New Jersey Institute of Technology

Undergraduate
Catalog
1991 - 1993

Contents

This catalog contains the programs, courses and requirements of undergraduate study at New Jersey Institute of Technology.

The provisions of this catalog do not constitute an offer for a contract which may be accepted by students through registration and enrollment in the Institute. The Institute reserves the right to change any provision, offering or requirement at any time during the student's period of study at NJIT.

Fall 1991

Tradition and Change

NJIT was founded in 1881, created by industry, the city and the state to serve a growing industrial center. Students were attracted by the opportunity to work closely with faculty who had experience in business and government. They graduated into good jobs, and had the pleasure of using their skills to help create a strong base of American manufacture and commerce.

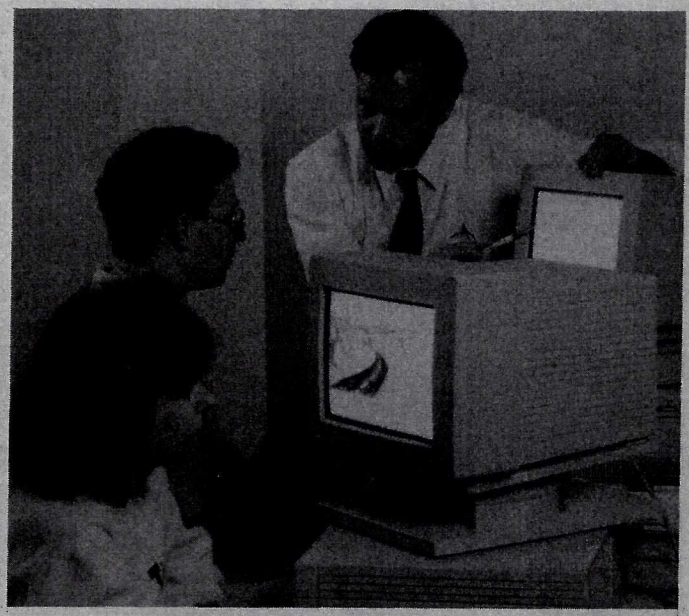
Today, a renewed emphasis on manufacturing and the need for innovation in all sectors have led industry and government to form new partnerships with NJIT. These alliances have enabled the state's technological university to grow in breadth and depth.

New programs have been developed under the guidance of industry, in consort with other universities, and with the strong support of organizations such as the New Jersey Commission on Science and Technology, the National Science Foundation and the Environmental Protection Agency. Corporations have contributed scholarships and fellowships, research grants, and equipment. NJIT is one of the leading computing-intensive campuses in the nation. All full-time, first-time freshmen receive a personal computer and software package to use while they are enrolled. A campus-wide fiber optic network links more than 1,400 locations to the university's main computers.

Diversification, new funding and new opportunities for growth have attracted outstanding students and faculty. NJIT's researchers are doing important work in manufacturing automation, information age technology, the protection and management of air and water resources, the management of hazardous and toxic substances, transportation, computer conferencing, biotechnology, microelectronics, building engineering and architecture, and a host of other fields.

Our students are diverse, dynamic, energetic—and among the brightest in the state. Close to 7,700 are enrolled, from freshmen to doctoral candidates. About one-third are enrolled in graduate studies. Some are studying in a five-year program to earn a professional degree in architecture. The majority are working for degrees in engineering, management or computer science and information science.

NJIT now has four colleges: Newark College of Engineering (1919); the School of Architecture (1974); the College of Science and Liberal Arts (1982); and the School of Industrial Management (1988). The university is accredited by the Middle States Association of Colleges and Schools.



Mission Statement

New Jersey Institute of Technology is a comprehensive technological university committed both to anticipating and responding to change. The university's primary function is to broadly educate a wide range of students to achieve their full human potential, preparing them for entry into professional positions, continued formal studies and lifelong learning. The university seeks to expand knowledge through research and scholarly activities with a strong applications orientation.

As a public institution, NJIT is closely linked to the State's economy. As an urban institution, NJIT is an active member of a complex and dynamic community. In all elements of its mission, the university focuses on the development of the technological enterprise, strives to be responsive to its many constituencies and aspires to the highest standards of excellence.

Accreditation

NJIT is accredited by the Middle States Association of Colleges and Schools (MSACS). The architecture program is accredited by the National Architectural Accrediting Board (NAAB). The B.S. program in computer science is accredited by the Computer Science Accreditation Commission (CSAC) of the Computing Sciences Accreditation Board (CSAB). The engineering programs of chemical engineering, civil engineering, electrical engineering, industrial engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET). The programs in manufacturing engineering and computer engineering are new and are not yet eligible for EAC/ABET accreditation. In the Engineering Technology program, the options in construction and contracting, electrical, manufacturing and mechanical are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET). The options in computer and surveying are new and are not yet eligible for accreditation. ABET publications of accredited colleges and universities will be made available to students who are interested in verifying that the programs of Newark College of Engineering are accredited by EAC/ABET or TAC/ABET.

Education for a Technological Age

NJIT offers challenging programs leading to the bachelor's degree. Many feature a variety of elective courses and permit students to develop programs suited to their interests and career objectives. All programs include a mix of courses representing both technology and the liberal arts in order to provide an effective education for today's complex technological society.

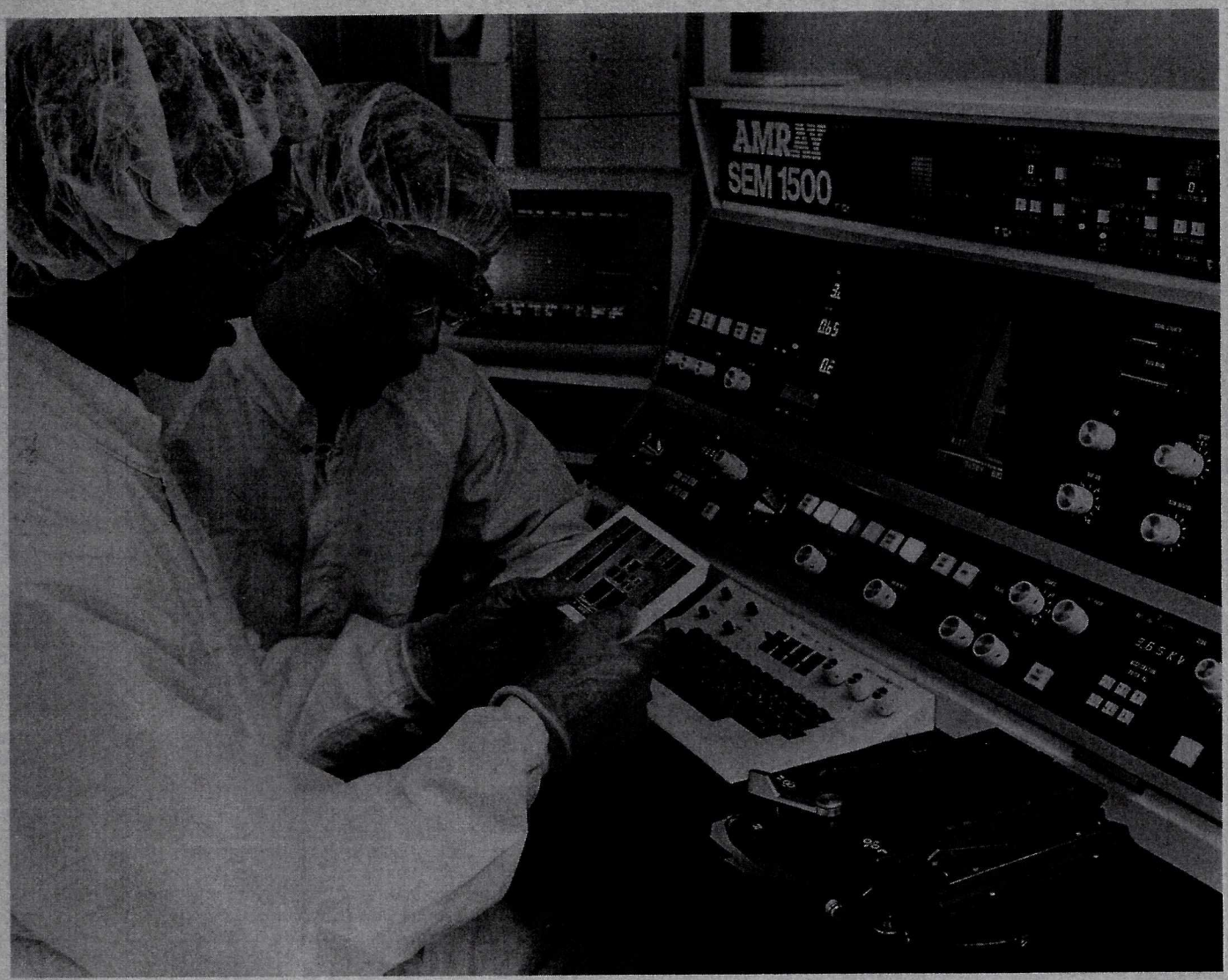
Full-time freshmen in all degree programs receive their own microcomputers to use at home or in the residence halls throughout their years of study at NJIT.

Bachelor's degree programs are offered in:

Applied Chemistry
Applied Mathematics
Applied Physics
Architecture
Chemical Engineering
Civil Engineering
Computer Engineering
Computer Science
Electrical Engineering
Engineering Science
Engineering Technology
Industrial Engineering
Information Processing Systems
Management
Manufacturing Engineering
*Materials Science and Engineering
Mechanical Engineering
Science, Technology and Society
Statistics and Actuarial Science

*pending

Major Research and Public Service Centers



Manufacturing

Center for Manufacturing Systems (CMS)
CMS is a cooperative research venture between NJIT and private companies. It is sponsored by the New Jersey Commission on Science and Technology. The Center is responsible for the overall direction and coordination of manufacturing activities and facilities at NJIT. CMS and industry collaborate on basic and applied research to improve industrial competitiveness through factory automation, advanced computer-based design, and advanced engineering and manufacturing techniques. The Center meets the needs of industry with academic resources available throughout the university. CMS has an Industrial Advisory Board that helps set priorities and establish directions for research and future manufacturing initiatives. CMS activities include:

Technology Extension (TEX) Program
The Technology Extension Program for Manufacturing Systems assists small- and medium-sized New Jersey companies. TEX shows these companies how technology can improve their businesses. TEX formulates teams of NJIT faculty and students who visit companies to recommend solutions to their manufacturing problems. TEX refers companies to other public or private agencies when necessary. TEX also organizes workshops on new technologies and advanced manufacturing strategies.

Computer Integrated Manufacturing (CIM) Laboratory
The CIM Laboratory supports a variety of manufacturing-related activities at NJIT. The laboratory contains integrated work cells for metal machining and forming, plastics processing, automated assembly and packaging, quality assurance, and computer simulation and modeling. Under development is an automatically guided vehicle to transport materials and parts between an automated storage/retrieval unit and associated work cells. The CIM Laboratory is linked via video to instructional classrooms and to a control room that monitors work cell operation.

Environmental Engineering and Sciences

Hazardous Substance Management Research Center (HSMRC)
HSMRC is designated an industry/university national research center by the National Science Foundation and an Advanced Technology Center by the New Jersey Commission on Science and Technology. It has six divisions that are concerned with the management of hazardous materials. It is based at NJIT and is funded by government and industrial sponsors who play an active role in its management. The Center conducts research through an academic consortium comprising NJIT; Stevens Institute of Technology; the University of Medicine and Dentistry of New Jersey; Rutgers, The State University of New Jersey; and Princeton University. The Center has an Industrial Advisory Board of approximately 30 members who propose, evaluate and advise on university-conducted research.

Northeast Hazardous Substance Research Center (NHSRC)
The HSRC in federal regions I and II administers an EPA-supported research program in groundwater remediation, incineration, transportation, site remediation, soil contamination, pre-treatment of industrial wastes, waste minimization, and waste reduction. The Center conducts research through an NJIT-led consortium comprising NJIT, Massachusetts Institute of Technology (MIT), and Tufts University.

Air Emissions Research Center (AER Center)
The Center is presently being developed by NJIT, Massachusetts Institute of Technology, Penn State University, and Ohio State University. It will perform research to advance the state of knowledge in pollution prevention. It will be sponsored financially by a government agency, industry, state governments, and universities. Industrial participants are expected to play a substantial role in formulating policy by selecting research projects, and monitoring the research activities of the Center.

Institute for Hazardous and Toxic Waste Management (IHTWM)
IHTWM seeks funds from governmental agencies and industry to support individual and teams of faculty and graduate students for research on hazardous and toxic waste.

Information Technology

Institute for Integrated Systems Research
INIS serves as the research arm of the Department of Computer and Information Science. The research focuses on improving productivity in the service and manufacturing industries by integrating existing and new hardware and software into single systems. It supports interdisciplinary research among microelectronics, computer engineering, and other disciplines.

Technology Extension Center in Information Services
The TExCenter makes the benefits of computer automation available to small- and medium-sized businesses and service organizations through formal and informal training, an inquiry service, and a resource center. The TExCenter is funded by the New Jersey Commission on Science and Technology.

Center for Information Age Technology (CIAT)
CIAT provides business, government, nonprofit agencies and educational institutions with expertise on integrating computer technology into their operations. It also conducts needs assessments, offers guidance in the selection of suitable hardware and software, and helps introduce workers to computer technology.

Materials Science and Engineering

Allied Institutions for Materials Sciences
New Jersey Institute of Technology; Princeton University; Rutgers, The State University of New Jersey; David Sarnoff Research Center; and Stevens Institute of Technology have established a research consortium currently involved in two efforts:

- The *Advanced Technology Center for Surface Engineered Materials* is developing through industrial and academic collaboration fundamental knowledge and techniques on processes and materials in four major areas: surface microengineering (NJIT); low temperature synthesis (Princeton and David Sarnoff Research Center, Inc.); chemical synthesis (Rutgers, The State University); and advanced surface manufacturing (Stevens Institute of Technology).
- *SEMATECH (Semiconductor Advanced Technology)* comprises a number of semiconductor manufacturers including AT&T, IBM, and others. SEMATECH funds the consortium's *Center of Excellence in Plasma Etching,* whose major activity is to develop a reactive ion etching process for sub-micron silicon technology.

