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VIII

RESEARCH AND FACULTY

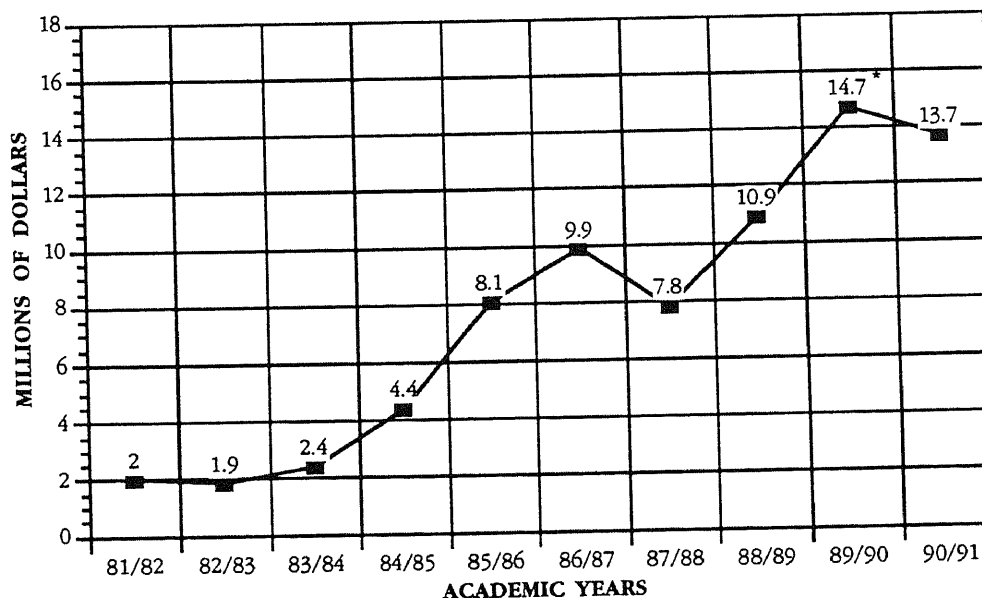
Research Funding

There has been nearly a 600% increase in research funding over the past decade, from just over \$2 million in FY 1981 to \$13.7 million in FY 1991. (Figure 8.1) This growth in research activity represents a key element in NJIT's 1985 plan to achieve national standing as a technological university. The university has made a major investment in recent years to create a more attractive research environment. Evidence of this commitment includes important faculty additions, extensive equipment

acquisitions, modernization of laboratories, the construction of new buildings and the development of research centers.

Focused efforts in areas identified as critical to the State's and nation's economy have been pivotal to the plan's implementation. Especially notable is the research program in hazardous substance management, which a National Science Foundation report lists as the recipient of the largest total direct funding of any NSF Industry/University Cooperative Research Center in the nation last year. There are presently forty-five such centers in the United

Figure 8.1
Expenditures For Funded Research
1981-1991



*The large increase in 1989-90 was primarily the result of a one-year research equipment grant for \$2 million from the New Jersey Commission on Science and Technology to NJIT's Advanced Technology Centers in Hazardous Substance Management Research and Manufacturing Systems.

States. NJIT's 1989-1990 funding was in excess of \$7.6 million, more than double the next nearest center. This research effort is also an Advanced Technology Center of the New Jersey Commission on Science and Technology and a regional center of the U.S. Environmental Protection Agency. These are consortial centers in which NJIT is the lead institution with Rutgers University, the University of Medicine and Dentistry of New Jersey, Stevens Institute of Technology, Princeton University, Tufts University and Massachusetts Institute of Technology. High levels of research activity are also occurring in microelectronics, manufacturing systems, and transportation and logistics.

As Figure 8.2 indicates, the largest proportion of the increased funding, as much as two-thirds, has come from the State. Federal funding has also grown rapidly in the last four years, from \$1.08 million in FY 1989 to a

