and more diverse graduate student population, Graduate Studies was reorganized in the summer of 1990. The academic, financial aid, and general policy oversight functions were assigned to a new Office of Graduate Studies headed by the Assistant Vice President for Academic Affairs-Graduate Studies. This officer reports to

**To ease the transition of international students to the United States and NJIT, five graduate ESL courses are offered, including one designed specifically for teaching assistants and others who work with undergraduate students. There are three components to this course: public speaking, pronunciation and pedagogy.*

the Vice President for Academic Affairs - Research and Graduate Studies. Admissions applications and non-departmental recruitment activity were assigned to a new Office of Graduate Admissions headed by a Director who reports to the Assistant Vice President for Academic Affairs-Enrollment Planning. This Assistant Vice President reports to the Associate Vice President for Academic Affairs-Academic Support Services, a new position established at the end of the 1989-1990 academic year.

Graduate admissions and financial aid functions are thus conducted by separate administrative departments. This arrangement, while non-traditional, may provide economies of scale by centralizing clerical aspects of all levels of admissions activity in one location. The academic authority for establishing graduate admissions policies continues to reside with the academic departments and the Office of Graduate Studies, which has the following responsibilities:

1. Reviews student performance and initiates appropriate actions.

2. Provides general student support services.

3. Administers and develops internal and external program review processes.

4. Oversees departmental procedures affecting graduate students or graduate programs.

5. Establishes and maintains academic procedures for graduate students.

6. Allocates, reviews and coordinates all graduate student financial awards.

7. Coordinates Graduate Council activities.

8. Provides information on procedures and policies affecting graduate students or programs to all members of the NJIT community.

9. Serves as a point of interaction between the university and the Graduate Student Association.

10. Interacts with other university offices on all matters affecting graduate students or graduate programs.

11. Interacts with external agencies.

In January 1991, an external reviewer reported positively on the reorganization and the personnel changes. The Office of Graduate Studies has established quality control as a high priority. The intent is to operate as a fully mature graduate school. This has meant redefining and promulgating standards of admission, retention and graduation. In the Graduate Catalogue, for example, the minimum GRE and TOEFL scores required for entry were lower than the actual profile of the student body. These will be revised in the next issue of the catalogue. The Office of Graduate Studies has developed a standard warning, probation and dismissal policy and process and has implemented the process in conjunction with the Graduate Council, the faculty policy-formulating body for graduate programs. Exploring ways to enhance and expand the Ph.D. programs is another important agenda item.

Graduate Admissions

The Office of Enrollment Planning markets the graduate programs, recruits students, and receives and processes applications materials. Its responsibilities include NJIT's Extension Programs, many of which are at the graduate level. Recent efforts have included the development of improved recruitment publications and a graduate student marketing plan.

Special emphasis is being placed on marketing to increase the number of domestic full-time graduate students. Not only is the competition from industry intense, but from major research universities with greater financial

resources and reputations. One program directed at this market is NJIT's BS/MS program, recently reorganized under the Division of Career Development Services. Job placement through the Office of Co-operative Education and Internships is a key component of this program. The interest in part-time graduate programs has been strong, with a steady increase in the demand for off-campus courses and programs. NJIT currently offers graduate courses at seven locations throughout New Jersey, including Exxon and AT&T. The university also recently joined the National Technological University and is expanding its distance learning capabilities. (See Chapter IX)

The priorities that will inform future graduate admissions efforts include maintaining a graduate student population of approximately 2,500; increasing the number of Ph.D. students, minority and women students, and international students from Latin American and European countries; increasing the number of full-time students who are U.S. nationals; and steadily improving the quality of the graduate student body.

Tuition and Financial Assistance

NJIT's tuition strategy is designed to maintain a competitive structure for in-state, out-of-state, and international students. Relevant internal policies and procedures, as well as support programs at competitor institutions, were recently analyzed. For example, the university supports a relatively large number of students with graduate teaching and research assistantships. Previously, funding was distributed primarily to already enrolled students rather than used as an incentive to attract new students. In addition, stipend levels were not competitive with industry nor, frequently, with other institutions. Reviewers of graduate financial need indicate that support levels should be about 50% of an industrial starting salary for a bachelor's degree recipient. A number of federal fellowship programs have, in fact, increased the stipend level for their programs in accordance with competitive needs. Other issues reviewed include the length of the support period and eligibility for on-campus employment.

As a result of the analysis, there is a new funding philosophy and a revised student aid structure that is more rational, consistent and flexible. Priorities have been established to attract targeted populations, and support amounts have been increased to levels competitive with other research universities and career alternatives.

Review of Academic Programs

The increase in the number and scope of NJIT's graduate programs in recent years, and the focus of professional accreditation bodies such as ABET on undergraduate programs, have made the need for an internal department-by-department review of graduate academic programs increasingly apparent. (Previous external reviews in 1983-1984 and 1991 focused on the administration of graduate programs in general.) Accordingly, internal reviews of three programs — Chemical, Civil and Electrical Engineering — were initiated in 1991.

The reviews are proceeding according to a timetable and format established by the Office of Graduate Studies. The Assistant Vice President for Academic Affairs - Graduate Studies met with a representative of the Educational Testing Service (ETS) to initiate the process. It will take two years, include a survey instrument developed by ETS in conjunction with the Council of Graduate Schools, and involve an external consultant's review of each department. In the fall of 1991, resumes of departmental faculty and statistical data were collected. Criteria being examined include faculty qualifications and activity, curricula, number and quality of students, records of graduates, and doctoral degree production.

Following completion of the initial reviews in 1992, additional departments will begin the process. The goal is to have a carefully defined cyclic review process in place for all current and planned programs. The process will

also include mechanisms for the future establishment of quality programs and the termination of obsolete programs. Both the review process and the regular procedures of the Graduate Council, in fact, support the development of new programs and courses to address regional needs in technological fields. NJIT also works closely with other universities, particularly Rutgers-Newark, to develop cooperative and joint programs. The result is often a synergy of research and faculty interests.