Biomedical Engineering

Center for Biomedical Engineering
This center is a cooperative effort of NJIT and several hospitals. It applies engineering principles to the understanding of mechanisms of disease and to the development of new treatment modalities for medical disorders. Funding comes from governmental agencies, private corporations, and foundations.

Electronics and Communications

Center for Microwave and Lightwave Engineering
This center fosters research in optoelectronics, antennas, millimeter and microwaves, including Gaussian beams, wire antennas, millimeter-wave integrated delectric structures, microstrip antennas, numerical electromagnetic codes, fibers and propagation in vegetation.

Center for Communication and Signal-Processing
This center promotes research on the theoretical and practical aspects of communications and signal-processing systems. Investigations are conducted with the cooperation of corporations that develop communications systems and related products.

Microelectronics Research Center
Research focuses on advanced semiconductor design and process technology. The center operates a class 10 cleanroom with a full research capability for submicron lithography, metal and dielectric film deposition reactive ion etching, inspection, and characterization. The major application area is microengineering including micromechanical, vacuum microelectronics, and smart sensors. The center performs research at the process, device and systems level.

Additional Academic and Service Centers

The Center for Technology Studies
The Center is sponsored by New Jersey Department of Higher Education. It fosters technological literacy and the study of science, technology and society in schools and colleges.

Center for Transportation Studies and Research
Researchers examine infrastructure, materials, operations, and public transportation policy and planning. Projects currently being considered for study include privatization of transit services, meeting rural transportation needs, and cooperative research with the Hazardous Substance Management Research Center on transporting of toxic materials.

Regional University Transportation Center in Federal Region II
The Regional Transportation Center provides technical, administrative and fiscal management necessary to conduct research projects in the field of transportation. The multidisciplinary approach of the Center's research combines methods from among civil engineering, operations research, statistics, economics, and related social sciences.

Defense Procurement Technical Assistance Center
The Center serves minority- and women-owned and other small businesses in northern New Jersey interested in providing goods and services to the U.S. Department of Defense. Center clients receive guidance on procedures for obtaining government contracts.

Enterprise Development Center
The Center helps new and developing businesses survive typically difficult start-up stages. Focus is on assistance to firms developing new technologies themselves, and those that want to use advanced technologies to enhance their business. The Center also prepares individuals for jobs in a rapidly changing technological environment.

The Foundation at NJIT

The Foundation is a privately incorporated resource development organization that supports excellence in instruction, research and public service programs at New Jersey Institute of Technology. The Foundation encourages private philanthropy on behalf of the university. It offers grants to faculty to encourage advanced research and funds faculty chairs of excellence. Currently, chairs in applied mathematics, computer auditing and optoelectronics are supported by the Foundation. Leaders from industry serve on its Board of Overseers and provide a vital link with the private sector.

Graduate Studies

NJIT undergraduates and graduates of other institutions from the state, nation and the world have the opportunity to pursue Graduate Studies at NJIT. Programs leading to the Master's, Doctorate and Engineer degree are offered in over twenty different areas of specialization. Programs are available for both the full-time student and the working professional interested in part-time study.

Full-time students are likely to become involved with the extensive research activity at NJIT through association with renowned faculty and research centers. Financial support is available through a variety of programs that permit students to become part of the teaching, administrative and research functions of the university. Other non-service-based support is also available.

Graduate courses and programs are also offered by NJIT faculty directly at off-campus sites through Extension Programs and by televised Distance Learning as part of the NJIT membership in the National Technological University. Current undergraduates have opportunities for early entry into graduate study through the BS/MS program and accelerated joint degree programs.

For information on admissions and programs of study, consult the separate Graduate Catalog or call the Office of Graduate Admissions at (201) 596-3460. Further information on graduate financial support, programs and policy can also be obtained from the Graduate Catalog or the Office of Graduate Studies at (201) 596-3462.

Master's programs offered are:

School of Architecture
Architecture
Architectural Studies

College of Science and Liberal Arts
Applied Mathematics
Applied Physics
Computer Science
Information Systems (pending)
Materials Science and Engineering (pending)
Interdisciplinary Studies

School of Industrial Management
Management

Newark College of Engineering
Applied Chemistry
Applied Science
Biomedical Engineering
Chemical Engineering
Civil Engineering
Electrical Engineering
Engineering Science
Environmental Engineering
Environmental Science
Industrial Engineering
Management Engineering
Manufacturing Engineering
Mechanical Engineering
Occupational Safety and Health Engineering
Transportation

Ph.D. programs are offered in the following fields:
Chemical Engineering
Civil Engineering
Computer Science
Electrical Engineering
Environmental Science
Management (jointly with Rutgers-Newark campus)
Mathematics (pending, with Rutgers-Newark campus)
Mechanical Engineering
Physics (pending, with Rutgers-Newark campus)
Transportation

Degree of Engineer programs are offered by the Chemical, Civil, Electrical and Mechanical Engineering Departments.

Extension Programs

Although the majority of academic programs are offered at NJIT's Newark campus, students may take courses and earn degrees in other areas of the state through the university's extension programs. Admissions requirements and the quality of instruction are the same for on-campus and extension programs. Registration, advisement, and support services for undergraduate programs are available at each site listed below.

Burlington County College: second- and third-year courses in electrical engineering.

Brookdale Community College: third-year courses in electrical engineering.

Mercer County College: third- and fourth-year courses leading to completion of a Bachelor of Science in Engineering Technology, construction and contracting option.

For more information about these and graduate off-campus programs, call the Office of Extension Programs at (201) 596-3640.

Access NJIT

The Center for Distance Learning at New Jersey Institute of Technology has the responsibility for development and administration of college courses delivered through telecommunications technology.

The Center operates Access NJIT, the NJIT telecourse venture, through which students remote from the campus—*distance learners*—earn college credit for enrollment in *telecourses.* Each telecourse comprises three key components: television lectures, print material, and an NJIT mentor who is reached by phone, mail, or computerized conferencing. Telecourses allow for a flexible, yet rigorous educational experience suited to motivated students. Students successfully completing these telecourses receive college credit.

The Center's reach is nationwide. Local transmission of course material is accomplished through cablecast, instructional television fixed service (ITFS), and VHS tape distribution. National delivery of Access NJIT telecourses is provided by the Mind Extension University, a division of Jones International cable network. In addition, Access NJIT originates programming for the National Technical University (NTU), a satellite-distributed provider of graduate courses for technical professionals.

The Center for Distance Learning also oversees the production of educational material for distance learning. The current inventory covers courses in many disciplines including science, computer science, mathematics, and management. An Access NJIT catalog of offerings is available upon request.

Access NJIT furnishes a convenient alternative to distant learners and students who have scheduling conflicts. In addition, Access NJIT telecourse material can be used by any NJIT student needing course review. Several campus workstations are set up for viewing.

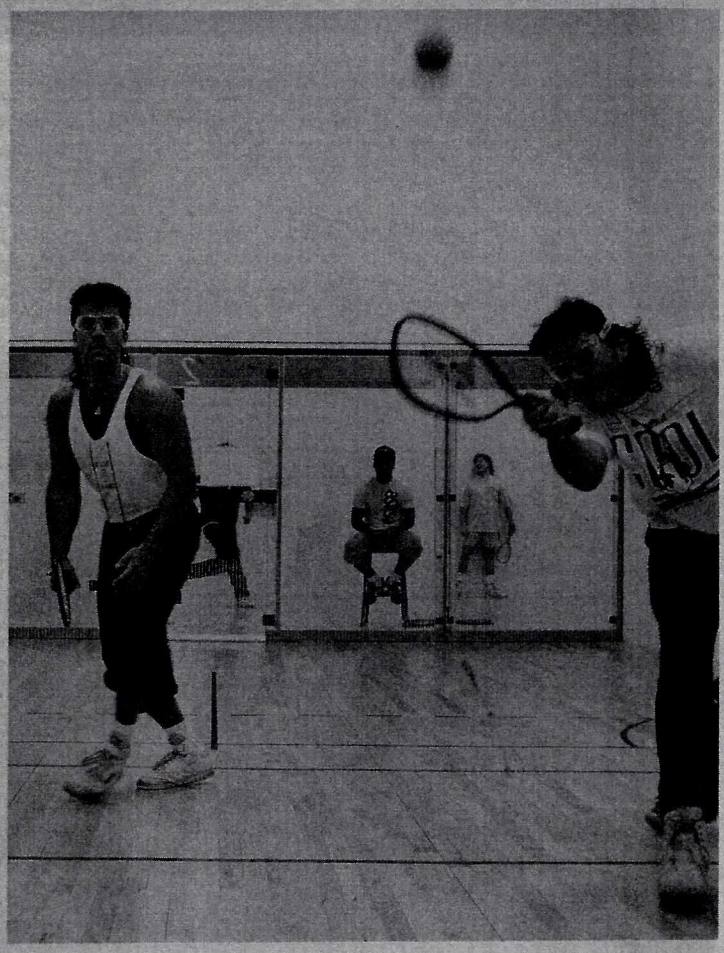
For more information, contact the Center for Distance Learning at (201) 596-3177.

Continuing Education

The Division of Continuing Education provides non-credit programs, seminars, workshops and short courses in order to maintain quality in the professions. Its *Public Programs Unit* offers review classes for professional examinations, and seminars for engineers, technicians and their managers. A *Contract Training Unit* offers both custom-designed and "off-the-shelf" programs to client companies. A *Special Projects Unit* provides training for organizations interested in developing a long-term relationship using grants or contracts negotiated through a third party such as a foundation, or an agency of state government. The division's *Center for Environmental Training and Technology Transfer* offers on-site training in technology for hazardous materials managers and remediation staff.

Consortium with Rutgers University-Newark Campus

Adjacent to NJIT is the Newark campus of Rutgers University, which has a student enrollment of over 10,000. NJIT and Rutgers-Newark enjoy an exceptionally close and productive consortial relationship within the thriving "University Heights" section of Newark. Each year the two universities co-sponsor a common season of theatrical productions, as well as "World Week," a joint program of honors colloquia, and a variety of other cultural and social activities. NJIT students have library privileges at the Dana Library of Rutgers-Newark. They may also enrich their educational experience by enrolling in Rutgers-Newark courses in arts and science disciplines not offered at NJIT, such as art, music, foreign languages, biology, and geology; and many Rutgers-Newark courses are regularly listed in the NJIT registration bulletins in order to facilitate the cross-registration process. Joint or cooperative degree programs now exist in several graduate and undergraduate fields, including the bachelor's programs in applied mathematics, applied physics, computer science, information processing systems, and science, technology and society (STS). As a result of this consortial relationship, the opportunities available to students at both universities are greatly enhanced.




New Jersey
Institute of
Technology

The Campus and Student Life

NJIT Campus

Located in the University Heights section of Newark, New Jersey Institute of Technology's 40-acre campus is adjacent to the campuses of Rutgers, The State University of New Jersey; Essex County College; and the University of Medicine and Dentistry of New Jersey. The campus is easily reached via interstate highways and public transportation. Newark International Airport and the Pennsylvania Railroad terminal are close by.

As part of a major expansion program, NJIT has recently constructed buildings to augment student housing, physical education facilities, classrooms, laboratories, and offices. New buildings to house the library, School of Industrial Management, admissions offices and electrical and computer engineering facilities are now under construction. In the design stage are renovations of existing university facilities to provide additional space for the School of Architecture and to consolidate offices related to Student Service functions.

NJIT's campus is home to major centers sponsored by the New Jersey Commission on Science and Technology. NJIT's three-story Otto H. York Center for Environmental Engineering and Science houses the Commission-sponsored Hazardous Substance Management Research Center, an internationally recognized leader in environmental research.

The 175,000-square-foot William S. Guttenberg Information Technologies Center houses the Commission-sponsored Center for Manufacturing Systems. The building is the site of the computer and information science, manufacturing engineering, and industrial engineering instruction and research facilities. A two-story "factory of the future" supported by the New Jersey Department of Higher Education is an important feature of the building.

The campus center has a cafeteria and a more informal eating facility, The Pub. In addition, there is a theatre on campus where student productions are staged, an athletic field, tennis courts and indoor recreational facilities including a swimming pool, racquetball courts, weight rooms, track, aerobics room, and more. The residence halls provide dormitory and apartment-style co-ed living accommodations for close to 1,000 students.

A Computing-Intensive Environment

Extensive computing facilities support both academic study and research. NJIT has centralized its computing services through a number of powerful systems. Minicomputers and microcomputers are located throughout the campus in academic departments and in computer laboratories.

A VAX 6430 serves as the main VMS computer for academic programs. A VAX 8800 serves the university's administrative needs. A DEC 5500 serves as the UNIX engine for academic work. Modern laboratories equipped with state-of-the-art workstations and complemented by four networked PC laboratories are available for student use. In addition, access to the various systems can be had at several terminal areas. A fiber optic spine connects nearly 2,000 campus locations and beyond.

The university is a member of the Newark Remote Access Center (NRAC). NRAC promotes supercomputer education, research, training and applications at its three member universities: NJIT, Stevens Institute of Technology, and the University of Medicine and Dentistry of New Jersey.

NJIT is also a member of the Partnership for Academic Consulting and Training in Supercomputing at the Pittsburgh Supercomputing Center (PSC). Access to a CRAY Y-MP/832 and a Thinking Machines Corp. CM-2 massively parallel system (32768 CPUs) at PSC are provided through the John von Neumann Center Regional Network (JvNCNET), a high-speed network connected to the National Science Foundation.

Through JvNCNET, the NJIT user community can access Internet and the National Science Foundation network that allows NJIT to communicate with other universities and organizations in the U.S. and abroad. Use of Internet and the National Science Foundation supercomputer network links NJIT with many other universities in the nation.

In addition, the university houses the Electronic Information Exchange System (EIES), a pioneering network in international computer-mediated communications.