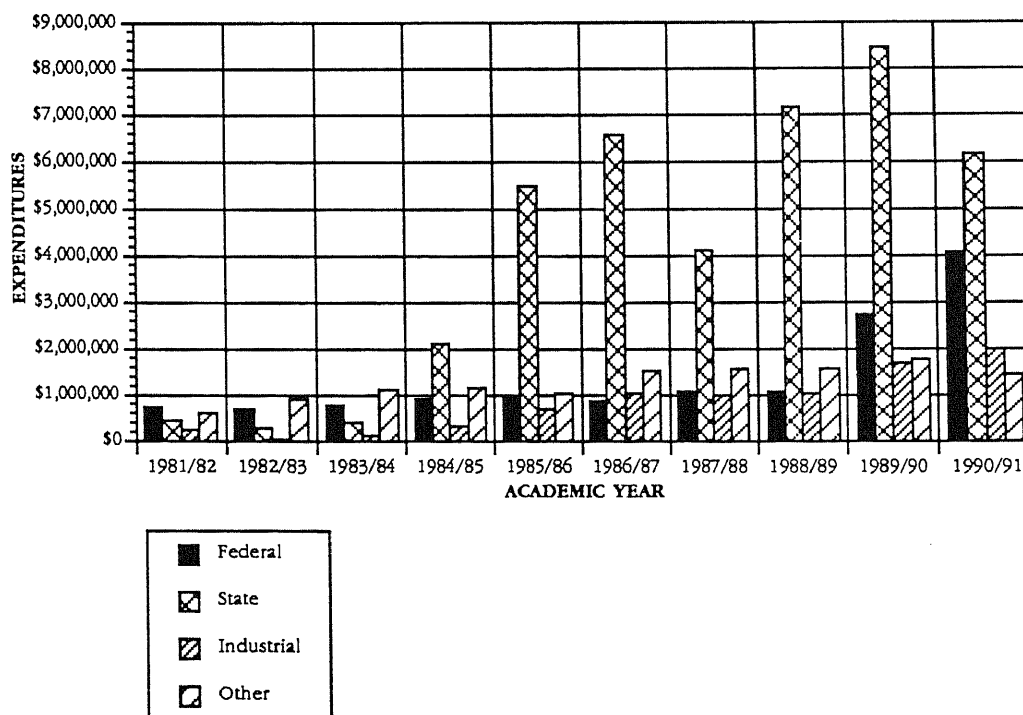
projected \$5.9 million in fiscal 1992. A high priority is the continued diversification of funding sources, including further growth in federal support.

Administration of Research

The recent growth in research activities at NJIT has resulted in a substantial enhancement of the intellectual environment and become a major source of support for both faculty and students. In recognition of the increased importance of this key mission element, the senior research administrator was recently upgraded to the vice presidential level, and a search is being conducted to fill that position. (The role was previously filled by an associate vice president who recently stepped down to return to full-time teaching.)

This is an important step, substantively and symbolically, consistent with the

Figure 8.2
Grants/Contracts Expenditures by Type
1981-1991



administrative structure at comparable technological universities. The responsibilities of the Vice President for Research and Graduate Studies include approval of the submission of all research grant proposals as the university's designated signatory, administration of Separately Budgeted Research (SBR) funds and the associated faculty release time, oversight of the university's research centers, simplification of procedures for grant budget preparation, and general oversight of the graduate programs including guidelines for quality control. In the execution of these activities, the vice president will interact closely with appropriate individuals and units within the university, including the deans of the four colleges, the Graduate Council and the Committee on Research. This individual will also represent NJIT to external constituencies on matters concerning research and graduate education.

Research Centers

In recent years, NJIT has established a number of interdisciplinary research centers with very positive benefits to the university. The centers provide a vehicle for expanding both faculty and student participation in research and public service activities consistent with the university mission; encourage coordination of interdisciplinary research and service activities; and offer support to faculty seeking external sponsorship, such as seed money, travel, contacts with sponsoring agencies, assistance in proposal generation, and research equipment. An important objective of the research centers is to concentrate university resources. They are thus able to provide assistance to faculty in fulfilling commitments on grants through support staff, laboratories, graduate student assistants and full-time research staff.

In addition to the large effort in hazardous substance management/environmental engineering, recently established research centers at NJIT include manufacturing systems, transportation, and microelectronics, among others. Their success in attracting distinguished

faculty and securing research support attest to their value.

A \$1.6 million grant in Fiscal Year 1992 for a major NJIT environmental initiative included in recent federal appropriations legislation provides compelling evidence in support of this approach. The Integrated Pollution Prevention Initiative (IPPI) is a comprehensive program involving academic institutions, industry, and the federal government under the leadership of NJIT's Center for Environmental Engineering and Science. The consortium will conduct research, implement innovative pollution prevention strategies with industry management, promote educational changes and develop public service campaigns. The research will focus on new approaches to manufacturing and processing. And the educational component will be a highly innovative interdisciplinary effort. It will seek to incorporate concern for waste minimization where appropriate in the curriculum, not as discrete pollution prevention add-ons but as important elements within problems, discussions, student design and management projects, and laboratory and field experiences. This concept of integration exemplifies NJIT's carefully planned, evolving role as an educator of tomorrow's leaders — professionals with in-depth knowledge and understanding of the critical issues impacting upon the global economy.