Personal Computers

Through NJIT's PC Distribution Program, all full-time freshmen receive their own personal computers to use during their undergraduate years. Students gather in small groups to assemble the computers themselves. The computer package also includes several software packages and hardware enhancements. Upon graduation, students may purchase the computer and software packages for a nominal fee.

Library Services

The university's Robert W. Van Houten Library, centrally located on the campus, provides facilities for study, research, and browsing. Approximately 144,000 volumes are available for student use, and 1,700 periodical subscriptions are received. Also on file are many indexing and abstracting services that give access to the literature of engineering, science, management, architecture, and other subject areas. Literature searches may be carried out via CD-ROM stations and via DIALOG or STN services.

Students may supplement NJIT library resources by borrowing material from the Newark Public Library and the libraries of Rutgers University-Newark Campus, the University of Medicine and Dentistry and the eight state colleges of New Jersey. In addition, students can easily take advantage of the rich library resources of New York City. Among these resources are the New York City public library and the Engineering Society library. Interlibrary loan arrangements with more distant institutions are also available. The library provides on-line literature searches, orientation tours, and instruction in the use of reference works.

Included among the library's resources is a small museum containing items developed and manufactured by Edward Weston, scientist, prolific inventor, and a founding member of the board of trustees of the university. Dr. Weston's rare book collection is also maintained by the library and is available to scholars and others interested in the history of science and technology.

Architectural Information Center

The School of Architecture maintains the Architectural Information Center with its collection of 70,000 slides, a core collection of architecture books, rare books, journals, drawings, and maps.

A Look at Student Life

The extracurricular programs at New Jersey Institute of Technology span a wide range of interests from sports to professional societies.

NJIT has an extensive varsity sports program. Men's sports are baseball, basketball, bowling, cross country, fencing, golf, judo, skiing, soccer, tennis, and volleyball. Intercollegiate competition is offered for women in basketball, cross country, fencing, judo, skiing, softball, tennis, and volleyball. An intramural program includes all sports available at the varsity team level plus track and field, racquetball, flag football, badminton, softball, and archery.

There are 15 social fraternities and five sororities, most with residential facilities, 15 honor societies, and 12 professional recognition societies. The latter include Tau Alpha Pi, Phi Eta Sigma, and the American Chemical Society, the American Institute of Aeronautics and Astronautics, the Society for Technology, the Society of Women Engineers and the Society for Advancement of Management, to name a few. There is an active professional society for almost every major field of study offered by the university.

The Student Senate administers a wide range of programs through the Student Activities Council, various Honors societies, and the Cabinet for Professional Societies and Cultural Organizations. Some of these activities include chess, scuba diving, mountain climbing, the "Vector" newspaper, the "Nucleus" yearbook, ham radio, photography, theater, and radio broadcasting. NJIT's close proximity to New York City allows students to take advantage of the recreational and cultural life of the city. There are frequent distributions of discount tickets to shows, museums, concerts, and sports events. The Motorsports Club, Outing Club, Ski Club and Student Activities Council follow their various interests on weekend trips throughout the Northeastern United States.

And there's the Hazell Center, where students gather to eat, plan programs and activities, socialize, work on publications, bowl, shoot pool, watch movies, play chess, or just relax.

NJIT provides an environment for learning, not only in the classrooms and labs, but on the playing field, not only from the faculty but from each other.

Student Services

The Dean of Student Services administers and coordinates the activities of the Student Services Division including the Hazell Center, the Counseling Center, Food Services, the Office of International Students and Faculty, Health Services, and Residence Life. Special services for women, evening, and disabled students are provided. The office is located on the third floor of Eberhardt Hall, room 33E. The phone number is (201) 596-3466.

Services provided students include:

The Hazell Center

The Hazell Center is the location for a wide variety of events, including art exhibits, films, and concerts. On the lower level there is a recreation area with billiards, ping pong, bowling, and pinball. Student organization offices and the Bookstore are also located on the lower level. The Hazell Center Annex, located in the basement of Cypress Hall, provides additional study space for students.

Center Information Desk personnel provide information about the campus and community events, public transportation, and I.D. cards. In addition, the Center Desk makes available to students the university telephone directory and discount tickets for musical, theatrical and sporting events. The Information Desk number is (201) 596-3605.

Food Services

Two separate food operations are located in the Hazell Center. The campus cafeteria is an NJIT-operated dining facility providing breakfasts, lunches, and dinners. A newly remodeled cafeteria offers a variety of selections from the grill, pizza area, deli sandwiches, hot soup kettle, hot entrees, large variety salad bar, take out items, desserts, frozen yogurt, and cold and hot beverages. The Pub, a non-profit corporation, offers moderately priced sandwiches and snacks and, to those over 21 years of age, beer and wine.

Counseling Center

The Counseling Center, staffed by experienced psychologists and counselors, is available to any student seeking confidential personal, academic or career counseling. In addition to the professional counseling staff, a psychiatrist is available for consultation as needed. The Counseling Center conducts various group workshops, maintains a library of career and graduate school information, and administers supportive testing. Students are welcome to come in and browse through the information materials or to speak with a counselor. Counseling services are also available to evening students who may be experiencing stress from academic, personal, family or employment responsibilities. The Counseling Center is on the third floor of Eberhardt Hall, Room 37E, and is open from 8 a.m. to 6:00 p.m., Tuesday through Thursday, and from 8 a.m. to 5 p.m. Monday and Friday. The phone number is (201) 596-3414.

Stop-In Center

The Stop-In Center, staffed by trained student-counselors, provides on-the-spot information and assistance about all aspects of college life. Peer counselors are prepared to talk with fellow students about any questions or concerns—academic or personal—as well as provide general information. If they are unable to resolve a problem directly, they refer students to the person or office that can. No appointment is necessary and students are invited to stop by (downstairs in the Hazell Center, Room 124) and become familiar with the staff and services available. The phone number is (201) 596-3422, 3421 and the Stop-In Center is open weekdays from 8 a.m. to 6:30 p.m. (Fridays to 5 p.m.).

Tutoring

Tutoring is available to all students on both a walk-in and appointment basis. The learning center has programs designed to help students at all levels understand basic concepts and develop skills necessary for academic success in mathematics, physics, chemistry, computer science, reading and writing, engineering, and economics, among other subject areas and disciplines. Students wishing to receive tutoring should contact the University Learning Center. The center is located in the lower level of the library/theater complex, Room 101. The phone number is (201) 596-2992.

Career Counseling and Placement

The Office of Career Counseling and Placement assists students and alumni who are seeking employment. It provides career counseling, information on employer characteristics and employer trends, and maintains an extensive Career Resource Library. The office schedules interviews with employers visiting the campus. It maintains an active list of full-time employment opportunities for evening students and alumni as well as complies a list of summer and part-time jobs. It also conducts appropriate surveys of alumni career progress. In addition, the office also places full-time and part-time students who are in good academic standing, for part-time on-campus employment dependent upon qualifications and position availability. The office, a unit of the Division of Career Development Services, is located on the second floor of Cullimore Hall, Room 212.

Residence Life

NJIT provides on-campus housing for men and women; undergraduate and graduate students. The university provides full-time professional and student staff to oversee residence hall operations.

Students may apply for on-campus housing after being accepted for admission. Assignments are guaranteed for one year only. Students given residence for the fall semester are automatically contracted for the spring semester. Housing space is allocated on a point system that weighs commuting time and class standing. However, a number of spaces are reserved for new students each year.

Freshmen are required to live in Redwood Hall, which houses 210 students. Freshmen also are required to participate in the meal plan. All rooms in Redwood Hall are two-person rooms. Oak Residence Hall serves 265 students. The eight-story apartment building accommodates mostly upper division and graduate students. Cypress Residence Hall is an eight-story building accommodating 420 upper division students in two-room suites. Each room houses two students.

All three residential buildings are fully furnished and air-conditioned. Desk attendants are on duty 24 hours a day.

Students who are accepted for admission to NJIT will receive information from the Office of Residence Life describing the procedure for applying for space in the residence halls.

Evening Students

Staff from the Office of the Dean of Student Services is available from 5 p.m. to 6:00 p.m. Tuesday through Thursday, at the Hazell Center to provide information to evening students. Quarterly throughout the year, evening students are mailed a schedule of special events and academic workshops.

The Counseling Center is open to evening students until 6:00 p.m., Tuesday through Thursday to counsel adult students who face stress from academic, personal or employment responsibilities.

International Students

The Office of International Students and Faculty offers numerous services and programs to aid students in their adjustment to NJIT. The office provides one-to-one advisement sessions and workshops to international students, scholars, and their dependents. An extensive orientation program is offered immediately preceding the beginning of each semester. Because of ever-changing immigration regulations that impact the status of students, all international students holding F-1 and J-1 nonimmigrant status should report to the office as soon as possible after their arrival. F-1 and J-1 students must maintain full-time registration (minimum of 12 credits per semester) throughout their period of study. The office is located in the lower level of Eberhardt Hall, Room 10. The phone number is (201) 596-2451.

Disabled Students

The Counseling Center provides counseling and coordinates special support services for disabled students. These may include providing general information and learning disabilities screening, and arranging for academic accommodations and priority registration. The Department of Mechanical and Industrial Engineering maintains a Macro Lab facility which is open to students who want to modify equipment or faciltiies to make them accessible to disabled students. A Kurzweil reading machine is in the Macro Lab for the use of blind, other visually impaired and learning disabled students.

The Counseling Center is on the third floor of Eberhardt Hall, Room 37E, and is open from 8 a.m. to 6 p.m. Tuesday through Thursday and from 8 a.m. to 5 p.m. Monday and Friday. The phone number is (201) 596-3414.

Student Health Service

The Student Health Service is located on the first floor in the annex of the Physical Education Building. The NJIT Student Health Service provides primary health care to all enrolled students who have submitted a completed medical examination form. The health evaluation and medical exam form is required for registration as an NJIT student. Failure to submit the form will jeopardize registration.

Services offered: Assessment and treatment of health problems and injuries; laboratory tests; allergy and immunization injections; health counseling and education; referral to hospitals, physicians and other resources.

Hours: 8:30 a.m.-4:30 p.m. Monday through Friday during regular semesters with summer hours available by appointment only. Physician available 8 hours per week by appointment. Nurse clinician Monday through Friday 8:30 a.m.-12:30 p.m., after 12:30 p.m. by appointment only.

Health Insurance: New Jersey law requires all full-time students to maintain health insurance coverage that provides basic medical and hospital benefits. As required by law, NJIT offers a basic policy at a minimal cost to the student. If you have coverage through your parents or through your employer you may waive coverage under the NJIT plan. This may be done by providing proof of comparable insurance and completing the appropriate waiver form available in the Student Health Service.

Further information may be obtained by calling the Student Health Service at (201) 596-3621.

Property Loss

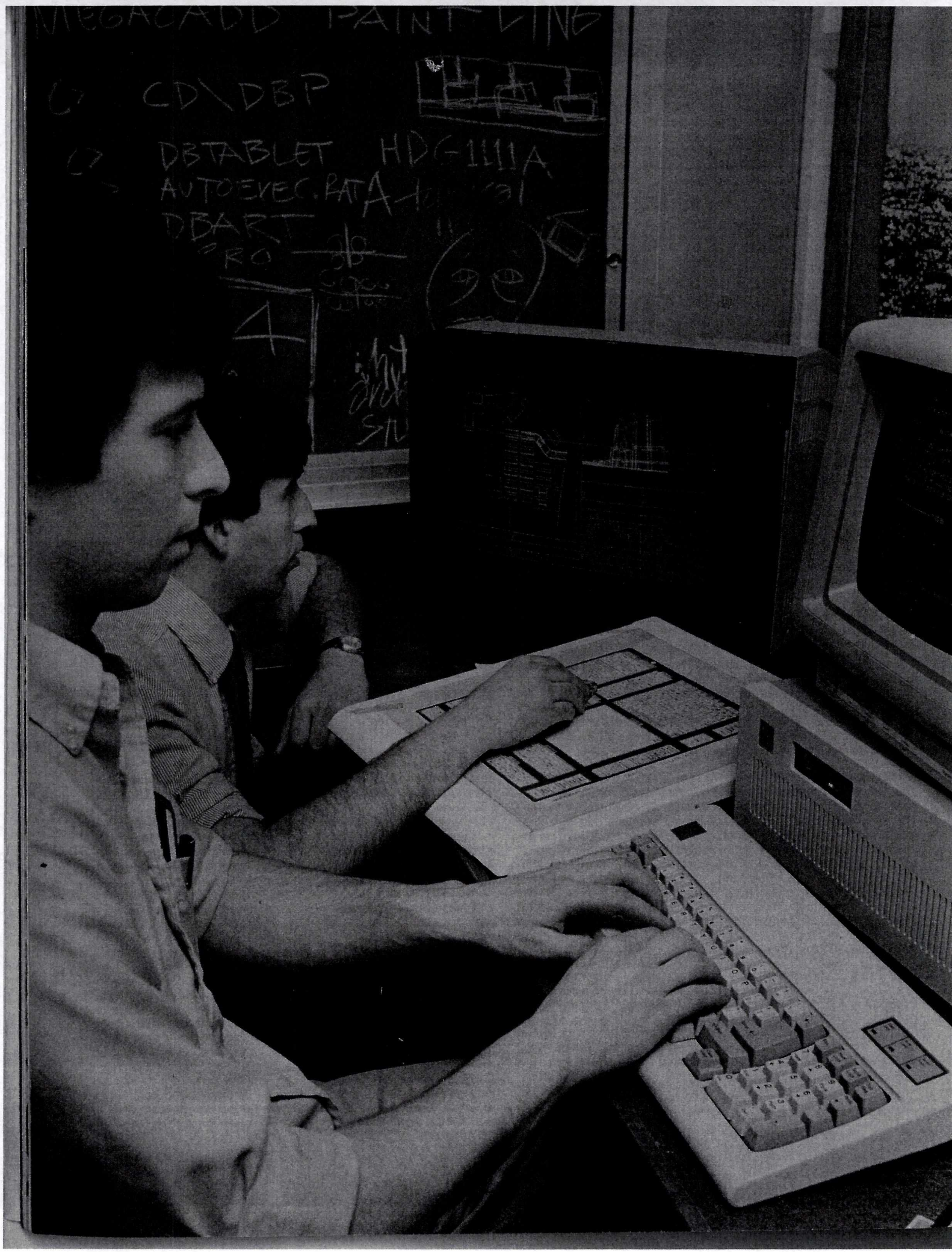
NJIT is not responsible for loss of property by fire or theft in its buildings or grounds.

Physical Education and Athletics

The major objectives of the Division of Physical Education and Athletics are to encourage students to develop individual physical skills that can be utilized throughout life, and to provide a variety of programs that will meet the diverse needs and interests of the NJIT community. These objectives are met by programs of skills instruction, intramural and intercollegiate competition, sports clubs, and open recreation.

The successful completion of two semesters of physical education is required as part of all curricula. This requirement must be met by all students who have registered as full-time undergraduate students for two or more consecutive semesters. Students are encouraged to complete the requirement as soon as possible. This requirement can be waived only by the Director of the Division of Physical Education and Athletics. To participate in physical education courses, a student must have a completed health history and physical form on file with the NJIT Office of Health Services. The activities of the division are administered and coordinated by the Office of Academic Affairs.

The Division of Physical Education and Athletics encourages the use of its facilities. The Physical Education Building houses a swimming pool; locker rooms; fitness center with a 1/16-mile indoor track; an athletic training room; dance, exercise and fencing areas; conference and audio/visual rooms; four racquet sport courts; and three gymnasia. Lubetkin Field is a multi-purpose recreational area with a regulation soccer field, fields for softball and baseball, and a jogging area. There are four tennis courts behind the Physical Education Building. Recreational areas are open from 7 a.m. to 11 p.m. Monday through Friday, from 9 a.m. to 3 p.m. on Saturdays, and from 3 p.m. to 9 p.m. on Sundays. For information contact the division office in the Physical Education Building. The phone number is (201) 596-3636.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Admissions

Applying for Admission

If you are considering applying for admission to any of the undergraduate programs at NJIT, you should read the detailed requirements and procedures set out on the following pages.

Many NJIT students enroll as freshmen after graduating from high school, but applications are also welcome from transfer students who have completed some college work. The university works closely with community colleges and other institutions to facilitate transfer of students.

Admissions counselors are available to help you define your college plans. They will give you further information about any of the undergraduate programs, and explain the admission requirements for each program. If you are uncertain about which program to take, a counselor can help you make a decision.

The university strongly encourages applicants to visit the campus. The Office of Undergraduate Admission will be happy to arrange an interview and a student-guided tour.

An interview may be required as we attempt to evaluate your ability to complete a program at NJIT.

For further information contact:
Office of Undergraduate Admission
New Jersey Institute of Technology
University Heights
Newark, New Jersey 07102
(201) 596-3300

General Admission Requirements

All Math/Science/Engineering Majors

HIGH SCHOOL UNITS Applicants for admission must have completed a minimum of 16 secondary school units. Prospective students who have not taken all these units may be required to complete preparatory courses in the summer and/or pursue a modified program in the freshman year.

Required units

English	4 units
College preparatory mathematics, including algebra, geometry, and trigonometry	4 units
Lab sciences, chemistry and physics preferred	2 units

Other units

These should be college preparatory courses in social studies, foreign language, mathematics, or science.

EXAMINATION REQUIREMENTS All applicants must take both the Scholastic Aptitude Test and the Mathematics Achievement Test (Level I or II) of the College Board.

Architecture Majors

Same general requirements with the following exception:

Lab sciences, physics preferred	2 units

Architecture applicants are also required to submit a portfolio, a collection of projects, or a single project, which best exemplifies a student's creativity, inventiveness, or intellectual development.

Management Majors

Same general requirements with the following exceptions:

College preparatory mathematics	3 units
Science, including one lab science	2 units

Science, Technology and Society Majors

Same general requirements with the following exceptions:

College preparatory mathematics	3 units

Engineering Technology Majors

Applicants must hold an associate's degree or its equivalent in an appropriate field of technology from a community college or similar institution. No admissions testing is required.

Freshman Admission

High school graduates who have not previously attended college may apply for admission as freshmen. In lieu of a certificate of graduation from an approved secondary school, a high school equivalency certificate, as issued by the New Jersey State Board of Education or similar state agency, may be submitted. To apply for admission, you must complete an Application for Undergraduate Admission form and pay a non-refundable application fee. Please review the admissions application for further details. Your application will be considered on the basis of your high school record, your performance on College Board examinations, and other pertinent information.

Early Admission

Exceptional students who meet the appropriate testing and course requirements for a freshman program year may begin as freshmen without completing the senior year of high school or receiving a high school diploma. Inquiries should be directed to the Office of Undergraduate Admission.

Advanced Placement

Accepted students may be awarded credit for freshmen course work in a number of areas by taking the proper courses in secondary school and/or attaining satisfactory scores on appropriate Advanced Placement (AP) Examinations.

Course Placement

Students enter at many levels of achievement. The credentials of all accepted students are reviewed before specific courses are assigned. The course work available ranges from the review (refresher) level to honors courses which provide more challenge for the well-prepared student.

Students for whom review is suggested or required may do such work during summer school or in a modified program during the freshman year.

Transfer Admission

To be considered for admission as a transfer student you must submit an Application for Undergraduate Admission and a non-refundable application fee.

Further details on transcript and testing requirements are found in the instruction sheet which is part of the Application for Undergraduate Admission. Additional requirements are as follows:

Transcripts of all attempted post-secondary school work. Applicants who have earned fewer than 30 college credits must also submit a secondary school transcript as well as standardized test scores (SAT or ACT).

NOTE: Transfer candidates who have completed the equivalent of one or more years of full-time study in the same discipline as the one they plan to enter at NJIT at an accredited U.S. college or university are not required to submit entrance examination results or secondary school records except in cases in which it is deemed necessary by the Office of Admission.

Engineering Technology Majors
Candidates for admission to the program leading to the Bachelor of Science degree in engineering technology must submit a transcript indicating that they hold an associate's degree in technology (A.A.S.) or in the physical or life science technologies. The university will consider applicants who have an educational background equivalent to an appropriate associate's degree but who do not have the degree. Transfer students from engineering programs may be required to complete a minimum number of technology courses in addition to the junior and senior year Bachelor of Engineering Technology program.

Students who apply to the computer option must demonstrate successful completion of a two-year program (or an approved equivalent) in computer technology.

Students who apply to the construction and contracting option must demonstrate successful completion of a two-year program (or an approved equivalent) in one of the following fields of technology: civil engineering, construction, drafting and design, mechanical engineering, or architecture.

Students who apply to the electrical option must demonstrate successful completion of a two-year program (or an approved equivalent) in electrical or electronics engineering technologies.

Students who apply to the manufacturing option must have completed a two-year program (or an approved equivalent) in a field of engineering technology.

Students who apply to the mechanical option must have completed a two-year program (or an approved equivalent) in mechanical technology.

Students who apply to the surveying option must have successfully completed a two-year program (or an approved equivalent) in a field of engineering technology.

The Scholastic Aptitude Test and the Achievement Tests of the College Board are *not* required of Engineering Technology applicants.

Architecture Majors
Transcripts of all post-secondary school work should be submitted. Architecture applicants are also required to submit a portfolio.

NOTE: Transfer candidates who have completed the equivalent of one or more years of full-time study in an architecture program are not required to submit entrance examination results or secondary school records except in cases where it is deemed necessary by the Office of Admission.

Special Programs

Accelerated Seven-Year B.S./M.D. (Medical) and B.S./D.M.D. (Dental) Programs

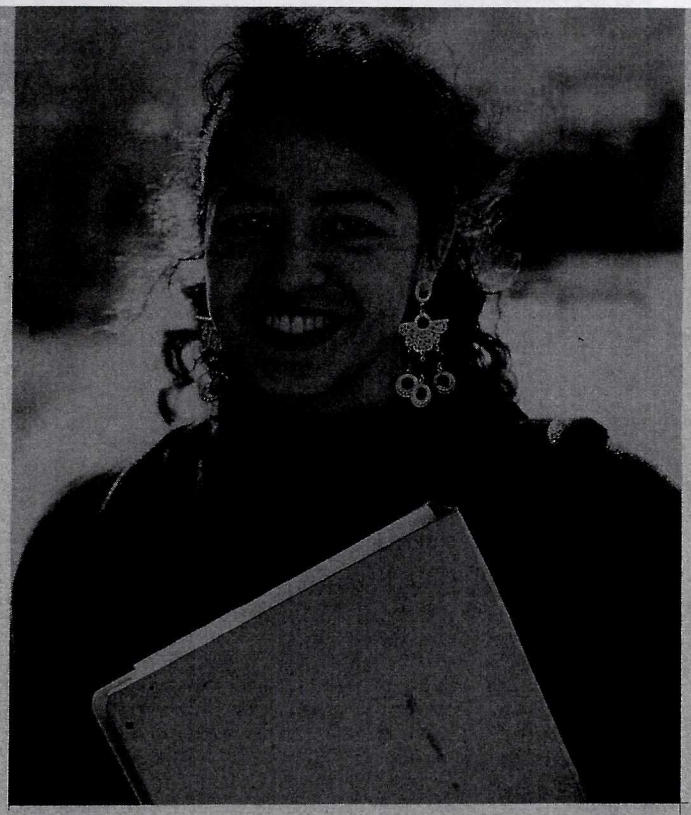
New Jersey Institute of Technology and the University of Medicine and Dentistry of New Jersey (UMDNJ) offer programs leading to the Bachelor of Science degree in Engineering Science at NJIT and the Doctor of Medicine (M.D.) degree at UMDNJ-New Jersey Medical School or the Doctor of Dental Medicine (D.M.D.) degree at UMDNJ-New Jersey Dental School, following completion of a prescribed seven-year program of study.

For a detailed description of these accelerated programs, see page 42.

Environmental Scholars Program

The Environmental Scholars Program was established in 1991 in order to provide special opportunities for outstanding students who wish to pursue a challenging program of study relating to the environment.

Environmental Scholars may elect any of the following five major fields of study: Environmental Science option in the Engineering Science Program; Environmental Studies option in the Science, Technology and Society Program; Applied Chemistry; Chemical Engineering; and Civil Engineering. No matter which major they choose, Environmental Scholars are entitled to the following benefits and opportunities: full membership in the Honors Program, including the annual merit award of at least $1,300 that all honors students receive; guaranteed funded professional research or internship experience in the summer following junior year, often at state-of-the-art facilities such as NJIT's Hazardous Substance Management Research Center and laboratories in Fortune 500 corporations nationwide; opportunities for community environmental service through the NJIT Service Corps; in-state tuition rates for qualifying students from states other than New Jersey; automatic acceptance into the B.S./M.S. Program or B.S./M.S. Internship Program.



Admission to the Environmental Scholars Program is highly selective, and candidates are advised to apply early in the senior year. To apply, interested students need only include with their regular application for admission to NJIT a 400-500-word essay on why they would like to be an Environmental Scholar. Successful applicants are expected to rank in the top 10 percent of their graduating high school class and to submit SAT scores of 1200 or higher, with comparable scores on achievement tests in mathematics (level I or II); biology or chemistry; and English (with composition). An interview with the Environmental Scholars Committee is also required. In addition, candidates are strongly encouraged to take placement tests on a special honors testing date in March.

For further information, contact the director of the Honors Program or the Office of Undergraduate Admission.

International Student Admission

International students whose native language is not English are required to submit their results from the Test of English as a Foreign Language (TOEFL) examination and may also be required to take courses in English as a Second Language.

Students who wish to receive transfer credit for course work completed in a country other than the United States are required to have their credentials evaluated by an independent service. NJIT recommends the use of: World Education Services, Inc., P.O. Box 745, Old Chelsea Station, New York, New York 10011. The transcript evaluation will be used to determine the transferability of courses. The cost for the evaluation of foreign records is borne by the student.

Only matriculated students will be considered for transfer credit. Credit will be given only for completed courses which are equivalent to those in the NJIT curriculum. A minimum grade of "C" is required in order to receive transfer credit.

Students whose native language is not English who transfer to NJIT from other U.S. colleges or from foreign universities are required to take the Humanities Department English Placement Test. Further details are included with the Application for Undergraduate Admission.

All students who will maintain F-1 (student) status while attending NJIT must submit an International Student Financial Statement as part of their application. This form is included with the application sent to such students.

No Form I-20 will be issed to students who have gained F-1 (student) status via another institution until *one semester has been completed at that institution.*

Non-Matriculated Students

Academically qualified students who do not desire to enter a degree program may enroll for credit in certain undergraduate courses. Such students must present transcripts of previous academic work or other appropriate evidence each semester they register in order to indicate adequate preparation for the course work involved. A non-matriculated student fee is required for each semester in which a student registers. Students are limited to three semesters of non-matriculated enrollment.

Official transcripts for non-matriculated students must list subjects completed, grades earned, and credits taken. No grades or academic credits will be awarded for audited courses. Auditors, however, may receive a statement of their attendance in the course.

Non-matriculated students who are approved for enrollment will be permitted to register for courses only if room is available after all degree candidates have completed their registration. Contact the Office of Undergraduate Admission for more information.

Credit by Examination

Accepted candidates may be granted credit for advanced courses by successfully passing a departmental examination to demonstrate proficiency in a subject area. Interested candidates should contact the Counseling Center for further information: (201) 596-3414.

Credit by Transfer

Credit may be given for completed courses which are equivalent to those in the NJIT curriculum for which a student has been accepted and in which final grades higher than the lowest passing grade have been earned. Requests for transfer credit should be directed to the Office of the Registrar.

College Level Examination Program (CLEP)

Applicants may be granted course credit for non-traditional college education such as independent studies or job-related experiences by successfully passing appropriate CLEP Subject Examinations. Interested candidates should contact the Counseling Center for additional information: (201) 596-3414.