Despite such successes, however, there may be too many centers for a university of NJIT's size. To ensure that both existing and proposed centers remain of high quality, fulfill their stated goals and best serve the mission of the university, a policy to establish, review and, if necessary, discontinue centers was recently adopted. A proposal for a new center must define the need for the program, its scope, the faculty performance record, potential funding sources, timelines and projected milestones. The policy also sets out the procedures for center initiation and disestablishment. It is an important quality and cost control mechanism as NJIT continues to develop its research capabilities.

Interdisciplinary Programs

Interdisciplinary degree programs are often linked with the research centers at NJIT. Recently established programs include transportation, environmental engineering and science, computer engineering, materials science and engineering, manufacturing, and Science, Technology and Society (STS). Involving faculty from more than one department, these units often can respond more quickly than departments to new opportunities and changing societal needs.

The process for initiating interdisciplinary programs includes review and approval by the Committee on Academic Affairs, as well as by the Graduate Council for new graduate programs or the Undergraduate Curriculum Review Committee if new undergraduate courses are involved. A critical mass of resources, including faculty, staff and an operating budget, must be identified. It is anticipated that following an initial gestation period of perhaps three to four years, program resources will begin to be based upon enrollment and research funding.

Reconciling the needs of interdisciplinary programs with those of the contributing departments can be a daunting task. The former often attract students and have research funding, while the latter make faculty appointments. Thus, as successful programs require additional faculty, hiring needs must be discussed with the appropriate department chairpersons. In such instances, the primary concern of the department chairperson is the long-term viability of new faculty budget lines, given anticipated enrollment levels and research funding. Conflicts may also arise in such areas as promotion and tenure, teaching load, course offerings and research goals. The deans of the colleges, working with the provost, presently resolve these on an ad hoc basis. However, there has been no formal mechanism for dispute resolution. It has been recommended that a regularized process be established for providing the directors of interdisciplinary programs with opportunities for input into matters affecting faculty associated with their programs.

Policy on Reinvestment for Research

A research reinvestment program provides flexible funding to academic departments based on the level of departmental faculty, staff and student participation in funded research. It is designed to encourage faculty to allocate more time during the academic year to sponsored activity and writing research proposals. For more than a decade, NJIT has had a policy of providing incentive grants to academic departments based on recovery of overhead from faculty grants and contracts. This involved the return of approximately 25% of the overhead. Recent efforts to develop innovative new growth programs in research has limited the funds available for such discretionary purposes. As a result, the practice of awarding incentive grants was temporarily suspended for the past two years.

A new and improved approach has been recommended that is based on return of a portion of the income from indirect charges and a sharing of the labor charges. It is contingent upon the implementation of a concurrent policy to increase NJIT's indirect cost recovery through appropriate overhead charges. The amount of overhead returned would be proportional to externally funded faculty time and earned indirect recovery during the year. In addition, faculty academic year time charged to a grant or contract would be matched by NJIT to the extent possible. Funds would be generated for department chairs, center directors and principal investigators, and would be placed in a discretionary Research Incentive Account (RIA). The money could only be used for seeding new programs, travel to present professional papers, additional release time, equipment, laboratory maintenance and other appropriate professional purposes.

Faculty Hiring and Advancement Policies

Over the past five years, NJIT has hired nearly a hundred new faculty, many to replace retirees or individuals otherwise leaving the

university. A large proportion of the new faculty have been appointed because of their expertise in areas considered critical to the economy, another high priority in NJIT's plan to achieve national status. Table 8.1 displays the total full-time instructional staff (including faculty and such temporary teaching staff as special lecturers and visiting researchers) since 1981. Table 8.2 shows new faculty hires by rank over the last five years. Among the newly hired full professors are center directors, department chairpersons and holders of funded chairs with national reputations in their fields.

As NJIT has become increasingly research-oriented, research potential has become

an important criterion in making offers of tenure-track faculty positions. This does not imply, however, that teaching is viewed as any less important; the goal instead is to engage faculty who evidence a balance between the two.