Tuition, Fees and Financial Aid

Tuition and Fees

New Jersey Institute of Technology reserves the right to revise its charges for tuition and fees and to establish fees as may be required by increased educational costs. Tuition includes charges for services other than instruction, such as library, publications, counseling, placement, etc., but does not cover the cost of damage to or loss of university property.

Fees provide funds for the operation of Health Services, Student Services and Activities, inter-collegiate athletics, and various facilities and services.

TUITION

As of September 1991 the charges for tuition and fees for undergraduate programs are as follows:

	N.J. Resident	Non-Resident
Full-time	$1814/semester	$3784/semester
Part-time	135/credit	281/credit

NOTES: Part time = 1-11 credits per semester. Full time = 12-19 credits per semester. Above 19 credits: each credit is paid for in addition to the full-time tuition rate and is charged at the part-time rate.

FEES

Full-Time (12 or more credits)	
Registration	$ 50
Academic Facilities	180
Student Services	45
Student Activities	28
Athletics	17
Health Fee	10
Total	$330
Part-Time (fees per credit)	
Registration	$ 4
Academic Facilities	17
Student Services	5
Student Activities	2
Athletics	2
Total (per credit)	$ 30
Part-Time (fee per semester)	
Health Fee	$ 5
International Student Fee	$15 per semester

Admission Application Fee

Applications for admission must be accompanied by a non-refundable fee of $25. This fee contributes to the cost of evaluating and processing applications.

Insurance

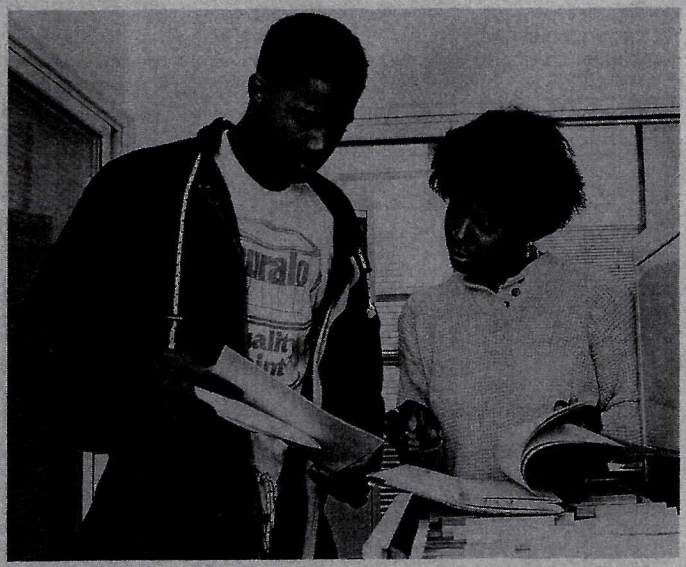
The university has compulsory accident insurance for all full-time undergraduate students. In addition, all full-time students must take out the university health policy at a cost of $130 per year, payable in the fall term, if they cannot prove similar coverage. Non-mandatory insurance is available to all who wish to purchase it. Application should be made to the Health Service Office.

Late Payment Fee

Students will be charged a late payment fee of $50 if they do not pay all tuition and fee charges by the deadline noted in the payment instructions.

Late Registration Fee

Registration is required for each semester. A late registration fee of $50 is required of those who register late.



Maintaining Registration Fee

Students enrolled in degree programs who find it necessary to discontinue their studies temporarily can maintain their registration by paying a $20 fee each semester. Students maintaining their registration will not be required to reapply for admission and will be allowed to register in advance.

Readmission Application Fee

Applications for readmission must be accompanied by a non-refundable fee of $25. This fee contributes to the cost of evaluating and processing applications.

Schedule Change Fee

A schedule change fee of $15 is charged when students change their schedule after the beginning of a semester.

Special Examination Fee

For special examinations, taken at times other than those regularly scheduled, a fee of $5 is charged.

REFUNDS

Fees

Fees are refundable prior to the beginning of the second week of classes. After that, fees are not refundable.

Tuition

Students who notify the university in writing of their withdrawal will be eligible for a refund of tuition based upon the following schedule. Please note that one class meeting during the Summer Session is equal to one week during the normal semester.

During the first week of the semester	100%
During the second week	80%
During the third week	60%
During the fourth week	40%
During the fifth week	20%
During the remainder of session	0%

The calculation of refunds will be based upon the date the Registrar's Office receives written notification of withdrawal.

Book Purchases

Students are advised to defer purchase of books until the official list of textbooks has been posted at the university bookstore.

Student Residency for Tuition Purposes

Residency status for the purpose of tuition assessment will be made by the university based upon N.J.S.A. 18:62-1 et seq. and New Jersey Administrative Code Title 9. These statutes require that individuals must be legally domiciled in the state for twelve months prior to enrollment to be eligible for in-state tuition rates. The law also permits those living in the state for less than twelve months to petition for resident status. Petitions will be granted only in those cases where there is clear and compelling evidence that New Jersey is the legal domicile of the student, parents or legal guardians on whom the student is dependent.

The procedures outlined below will govern the determination of residency status for the purpose of calculating tuition. All students who are not domiciliaries of New Jersey will be assessed out-of-state tuition rates.

Initial Determination of Residency

When an application is submitted for admission to any graduate or undergraduate program the admissions office will determine the applicant's resident status for tuition assessment. This determination will be based upon information supplied by the applicant on the application for admission. Applicants who are not citizens of the United States must complete the non-resident portion of the application and supply documentation of their non-immigrant status.

The university reserves the right to correct any errors in resident status based upon incorrect or insufficient information supplied by the student which directly or by inference leads to an inaccurate tuition assessment. When an error has been identified and corrected, tuition will be recalculated for the terms affected and the student will be held liable for any additional tuition.

Legal Determination of Residence

"Persons who have been domiciled within this State for a period of 12 months prior to initial enrollment in a public institution of higher education are presumed to be domiciled in this State for tuition purposes. Persons who have been domiciled within this State for less than 12 months prior to initial enrollment are presumed to be non-domiciliaries for tuition purposes."

The university reserves the right to request the student to have the Internal Revenue Service or the New Jersey Division of Taxation forward tax records to the appropriate university office for review.

An individual who claims to have established a new domicile in New Jersey must show (1) a physical abandonment of the previous domicile, together with an intent not to return to it, and (2) actual presence in New Jersey with the intention of remaining permanently in the state for reasons other than attending school.

An individual from another state or country who has enrolled in any type of educational institution in New Jersey prior to applying to NJIT will be presumed to be in New Jersey primarily for educational purposes and will be presumed not to have established domicile in New Jersey. Although the student may present proof to overcome these presumptions, it must be noted that continued residence in New Jersey during vacation periods or occasional periods of interruption to the course of study does not of itself overcome the presumptions.

THE EFFECTS OF MARRIAGE

A non-resident student who marries a bonafide New Jersey domiciliary assumes the domicile of that spouse for tuition purposes in the term following marriage. The same test for residency will be applied to spouses when marriage is claimed as the basis for domicile.

No change in status will occur when a domiciliary student marries a non-domiciliary.

FOREIGN NATIONALS

International students studying under an F-1 or J-1 status may be eligible to pay resident tuition upon receipt of their (green) permanent resident card. In addition to receipt of permanent resident status in the United States, students must comply with the definition of "Domicile" above.

Residency will be determined as of the first term following the admission date on the green card. Applications will not be processed unless a photocopy of both sides of the green card is included with the application. A tuition refund will be issued if the admission date on the green card precedes the start date of the current term.

Residence established solely for the purpose of attending a particular college or university cannot be considered as fulfilling the definition of domicile.

Request for a Change of Residency Status

Requests for a change in residency status must be submitted to the Registrar no later than four weeks before the end of the term for which a change in status is sought. A Residency Analysis Form with all supporting affidavits, deemed appropriate by the Registrar pursuant to New Jersey Administrative Code, Volume 9, Section 5 et seq., must be filed at the time of application. Students who qualify for resident tuition assessment based on the information supplied with their request will have their status changed only for the current and subsequent terms. No adjustments in tuition assessments will be made for prior terms.

Appeals

Appeals from the determination of residency status will be made to the Registrar and will be accepted no later than one month after the date of notification of any such determination. Unresolved appeals will be forwarded to the Assistant Vice President for Academic Affairs: Enrollment Planning. The Vice President will respond to the appeal within thirty working days of receipt of the appeal.

The decision of the Assistant Vice President for Academic Affairs: Enrollment Planning will be final.

Student Responsibilities

Students are responsible for providing relevant and accurate information upon which a residency determination can be made. The burden of proving residency status lies solely upon the student. Moreover, it is considered the obligation of the student to seek advice when in doubt regarding eligibility for in-state tuition assessment. If the student delays or neglects to question eligibility status beyond the period specified above, the student forfeits the right to a residency assessment to which he or she might have been deemed eligible had an appeal been filed at the appropriate time.

Students who are classified as resident students but who become non-residents at any time by virtue of a change of legal residence are required to notify the Registrar immediately.

An independent student loses residency status for instate tuition payment immediately upon abandonment of the New Jersey domicile. Assessment of non-resident tuition charges will take effect the term following the date of abandonment.

Penalties

If a student has obtained or seeks to obtain resident classification by deliberate concealment of facts or misrepresentation of facts or fails to come forward with notification upon becoming a non-resident, he or she is subject to disciplinary action before the university's professional conduct committee.

Factors Considered in Determining Residence for Tuition Assessment

This section of the policy statement conforms to the regulation of the Department of Higher Education, published in the New Jersey Administrative Code, Volume 9, Section 5-1, 1-1.5.

CLASSIFICATION

A student shall be classified as a "resident" for tuition purposes upon admission to a public institution of higher education in the state of New Jersey if the student, parents or legal guardians upon whom the student is financially dependent have been domiciled within the state of New Jersey for at least twelve months prior to the date of enrollment.

Students who have been domiciled within this state for less than twelve months prior to the date of enrollment are presumed to be non-residents for the purpose of calculating tuition. Students who assert residency but whose resident status is challenged by the university, must prove their domicile according to the following regulations.

DOMICILE

"Domicile" means the place where a person has his or her true, fixed, permanent home and principal living establishment, and to which, whenever he or she is absent, he or she has the intention of returning.

Although actual presence is not necessary to preserve domicile once it has been acquired, a person, if absent from the state, must have the intention of returning to New Jersey in order to remain a domiciliary.

In determining whether domiciliary status has been shown, mere physical presence and the assertion of a declaration of intent to remain in the state may not be sufficient. To assist in determining whether

a person is a New Jersey domiciliary, the primary evidence is a notarized affidavit setting forth domicile and a copy of New Jersey income tax return substantiating employment in New Jersey as the applicant's primary reason for residing in the state. In the case of dependent students, a copy of the parent's or legal guardian's New Jersey tax return will be required. The following additional items may be considered: voter registration of the individual in New Jersey; a New Jersey driver's license; New Jersey motor vehicle license plates; presence of spouse or children in New Jersey; employment or business in New Jersey; property ownership in New Jersey; and the location of a student's bank(s) in New Jersey. In unusual circumstances, if primary evidence is not available, the institution may make a determination of New Jersey domicile based exclusively on supplementary evidence; however, supplementary evidence may not be deemed sufficient to justify a determination of domiciliary status.

If a student resides with his or her parents or legal guardians for more than six consecutive weeks last or this year, or is dependent upon them for food, clothing, or shelter during the present or prior year, or is claimed, or will be claimed, as a dependent for income tax purposes for the last or current year, the student is deemed to be financially dependent. In such case, the domicile of the individual's parent or legal guardian for the year prior to the term of admission will determine the domicile of the dependent student.

Conversely, if a student has not lived, and will not live, with parents or legal guardians for more than six consecutive weeks during the present or prior year; and has not received and will not receive financial assistance from parents or legal guardians of more than $750 in support of any kind including food, clothing and shelter last year and this year; and has not been claimed as an exemption on parents' or legal guardians' tax return last and this year; and has resources, which should be at least equal to the level of public assistance in the preceding calendar year, the individual is deemed to be financially independent and student's own domicile, for the year prior to the term for which New Jersey domiciliary status is sought, will determine his or her domiciliary status.

Any other non-immigrant alien (H-1, E-1 etc. status) will be classified as a non-resident for the assessment of tuition.

REFUGEES

Students attending NJIT as documented refugees may be eligible to pay resident tuition rates provided they are domiciled in New Jersey and maintain good academic standing. Their status will be reviewed each semester by the Director of Financial Aid.

POLITICAL ASYLUM

Students who have been granted political asylum in the United States may be eligible to pay resident tuition rates effective the semester after which asylum has been granted.

PRESENCE IN NEW JERSEY DUE TO MILITARY SERVICE

As a general rule, in the absence of any intention to effect a change of domicile, the domicile of a person is not affected or changed by reason of his or her entry into the military service.

By action of the New Jersey legislature (July 1985), United States military personnel and their dependents who are living in New Jersey shall be regarded as residents of the state for tuition purposes.

Military personnel stationed in New Jersey or in another state, and living in another state, must show the requisite intention of abandoning their original domicile and establishing a new domicile in New Jersey.

Financial Aid

The Office of Financial Aid provides counseling and administers loans, scholarships and grants to qualified students. Federal and state programs, private, industrial and university resources are utilized to support the university's financial aid programs. Approximately 75% of the students receive some source of financial assistance.

A pamphlet giving complete information on state, federal, and university financial aid is available. The pamphlet describes the various forms of aid and lists donors and other sources of scholarship funds.

Financial aid applicants and/or their families have a responsibility to contribute to the cost of their education. Financial aid attempts to fill the gap between the total family contribution and the yearly cost of education.

Most financial aid awards are based on demonstrated financial need, which is the difference between educational expenses (tuition, fees, books, supplies, room, board, and miscellaneous expenses) and the amount the student and family can contribute to his/her education.

Eligibility

Applicants for financial assistance must be enrolled in a degree or certificate program and carry at least six credits. For most programs, applicants must be citizens or permanent residents of the United States. Students with F-1 visas are eligible for deferred payments, Student Senate Loans, and a limited amount of institutional work study. All eligible applicants must meet the university's criteria for satisfactory academic progress.

Personal Resources

The concept of need analysis is used to determine the amount of support each family should contribute toward the student's education. The family contribution is calculated from the financial data on the New Jersey Financial Aid Form (NJFAF). The family contribution includes both the parents' and student's contribution.

How to Apply

1. Contact the Office of Financial Aid for appropriate forms.
2. Review Financial Aid Handbook available in the Office of Financial Aid. Consult handbook calendar for deadlines.
3. Submit a Financial Aid Form (FAF) to the College Scholarship Service, Princeton, NJ 08540. New Jersey residents should submit a New Jersey Financial Aid Form (NJFAF).
4. Submit to the Office of Financial Aid:
   - In-house application
   - Documentation of the family's income as reported on FAF
   - Proof of citizenship (permanent residents only)
   - NJIT Verification Statement
   - Student profile

NOTES: Educational Opportunity Program—Students must also contact the Director of the Educational Opportunity Program. Transfer students must submit transcript(s) from previous college(s). Additional documents and/or personal interview may be requested by the financial aid office.

Payment of Awards

Tuition, fees and/or room and board are deducted from the student's financial aid. If there is a balance, a refund check will be issued. It is the student's responsibility to arrange payment for all other university bills. Failure to comply will result in a hold on registration for the following semester.

- Financial aid awards are divided into two semester payments.
- Financial aid refunds are issued after the ninth week of the semester.
- Federal, state or university aid is used for educational expenses only.
- Tuition may be paid by MasterCard or VISA.

Refund Policy

Refunds of federal financial aid are processed in accordance with federal guidelines. Title IV overpayments are allocated to Carl D. Perkins Loans, Supplemental Education Opportunity Grants, and Pell Grants. To receive all financial aid for indirect costs, students must be attending NJIT after the ninth week of the semester.

- Full-time students are eligible for refunds at the end of the fifth week.
- Pell Grants are adjusted according to full-time and part-time status at the end of the fifth week.
- Exceptions: Stafford Loans are awarded if a student is carrying six or more credits at the end of the fifth week. Outside scholarships will be handled on an individual basis.

Deferred Payments

Students who lack the funds necessary to meet the semester payment by the due date may arrange for a deferred payment in the finance office. One-half of the total tuition and fees must be paid at registration and the balance may be deferred until the mid-point of the semester. There is a $25 processing charge and 5 percent interest on overdue payments.

Verification

Federal regulations now require that every financial aid application be reviewed through a verification process. Applicants must provide the Office of Financial Aid with the appropriate documents before a disbursement of funds can be made. In some cases, such as Stafford loans, verification must be completed prior to processing an application for financial aid. Students who do not submit the required information may not receive financial aid. For further information contact the director of financial aid.

Student Employment

Students complete an application for on-campus employment with the Office of Career Counseling and Placement located in Cullimore Hall, Room 212. U.S. Citizens and Permanent Residents wishing to work through the College Workstudy Program must complete a Financial Aid Form (FAF) and an NJIT in-house Financial Aid Application Form available from the Office of Financial Aid, Cullimore Hall, Room 115.

Academic Progress Policy

New Jersey Institute of Technology requires that students maintain satisfactory progress in working toward a degree. Federal and state regulations governing financial aid require that students receiving aid from government agencies must meet academic performance and progress requirements defined by the university and approved by the appropriate government agencies. Consequently, students who do not meet the academic progress requirements may become ineligible for financial aid including grants, scholarships, loans, and work-study funds. The financial aid office reviews each student's eligibility on an annual basis. Full- or part-time status for the purposes of financial aid is determined at the time of admission. Students who change their status must inform the director of financial aid. Students should consult the Financial Aid Handbook available in the Office of Financial Aid for eligibility requirements.

■ NJIT Scholarships, Awards and Loans

A list of the numerous scholarships, awards and loans available to NJIT students may be obtained from the Office of Financial Aid. Most scholarship funds are provided by designated or undesignated annual gifts and the proceeds from endowments and are generally based on financial need.

Departmental Scholarships and Awards are provided to students in many different disciplines. Individuals, corporations and associations provide the funds for many of the scholarships and awards.

Additional Corporate and Private Scholarships are available to students who qualify based on donor stipulation.

Minority Scholarships provide various awards to those students who have excelled academically and demonstrate need.

Loan Funds are derived from gifts to the university which have been designated for loans to students. Eligible applicants must be in good academic standing, demonstrate evidence that they will graduate from NJIT, and show that they need the loan for the purpose of meeting educational expenses. Loans are repayable after graduation at a low interest rate. Failure to meet the agreed repayment schedule can result in additional charges.

Presidential Scholarships provide tuition remission and special recognition to freshmen and are based on high school grades, rank in class, and standardized test scores. Full tuition remission is provided for in-state students. Half tuition remission is provided for out-of-state students. No special application is required.

Honors Scholarships provide $1,300 per year to students accepted into the university Honors Program.

Newark Scholarships provide fall tuition remission to entering freshmen who are graduates of the Newark City school system and have met certain academic criteria. No special application is required.

■ Alumni Association Scholarships

These scholarships are awarded to undergraduate students who achieve academically and demonstrate financial need. Many of the scholarships are for students enrolled in the programs of Newark College of Engineering.

■ Government Scholarships, Grants and Loans

Carl D. Perkins Loans Undergraduates or graduates who are U.S. citizens, permanent residents, or refugees and who can demonstrate need are eligible. The average loan per year is $400; however, a student with documented dadditional need can receive up to $2,000. No interest accrues while the student is in attendance and is carrying at least six credits. Repayment of the loan commences six months after graduation or if the student withdraws from school.

Stafford Loans permit students to borrow directly from a participating lending institution. The loan is guaranteed by a state or private nonprofit agency and is insured by the federal government. Students may borrow according to the following schedule: first and second years of undergraduate study, $2,625 per year; third and fourth years of undergraduate study, $4,000 per year; aggregate Stafford limits for undergraduates, $17,250.

***Garden State Scholarships (GSS)** are awarded to students who demonstrate high academic achievement based upon their high school records and Scholastic Aptitude Test scores. State funds are made available to New Jersey institutions that identify qualified students to receive the awards.

Garden State Distinguished Scholars Program awards $1,000 to New Jersey residents based on their outstanding record of achievement in high school. Students must be enrolled full-time in an eligible New Jersey institution of higher education.

Government Grants

The following grants are renewable for up to four years and may be received for five years if the student is in an approved five-year undergraduate program.

Pell Grants Pell grants range from $210 to $2,400 per year, depending on eligibility as determined and expressed by a standard formula by the federal Department of Education. The amounts of the grants differ in value based on the student's index number shown on the Student Aid Report (SAR) and the cost to attend the college.

Supplemental Education Opportunity Grants (SEOG) These grants are made to undergraduate students with financial need who would be unable to continue their education without the grant.

**Tuition Aid Grants (TAG)* Students must be full-time undergraduates at a New Jersey college. They must have demonstrated financial need and be legal residents of New Jersey for at least 12 consecutive months immediately prior to the beginning of the term for which aid is requested. Grants have a value from $400 to $3,360.

**Educational Opportunity Funds Grants (EOF)* Full-time students from educationally and economically disadvantaged backgrounds who meet income guidelines set by the state may be eligible for EOF grants. Students must be legal residents of New Jersey for at least 12 consecutive months immediately prior to the beginning of the term for which aid is requested. Generally, family contribution toward the cost of attending college cannot exceed $625. Undergraduate grants range from $550 to $1,000 per year. Graduate grants are $2,500 per year maximum. Grants are renewable subject to continued eligibility.

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*For all state programs (GSS, TAG, EOF), a student must be a full-time undergraduate at a New Jersey college or university, must demonstrate financial need, and must be a legal resident of New Jersey for 12 months prior to the beginning of the term for which aid is requested.

Academic Policies and Procedures

Registration

NJIT has an advance registration system. This places an obligation upon all students currently enrolled in degree-granting departments to preregister for their courses. Registration is required each semester.

NEW STUDENTS will be informed of registration procedures by the Office of Undergraduate Admission.

CURRENTLY ENROLLED STUDENTS will be informed of advance registration details by the Registrar's Office.

READMITTED STUDENTS will be informed of registration procedures by the Registrar's Office after being granted permission to register by the Office of Undergraduate Admission.

Registration by an undergraduate student is not considered complete until all financial obligations have been satisfied or appropriate arrangements made with the finance office. Students are not permitted to register for a portion of a course but must register and pay tuition for the entire course.

*Registration at Another College

Students in good standing at NJIT wishing to take courses at a college or university other than those included in the cross-registration program must:

1. Obtain "Approval for Courses at other Colleges" form from the Registrar's Office.
2. Obtain approval from the NJIT department giving the comparable course prior to enrolling in the course. Be prepared to show the department advisor a catalog description of the course(s) you intend to take.
3. Have the form countersigned by the Registrar and retain one copy. Registrar will retain original and send a copy to the NJIT department involved.
4. Take the copy to host college and follow their registration procedure.
5. Upon completion of the course(s), arrange to have an official transcript sent to the Registrar, NJIT. Upon receipt, your NJIT grade record will be updated, provided that your grade is a "C" or higher.

*Exclusive of cross-registration at Rutgers—NCAS, Essex County College, University of Medicine and Dentistry of New Jersey.

Full-Time Status

Full-time status will be accorded only to students enrolled for 12 or more credits.

Credits That Must Be Taken At NJIT

Students transferring to New Jersey Institute of Technology must take at least 33 credits in upper division courses approved by the department of their major study to be eligible for graduation.

Cross-Registration Policy

NJIT students may take advantage of the cross-registration system in place at the four cooperating institutions located in the University Heights section of Newark (NJIT, Rutgers University-Newark Campus, the University of Medicine and Dentistry of New Jersey, and Essex County College). Through cross-registration, NJIT students can register for courses in art, history, music, philosophy, foreign languages, the social and behavioral sciences, biology, etc. offered by participating institutions. Except in the case of Rutgers-Newark courses listed in the NJIT course bulletin, permission must be obtained from departmental representatives. Specific procedures for cross-registration are detailed in the semester course bulletin published by the Registrar's Office.

Cross-Registration Procedures

Students should consult the registration bulletin for current information on cross-registration procedures.

Cross-Registration Procedures for Summer Students

The above procedure applies only to day undergraduate courses. For summer courses, a form entitled "Permission to Take Courses at Other Colleges" should be processed through the Registrar's Office and the student must pay the applicable tuition to the host school.

Transfer Credit

Transfer credit may be awarded at the time of admission for courses which are equivalent to those offered by NJIT. A minimum grade of "C" must be earned in the course in order to receive transfer credit. All transfer credit must be documented by an official transcript issued by the school where the course was completed. Students who have attended foreign institutions of higher education must also submit an evaluation of their work made by World Educational Services Inc. or another approved service. Further information regarding evaluations may be obtained from the Office of Undergraduate Admission.

Students may request additional transfer credit by completing a Request for Transfer Credit form and submitting it to the Registrar's Office along with the appropriate documentation.

Course Additions

Students who add a course to their program will be charged the full tuition and fee for the course added. If, within the first five class days of the semester, students change their schedule, they must fill out a schedule change form, present it to the Registrar, and pay a schedule change fee.

Courses cannot be added after the fifth day of the semester. Students attending courses for which they are not properly registered will not receive credit for such courses.

Auditing A Course

Students who wish to audit a course must state their intention to do so at the time of registration. A change to auditor status is not permitted once a semester has begun. Students who audit a course will be required to pay the full tuition and fees for the course audited.

Withdrawal from Course(s)

Students who wish to withdraw from one or more courses may do so without penalty by completing and submitting a Schedule Change Form to the Registrar's Office by the end of the ninth week of the semester. This form requires the signature of the instructor(s). It is available at the Registrar's Office. Failure to submit this form to the Registrar by the deadline will result in a final grade other than "W".

Withdrawal from NJIT

Students wishing to withdraw entirely from the university may do so without penalty by the end of the ninth week of the semester. A Schedule Change Form must be completed and submitted to the Registrar by this deadline. Failure to do so will result in grades other than "W".

Readmission

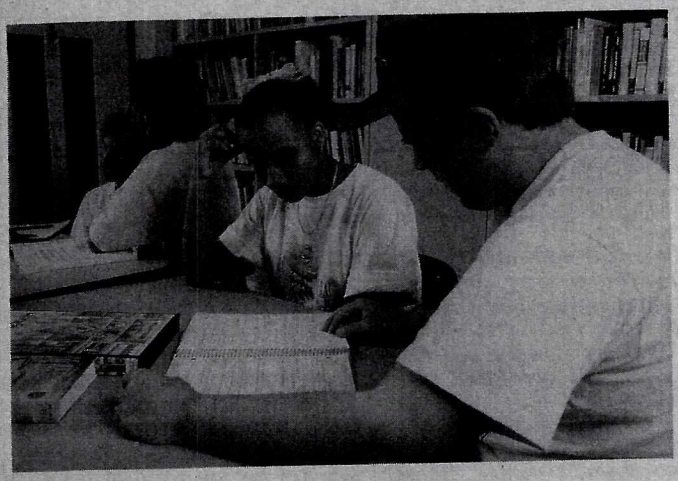
Students seeking readmission must apply to the Office of Undergraduate Admission. Applications must be accompanied by a nonrefundable fee of $25 and received by:

For the fall semester	June 1
For the spring semester	November 1
For the summer session	April 1

Applicants will be informed of their readmission status by the Office of Undergraduate Admission. Those who are advised of acceptance for readmission will be sent registration instructions by the Registrar.

Course Cancellations

Courses may be cancelled at the discretion of the university. Course cancellations will be posted outside the Registrar's Office.



Basic Skills

New Jersey Institute of Technology places prime importance on its students' ability to use language to communicate ideas and information. The capacity to express well what has been learned in a course is an essential component of that course, and so the university requires students to master the verbal skills necessary for writing and speaking clear, correct English. Appropriate remedial work may be assigned to students who are unable to demonstrate the mastery of these skills. To the extent appropriate to the course, instructors in all disciplines stress the importance of writing and speaking ability.