Hiring policies and practices are critical to the university, particularly as they affect the faculty profile at the assistant professor level. New faculty must be brought into an appropriate intellectual context, part of a careful plan of departmental and institutional development. This means continuing to identify specific areas of research and programmatic growth, and searching for the appropriate individuals compatible with those goals. Once new faculty

Table 8.1
Full-Time Instructional Staff by Rank
1981 – 1991

Rank	Fall 1981		Fall 1986		Fall 1991	
	#	%	#	%	#	%
Distinguished & Full Prof.	73	27.3	89	28.1	103	32.3
Associate Prof.	95	35.6	109	34.4	97	30.4
Assistant Prof.	55	20.6	50	15.8	84	26.3
Other (Spec. Lect., Visiting Researcher)	44	16.5	69	21.7	35	11.0
Total	267	100.0	317	100.0	319	100.0

Table 8.2
New Faculty Hires by Rank
1987 – 1991

Rank	F87	F88	F89	F90	F91
Distinguished & Full	5	3	0	3	1
Associate	6	4	4	2	1
Assistant	11	26	9	12	8
Total	22	33	13	17	10

are hired, ongoing efforts to provide them with the resources to meet a clear set of goals and expectations are, of course, critical. Sources of funding (e.g. SBR funds) for newly appointed faculty, most notably at the junior level, should also be identified, particularly in times of budget cutbacks. This requires continued close coordination with center directors and with the Vice President for Research and Graduate Studies during the hiring process.

These considerations should be part of an explicit departmental hiring plan. Departments should be required to submit such a plan to the appropriate area Dean and the Provost for comment and approval prior to initiating a search process. When new faculty are hired, they should be helped to identify specific goals relative to instruction, research, and service, compatible with the departmental hiring plan. Progress toward those goals should be monitored annually, and the results of that assessment discussed with the faculty member. If an untenured faculty member is not making satisfactory progress toward those goals, consideration should be given to issuing a terminal contract. On the other hand, faculty who have significantly exceeded those goals should be considered for early promotion. For faculty with center support, center directors should be consulted by the department at an early stage in the promotion and tenure process.

It is important that the deans assume a stronger role in the hiring and promotion processes, holding chairpersons responsible for their actions and recommendations in these areas. They should also receive departmental P&T recommendations and support documentation at the same time as the university P&T committee and then forward their recommendations to that committee.

Minority and Women Faculty

To support a diverse student body and the changing needs of the workforce, a university should have a diverse instructional staff. In this regard, NJIT's record is disappointing, although

consistent with other technological universities. In fall 1991, more than eleven percent of the full-time instructional staff were women, and nearly four percent were Black or Hispanic. The proportion of Asian instructional staff is higher — about sixteen percent in 1991. There have been modest successes. As Table 8.3 indicates, the percentages of tenured faculty who are women or minorities has increased since 1981. There is a limited pool of minorities and women in science and engineering, however, and intense competition from industry and other universities, regionally and nationally, in recruiting and attracting minorities and women to these fields.

NJIT has engaged in a variety of efforts to locate and recruit such faculty. These include participation in New Jersey's Minority Academic Career Program, soliciting resumes from minority graduates for a Minority Faculty Vita Bank, and sending letters of interest to persons listed in the Directory of Minority and Women graduates who might be potential candidates for faculty positions. Efforts are also being undertaken to recruit minority graduate students to pursue their graduate education at NJIT and eventually become candidates for faculty positions. More creative efforts are called for, however. On an experimental basis, for example, extra faculty lines have been provided to departments for targeted hires without counting them against authorized budget lines. Exploiting NJIT's base in industry through an industrial fellowship program, offering part-time Ph.D. programs, and consideration of non-traditional credentials are other possible approaches.

National reports, as well as a study commissioned by the New Jersey Department of Higher Education, confirm that three-quarters of the faculty at New Jersey's colleges and universities will retire from the system by the year 2010. This creates opportunities that could facilitate dramatic changes in the professoriate. Much of the responsibility for faculty appointments lies with the individual departments. Goals and objectives to increase the number of women and minorities should be set as part of the university's affirmative action efforts and with a realization of the demographics

of a changing workforce. All departments, especially those in the Newark College of Engineering, should view upcoming vacancies as an opportunity to attract a cadre of scholars with an improved representation of women and minorities.

Policy on Teaching Loads

Faculty teaching loads for a generation have been based on a benchmark of twelve hours per semester. Nevertheless, release time from teaching for research, curriculum and course

development, administration and committee work has been awarded to many faculty during this period so that the current average teaching load is seven hours per semester, a reasonable average for a research university. However, the system of allocating teaching loads does not always work effectively for individual faculty. For example, faculty in a pre-tenure probationary period typically are allowed to develop their research program with a teaching load no greater than two courses per semester, but there are exceptions, particularly during the latter stages of the probationary period. Faculty engaged in