English as a Second Language

Students whose first language is not English and/or whose English proficiency is limited will be required to take a special examination in English. Students unable to meet the minimum standard of the examination will be required to take Eng 096, 097 during their first year. Tutoring may also be required. Such students will not be permitted to enroll in Eng 111 or Hum 112 until they have achieved satisfactory grades in Eng 096, 097.

Freshman and Transfer Testing

After being accepted to NJIT, but prior to registration, all entering freshmen are required by the State Board of Higher Education to take the New Jersey College Basic Skills Placement Test. In addition to this test of reading, writing, and mathematics, NJIT requires two more exams in mathematics and chemistry. Transfer students who do not receive transfer credit for first freshman courses in English, mathematics and chemistry are required to take these placement tests also. All testing is held at NJIT; no fee is charged.

The results of the placement tests do not affect a student's admission to the university. The information is used only to make decisions about the kind of courses a student is prepared to take at NJIT.

Additive Credit Courses

Additive credit cannot be used to satisfy degree graduation requirements in any curriculum. Courses with additive credit are listed on the transcript and factored into the calculation of cumulative credits and the cumulative grade point average (GPA). Courses carrying additive credit include physical education courses and basic skills courses in English and mathematics (e.g. Eng 098). In some cases, the first course in the developmental sequence in freshman physics and chemistry (e.g. Chem 111) and cooperative education courses (e.g. EET 395) are taken for additive credit.

Professional Skills Examinations

In order to maintain accreditation of its programs, NJIT actively participates in programs that assure the quality of education in all undergraduate majors. In some cases, this participation requires students to prepare and sit for professional examinations. In other cases, NJIT students are required to sit for state-wide examinations, especially during the sophomore and senior years. Since these examinations carry no credit, they are not specifically listed in the major curricula listed elsewhere in this catalog. Nonetheless, these proficiency examinations are part of degree requirements, and students selected to participate in such examinations are required to take them.

Academic Standing

Grades

The following grades will be used:

GRADE	SIGNIFICANCE
A	Superior
B+	Excellent
B	Very Good
C+	Good
C	Acceptable
D	Minimum
F	Inadequate
AUD	Audit
INC	Grade deferred—given in rare instances to students who would normally have completed the course work but who could not do so because of special circumstances. If this grade is not removed during the next regular semester, a grade of F will result. Once a grade of F has been issued, it cannot be changed. The course must be repeated.
W	Withdrawn
S	Satisfactory
U	Unsatisfactory

Grade Reports The Registrar mails a grade report to students at the end of each semester.

Undergraduate Course Repetition Policy

Courses numbered between 100 and 299 (Lower Division Courses)

A student may repeat any course numbered between 100 and 299 an unlimited number of times. Only the highest of the grades obtained in the original and first repeat will be counted in a student's overall GPA. In second and subsequent repeats of a course, all grades received will be averaged with the highest of the first two grades in a student's overall GPA.

Courses numbered 300 and above (Upper Division Courses)

Students may repeat any course numbered 300 or above an unlimited number of times; however, all grades received shall be included in the computation of the overall GPA.

Credit by Examination

Examinations to earn credit are available in certain courses. Students who believe they have the background covered in a given course should consult with their advisor and the department offering the course to see whether an examination is offered. To receive credit by examination, a student must perform at a level equivalent to a grade of "C" in the course. Students who have failed or attempted a course at NJIT may not take an examination for credit in that course. A fee of $35 will be charged for the examination.

Dean's List

Students matriculated in a regular program can qualify for academic honors at the end of the fall and spring semesters if they have completed 12 or more credits in the semester, achieved a GPA of 3.00 or better in the semester, and have no incomplete grades or any grade lower than a "C" in the semester.

Transcript of Grades

Students who wish to obtain a transcript issued on their behalf must submit a request in writing to the Registrar. Written transcript requests must be accompanied by a fee for each copy of $3. Please allow 10 days to process the request. Transcripts will not be issued to or on behalf of a student with outstanding financial obligation to the university. Official transcripts bearing the university's raised seal will be issued only to other educational institutions, government agencies, or employers. Under no circumstances will official transcripts be issued to students.

Graduation

New Jersey Institute of Technology is authorized to grant degrees by the New Jersey State Board of Higher Education.

Each degree is certified by a diploma bearing the university seal and the signatures of officers of the university.

Candidates for graduation who satisfactorily complete a regular undergraduate program receive the bachelor's degree in the program pursued.

Each prospective candidate for any degree must file an Application for Candidacy on or before the deadline date set by the university.

In order to graduate, students must attain a grade point average of 2.0 in all the courses listed in the catalog as being required in the appropriate curriculum. They must also earn a GPA of 2.0 in the upper division course requirements of their major.

Candidates for any degree granted by the university shall appear in person upon the appointed commencement day to receive the degree, unless excused by the president.

Graduation with Academic Honors

The academic honors of cum laude (GPA of 3.40-3.64), magna cum laude (GPA of 3.65-3.84), and summa cum laude (GPA of 3.85-4.00) are awarded to qualified students at graduation. Cumulative GPAs are rounded to the nearest two decimal places.

Extenuating Circumstances

Students should bring to the attention of the Dean of Student Services or the chairperson of his/her professional department either directly or through his/her advisor any extenuating circumstances which may adversely affect his/her academic standing. This action should be taken as soon as such circumstances develop.

Academic Standing/Probation

Students are required to maintain a GPA of 2.0. Students who earn a GPA of less than 2.0 in their most recent semester will be placed in the academic status termed "probation." Probationary status will be removed when the cumulative GPA is raised to 2.0.

Academic Suspension

The academic record of students will be reviewed by the Committee on Academic Standing, and students will be subject to suspension from the university whenever they have been placed on probation for two successive semesters or earn a GPA of less than 1.5 in their most recent semester.

When the record of a student has been reviewed, the Committee on Academic Standing may: assign the academic status of "probation"; suspend the student from the university; stipulate specific requirements which the student will be obliged to fulfill in order to retain the privilege of initiating or maintaining registration in any following semester.

Appeals

Decisions relating to a student's status are made in accordance with regulations approved by faculty. Students are afforded a right of appeal against adverse decisions and should consult with the Office of Student Services within five days of receiving notice of the decision being appealed.

Appeals will be heard by the Committee on Student Appeals, whose decision is final. The decision of the Committee will be communicated in writing to the student within 15 days of the hearing.

Students wishing to appeal should prepare a letter stating accurately and completely the decision being appealed, noting when it was taken, by whom, etc., and clearly but succinctly stating the reason for feeling that justice has not been fully served. Transcripts, test scores and other information which form part of the student's record will also be distributed to the committee members for their consideration.

Reinstatement after Academic Suspension

Students who are suspended from the university may apply for reinstatement after a lapse of at least one regular semester. Students may apply for reinstatement on an application form obtainable from the Office of Admission.

Such applications must be submitted to the Office of Admission according to the schedule governing readmission.

Courses taken at another college while a student is under academic suspension at NJIT will be counted only as transfer credits. Students are strongly urged to consult with an NJIT department advisor before registering for courses at other institutions.

Degree Options

Double Major

Qualified students whose career plans make such study appropriate may be granted permission to major in two disciplines. Written approval of the proposed curriculum by the chair of the two departments, subject to the review and authorization of the appropriate dean(s), must be obtained by the student. The candidate for the double major must fulfill all requirements for both degree programs.

Two Baccalaureate Degrees

Qualified students whose special interests and career plans make such study appropriate may be granted permission to earn two undergraduate baccalaureate degrees.

Written approval to undertake this curriculum must be obtained from each of the departments involved and the dean(s) of the appropriate college(s). In addition to meeting all general university requirements, the candidate for two degrees must earn at least 30 credits more than is required for either degree and must fulfill all requirements of the two degree programs. Normally this requires five years of study.

B.S./M.S. Program

Students may apply for admission to enter the special program which normally leads to a Master of Science and Bachelor of Science degree at the end of their fifth year. Students accepted into the program will substitute six graduate credits for two departmental undergraduate courses and/or technical electives. (The courses for which the graduate courses substitute are specified by the department offering the master's degree.) Students will typically take 24 more graduate credits to complete the requirement for the M.S. degree. The advantages of this program over the regular M.S. program are that students may start their M.S. work in their senior year, and that they typically need only 24 credits after completion of the credits required for the B.S. degree as opposed to 30 credits for a regular M.S. student. Students entering the master's portion of the B.S./M.S. program on a full-time basis will be eligible for graduate student financial support. Further support can be available for continuation beyond the master's degree into a doctoral program.

Students may, if they choose, receive the B.S. degree separately after all the requirements for that degree have been completed.

B.S./M.D. and B.S./D.M.D. Options

Students accepted into a special accelerated joint degree program may pursue the B.S./M.D. (medical) or B.S./D.M.D. (dental) options in engineering science. For information about admission to these programs, see page **00.**

Minors

Students wishing to earn minors are responsible for registering their intent with the Registrar's Office by the semester preceding graduation. They must fill out a special minors form which is available from, and should be returned to, the Registrar's Office. Following certification by the minor-granting department, division, or degree program, designation of the minor will appear on a student's academic transcript. Minors require a minimum of 18 credits, at least half of which are earned in upper division courses (300 or higher). At least half of the credits for a minor must be earned in courses taken at NJIT. No minor may be earned by a student in the same department or area of specialization as that student's major (e.g., an actuarial science major may not take a minor in applied mathematics).

A student who has already graduated from NJIT may earn a minor by completing all requirements for the minor within two years of graduation. However, all credits to complete the minor after graduation must be taken at NJIT.

At present, NJIT offers minors in the following areas: applied mathematics; chemistry; communication arts; computering engineering; computer science; drama/theatre; economics; finance; history; human resources management; information systems; literature; management; manufacturing engineering; marketing; physics; science, technology and society; scientific computing and statistics.

Rights and Responsibilities

Standards of Conduct

New Jersey Institute of Technology requires students to conduct themselves with decorum and to adhere to high standards of ethical and professional behavior. The university has adopted and requires all students to comply with a "Code of Professional Conduct." The policies and procedures governing this code are contained in a separate publication, Log NJIT, and are deemed incorporated into this catalog. A copy of Log NJIT is supplied to all new students and may be obtained from the Office of the Dean of Student Services.

Family Educational Rights and Privacy Act

The Federal Family Educational Rights and Privacy Act of 1974 gives students the right to inspect educational records maintained about them by the university, the right to a hearing to challenge the contents of these records, and the right to make explanation for challenged information. The law also requires the university to maintain the confidentiality of student records except with respect to special cases noted in the legislation.

The Registrar of New Jersey Institute of Technology is responsible for student records. Educational records include transcripts, admission files, and registration forms. Students wishing to review their files must make a written request to the Registrar listing the items of interest. Student health records are maintained by the Director of Health Services and may be examined only by a health professional of the student's choice. Files covered by the Act will be made available within 45 days of the request. Students may have copies made of their records at their own expense at reasonable rates to be determined by the records custodian. A catalog of educational records maintained by the university is available from the Registrar. Exceptions to the right of inspection include financial aid records and records of institutional, supervisory and administrative personnel, and educational personnel ancillary thereto, which are in the sole possession of the maker.

Within the university community, only those members acting in the student's interest are allowed access to student files. These include personnel in the Registrar's, Admission, Student Services, and Finance offices; and academic personnel within the limitations of their need to know.

With the exceptions stated in the Act, no one outside the university shall have access to a particular student's educational record without the written consent of the student, except in extraordinary circumstances such as emergencies. Accrediting agencies carrying out their accrediting function and certain state and federal officials are permitted access. A record of, and reasons for, granting access will be kept by the university and will be available to the student.

The university at its discretion may provide directory information, in accordance with the provisions of the Act, to include: the student's name, address, telephone listing, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, class schedule, degrees and awards received, and the most recent previous educational agency or institution attended by the student. Students who desire directory information to be withheld should notify the Registrar in writing within the first two weeks of initial registration.

Request for non-disclosure will be honored by the univerity for ONLY ONE ACADEMIC YEAR. Therefore, authorization to withhold directory information must be filed annually in the Office of the Registrar.

Students who disagree with an entry should attempt to resolve the question with the Office of the Registrar. Failing this, either the school or the student may request a formal hearing. In accordance with the Act's requirements, the hearing will be held within 30 days of the request, and will be conducted by a school official or other person without a direct interest in the outcome. Students will be given a full and fair opportunity to present relevant evidence and to provide their own counsel.

Students may include a written statement in their file explaining a disputed entry following an unfavorable determination of an appeal. A written decision will be rendered within 15 working days after the hearing of an appeal.

Students who believe that the adjudication of their challenge was unfair or contrary to the provisions of the Act may request, in writing, assistance from the President of the university. Further, students who believe that their rights have been abridged may file complaints with the appropriate federal agency.

Affirmative Action

NJIT does not discriminate on the basis of sex, race, age, religion, natural origin or handicap in its educational programs, activities, or employment policies. The university has committed itself to a program of affirmative action and is in compliance with Title IX. For information about affirmative action at NJIT, contact the director of affirmative action.

Drug Abuse Prevention Program

New Jersey Institute of Technology discourages the use of illegal drugs. University policy concerning possession and consumption of alcoholic beverages on campus subscribes to strict enforcement of the laws of the State of New Jersey and the City of Newark. In addition, the policy stipulates that any consumption must occur within a responsible social framework wherein beverages are not the focus of the event.

Students with drug and alcohol abuse problems should be aware that they can receive information, counseling and referral assistance from the Office of the Dean of Student Services, the Counseling Center, the Health Services Office, or the Stop-In Center.

In addition, a series of educational programs focused on the areas of drug and alcohol information and substance abuse prevention are offered by the university through the Division of Student Services. Individual and group counseling is available on-campus, arranged through the Counseling Center. Referrals are made to off-campus facilities and organizations as needed.