Table 8.3
Women and Minority Full-Time Instructional Staff
1981 - 1991

	1981	1986	1991
Full-Time Women Instructional Staff			
Distribution by Rank			
Professor	0	1	8
Associate Professor	3	11	9
Assistant Professor	14	9	13
Other (Spec. Lect., Visiting Researcher)	6	13	6
Total	23	34	36
% of Full-Time Instructional Staff	10.6%	10.7%	11.3%
% of Tenure Track Faculty	7.6%	8.5%	10.6%
% of Tenured Faculty	2.9%	6.5%	9.7%
Full-Time Black and Hispanic Instructional Staff			
Distribution by Rank			
Professor	0	1	1
Associate Professor	3	3	5
Assistant Professor	0	3	3
Other (Spec. Lect., Visiting Researcher)	4	2	3
Total	7	9	12
% of Full-Time Instructional Staff	2.6%	2.8%	3.8%
% of Tenure Track Faculty	1.3%	2.8%	3.2%
% of Tenured Faculty	1.1%	1.6%	2.7%

scholarly activity, even though tenured, should also be teaching no more than two courses per semester for a period of time in order to be provided the opportunity to develop their research program. In addition, faculty with a history of funded research who are developing proposals between funding periods should teach no more than two courses per semester.

NJIT's teaching load allocation model has been negotiated, in relevant part, with the faculty bargaining unit (PSA). It distributes release time on a formula basis for piece work, e.g. thesis and co-op advisement. An alternative model has been recommended by NJIT and discussed in appropriate context with PSA; it would allocate teaching loads so that faculty engaged in scholarly activities can anticipate that each semester they will have a teaching load consistent with those activities. This approach is consistent with policies and practices at research-oriented institutions within and outside of the region.

The model widely used in research universities places the decision about teaching loads at the departmental level. In the proposed model, the Provost would apportion lines to each of the four colleges based on the number of FTE's, the level of external research support, the development plans that may have been approved for individual departments, the opportunities within the various disciplines for gaining support of teaching load reduction and other factors which may be deemed important. The Dean, in turn, would allocate lines to the academic departments based on the same variables, perhaps holding back one or two lines as a contingency against unanticipated need.

It would then become the responsibility of the department chairpersons to establish a nominal load for their faculty. This would depend on the number of lines assigned to the department and the teaching model. Larger classes, implemented only where academically appropriate, would mean fewer classes to teach; using assistants wisely could also mean a more effective distribution of teaching loads.

Because NJIT is a university in transition,

the academic departments should seek to identify faculty with demonstrated records of scholarship in assigning reduced loads. New faculty and faculty on pre-tenure or probationary status would be assigned the reduced nominal teaching load of a department. Other faculty would teach four courses per semester unless the department (or the Dean) awarded them release time for a specific assignment requiring a reduction in teaching load. Teaching load reductions for advising students as on projects and theses, and for activities such as service on the university P&T Committee, would no longer be provided. These activities would be considered part of the academic load.

In this load model, the department chairpersons would be accountable to their respective deans for the appropriate utilization of the release time allocated to their department, and the area deans would be accountable to the Provost for the college-wide allocation of release time. The responsibility for assigning release time to individual faculty would rest primarily with the department chairperson and, secondarily, with the deans.

It is important to understand that adoption of this alternative teaching load policy in its entirety, as set out, will require negotiation with the PSA. A second key point is that given the current average teaching load of about seven hours per semester, implementation of the policy should involve no net cost to the university, provided that extra compensation for thesis advisement, for example, is eliminated.

Policy on Postdoctoral Research Staff, Research Associates/Assistants and Visiting Professors

Postdocs, research associates, and visiting professors are not considered to be filling permanent positions. If they are employed for a minimum of ten months, they are covered by benefits. If they continue employment beyond one year, they must be enrolled in the pension system. These positions are not included in any of NJIT's bargaining units and are, therefore,

considered to be non-aligned. Raises are granted as they would apply to similar non-aligned employees.

These conditions do not take into account the special circumstances which may be involved in the hiring of foreign nationals, such as income tax agreements with other countries or salary requirements attached to certain types of visas. Nor do they address the differences in work requirements for national and international post docs. Owing to visa restrictions, for example, international post docs are permitted to work only twenty hours per week. There is no such restriction on American postdocs. As a result of the restriction on international students, however, they are not entitled to medical benefits. And even though an American postdoc works a 40-

hour week, he or she cannot receive the medical benefits due a full-time employee. The abbreviation "postdoc" itself is misleading, since it stands for postdoctoral research associate. There should be a clarification of the postdoc and research associate positions.

Given the foregoing, a more general policy statement should be developed to cover the hiring of both national and international post docs, research associates, and visiting professors. A joint committee of research faculty, representatives of Human Resources and the Office of International Students, and the Vice President for Research and Graduate Studies should be formed to develop a comprehensive, consistent policy.