Drug-Free Workplace Policy Statement

New Jersey Institute of Technology is committed to maintaining a drug-free workplace in compliance with applicable laws. The university is further committed both to rigorous enforcement of applicable laws and policies and to support for those trying to cope with drug-related problems. The unlawful possession, use, distribution, dispensation, sale or manufacture of controlled substances is prohibited on university premises. Any NJIT employee determined to have violated this policy or engaged in drug-related problems which impacts on the workplace may be subject to disciplinary action up to and including termination. At the discretion of the university, any employee convicted of a drug offense involving the workplace shall be subject to employee discipline (up to and including termination) and/or required to satisfactorily complete a drug rehabilitation program as a condition of continued employment.

The illegal use of controlled substances can seriously injure the health of employees, adversely impact the performance of their responsibilities, and endanger the safety and well-being of fellow employees, students, and members of the general public. Therefore, the university urges employees engaged in the illegal use of controlled substances to seek professional advice and treatment. Anyone who is employed at NJIT who has a drug problem is encouraged to contact the Director of Human Resources, who will assist in obtaining available treatment. Employees engaged in contracts with the U.S. Department of Defense are additionally subject to Department of Defense requirements and may be required to submit to tests for the illegal use of controlled substances.

As a condition of employment, an employee of NJIT will notify his/her supervisor if he or she is convicted of a criminal drug offense involving the workplace within five days of the conviction. In the event any such conviction involves an employee working on a federal contract or grant, the university will notify the granting or contracting federal agency within ten days of receiving notice of a conviction. A copy of this statement shall be given to all employees.

This statement and its requirements are promulgated in accordance with the requirements of the Drug-Free Workplace Act of 1988 enacted by the United States Congress. The university will continue its efforts to maintain a drug-free environment by adhering to the above policy and by providing ongoing drug awareness programs.

Academic Programs

Honors Courses

Special honors courses are offered to well-qualified students. An honors course typically covers in greater depth the content of the regular course it replaces. In the first two years, honors courses are available in chemistry, computer science, humanities, psychology, economics, engineering, general social science, mathematics, and physics. Students are invited to participate on the basis of their high school records and standardized test scores.

In their junior and senior year, students with outstanding college performance may elect a variety of honors courses. In certain cases, qualified students may elect to substitute graduate courses for courses in the regular undergraduate program.

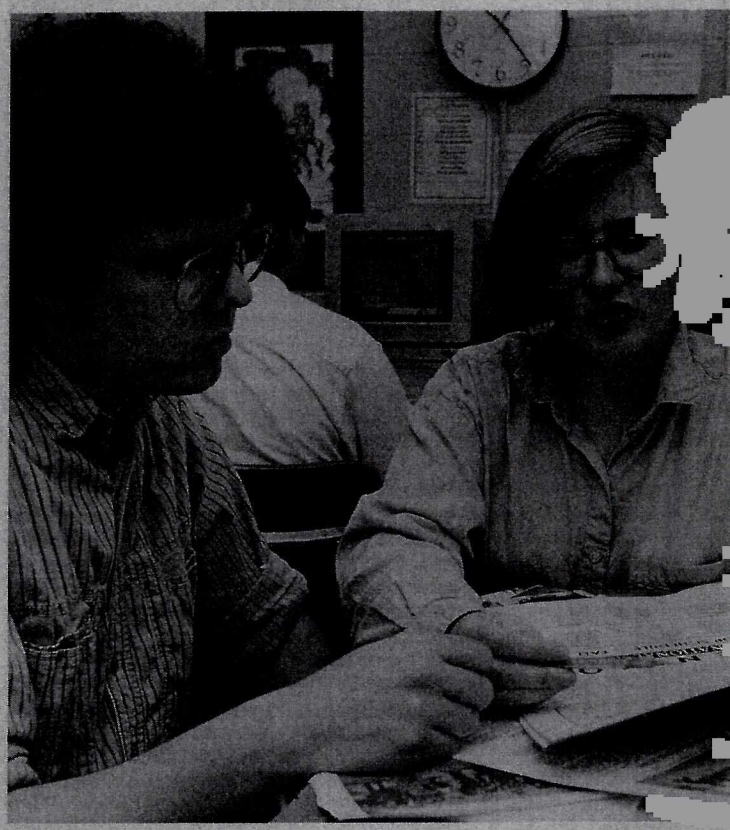
Honors courses are listed in Courses of Instruction later in this catalog and are designated by an "H" following the course number. Interested students should consult with the department offering the honors courses.

Honors Program

Since its inception in 1985, the NJIT Honors Program has emerged as one of the nation's leaders in technologically oriented honors education. With approximately 160 students, drawn from more than a dozen countries and from every degree program offered at NJIT, the Honors Program strives to set a standard of excellence for the entire university. Graduates of the program are currently employed by leading technological corporations such as IBM, AT&T, and Procter & Gamble; others are pursuing graduate degrees at prestigious universities including Stanford, Cornell, Columbia, University of Pennsylvania, University of Michigan, University of Minnesota, Washington University, and Rensselaer Polytechnic Institute. The NJIT Honors Program is a member of the National Collegiate Honors Council (NCHC) and its northeast regional affiliate, and regularly participates in conferences and special events sponsored by those organizations.

The Honors Program provides outstanding students with unique opportunities for academic growth, including participation in a non-credit honors colloquium series featuring trips, lectures, presentations, and discussions on a wide variety of topics; automatic acceptance into the B.S./M.S. Internship Program; eligibility for the Environmental Scholars Program and the accelerated B.S./M.D. (medical) and B.S./D.M.D. (dental) programs; and opportunities to take graduate-level courses and to work on advanced research projects and theses. During their first two years all honors students earn a specified number of credits in honors courses. Upper division students register for at least two honors courses or seminars in humanities, management, and STS (science, technology and society), while fulfilling the specific requirements for honors in their major fields of study. A grade point average of at least 3.2 must be maintained (3.0 during the freshman year). Students who successfully complete this rigorous program of study graduate with the distinction of "Honors."

In addition to opportunities for academic excellence and acceleration, and the satisfaction of belonging to a select community of scholars, honors students enjoy a number of benefits and privileges. These include exclusive use of the centrally located Honors Center (lounge and advanced computer facilities); guaranteed space in the residence hall for the duration of the student's degree program;



assignment to an honors freshman faculty advisor; opportunities to participate in service activities designed to enrich the lives of less fortunate members of the surrounding community; and an annual merit award of at least $1,300 regardless of financial need. Other merit awards for which honors students are eligible include Presidential (tuition) and Residential (room and board) Scholarships; the Bauder Scholarships; the Garfield Scholarships; New Jersey Bell Scholarships; Allied-Signal Scholarships; the Robbins-Baiano Scholarship; the Linkletter Scholarship; the Longo Scholarship; the Cavenaugh Scholarship; special scholarships for students majoring in Mechanical Engineering, Civil Engineering, and Statistics and Actuarial Science; and several alumni scholarships.

Admission to the Honors Program is highly selective. Most successful applicants rank in the top 10 percent of their graduating high school class, with SAT scores over 1250 and strong records of achievement in activities and organizations with which they are affiliated. A personal interview with the program director is required. Qualified students may be invited to take placement tests on a special honors testing date in March, and it is strongly recommended that they do so. Although there is no separate application for admission to the Honors Program, candidates are advised to apply to NJIT early in the senior year and to contact the Honors Program directly regarding their interest. A limited number of spaces are available for students entering the sophomore year of study, but upper division and transfer students are not normally eligible for admission. For further information contact the director of the Honors Program or the Office of Undergraduate Admission.

Educational Opportunity Program

The Educational Opportunity Program provides special academic and financial assistance for students who come from economically and educationally disadvantaged backgrounds. The EOP begins with a program of intensive study during the summer preceding the freshman year to prepare students for any of the various programs offered in the day schedule. It also provides scholarship support and tutorial and counseling services. Further information may be obtained from the director of the Educational Opportunity Program.

Freshman Studies

The Office of the Dean of Freshman Studies was established in 1990 to assure the successful education of all first year and "newly-arrived" transfer students. The Dean coordinates the Freshman Seminar, Freshman Faculty Advising and Early Academic Warning program and will also be responsible for the proposed office of Academic Advising. The Dean works closely with faculty and students to resolve and clarify any academic concerns/issues which may occur. For further information, contact the Dean of Freshman Studies.

Pre-Professional Programs

Law

While students desiring a professional legal career may apply to law school with any NJIT undergraduate major, the science and technology policy (pre-law) area of specialization of the Science, Technology and Society (STS) major is particularly appropriate. With flexible requirements and access to relevant courses at both NJIT and Rutgers-Newark, STS provides a strong undergraduate preparation for law school and a career in law. For more information, contact the director of the STS program.

Medicine and Dentistry

NJIT offers several tracks for students interested in attending medical or dental school after graduating from NJIT.

Students admitted into a special accelerated joint degree program may pursue the B.S./M.D. (medical) or B.S./D.M.D. (dental) options in engineering science. Offered in cooperation with the nearby New Jersey Medical School and New Jersey Dental School of the University of Medicine and Dentistry of New Jersey, these options allow students to earn both the B.S. in Engineering Science and M.D. or D.M.D. degrees after seven years of study.

In addition, a focused, four-year premedical/predental option in engineering science is offered to students who are interested in applying to medical or dental school after completing a four-year bachelor's degree at NJIT.

Details on these programs appear in the description of the engineering science program in the catalog.

For students wishing to prepare for medical or dental school in a program that combines science and technology with the broader perspective of the humanities and social sciences, the Science, Technology and Society major offers an area of specialization in Medicine and Society. Students pursuing bachelor's degrees in other fields should earn at least the following credit hours beyond the General University Requirements if application to medical or dental school is anticipated: at least 16 credits of course work in chemistry, including Chem 343 and Chem 344 (organic chemistry); 8 credits of course work in physics; and 12 credits of course work in biology (biology courses may be conveniently taken at Rutgers-Newark).

For further information on preparation for careers in medicine and dentistry, contact the advisor for premedical and predental studies in the Department of Chemical Engineering, Chemistry, and Environmental Science.

Aerospace Studies

A commission as a Second Lieutenant in the United States Air Force may be available to the student who completes the Aerospace Studies option through the Air Force Reserve Officer Training Corps (AFROTC) program on campus. Students in any bachelor's or master's degree program may pursue this option in conjunction with their normal academic studies. Additionally, students who are undecided about pursuing a career as an Air Force officer may take these courses to fill electives under Special Student status with department approval (generally AS 100 and 200 level courses only).

Students who seek a commission may participate in programs ranging from four to two years in length, with special one-year programs available for certain degree programs. The four-year program, most comprehensive, consists of four academic years of AFROTC classes. The courses taken include AS 111 and 112, introductory courses which explore the mission and organizational structure of the US Air Force; AS 221 and 222, the study of the evolution of air power from its earliest beginnings through the present, emphasizing historical events and their impact on the development and deployment of air power; AS 333 and 334, the study of the concepts and skills required by the successful manager and leader, focusing on organizational and personal ethics, communicative skills, and managerial strategy viewed in the context of the military; and AS 443 and 444, a survey of a broad range of topics concerning American civil and military relations and the environment in which U.S. defense policy is formulated, including the role of the professional officer in a democratic society, the requisites for maintaining adequate national security forces, and a special study of military justice and its effect on citizenship.

The four-year program has a field training requirement of four weeks. Programs of less than four years in length require a six-week field training session. During field training, which occurs the summer between the sophomore and junior years, students are placed in a variety of leadership positions and given the opportunity to demonstrate their leadership, managerial, organizational, and physical skills. Upon returning to school for a fall semester, the students resume their Aerospace studies with AS 333, followed by AS 334, 443, and 444 as described above.

Evening Study

All undergraduate degree programs, with the exception of architecture, are also available for part-time evening study. Evening undergraduate students can carry up to half of the full-time course load, and hence require longer to complete a degree.

Degree requirements for evening students may vary slightly from those shown for full-time day students. To learn specific degree requirements for the year in which they plan to graduate, evening students should consult with the assigned advisor in their major field.

Not all courses required for a degree are offered every year in the evening, and the selection of electives is limited. Evening students should consult the Schedule of Evening Courses and are advised to plan their program of study a year in advance. Careful planning and consultation with the advisor will avoid unnecessary delays.

Engineering

Both day and evening programs in chemical, civil, electrical, industrial, and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET). New degree programs in manufacturing engineering and computer engineering are now being offered and will be eligible for accreditation in the future. In addition, there is an engineering science program that may seek accreditation in the future.

Each curriculum is sufficiently broad to permit a graduate to enter the engineering profession immediately, or to continue on to advanced study in the fields of engineering, science or management. While most graduates remain in the engineering profession, a significant number use their engineering background as a foundation for professional careers in such areas as law, medicine, business, education or science.

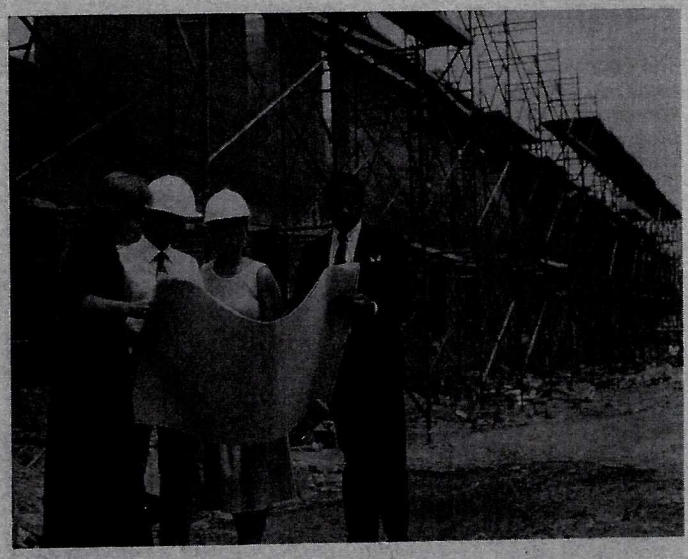
Because the engineer applies scientific principles and practical judgment to the solution of many problems concerned with human welfare, engineering programs include courses in the basic sciences and in the humanities and social sciences in addition to courses in engineering analysis and design. Thus, the overall program provides students with a liberal education, designed to permit them to make important contributions not only toward the solution of specific technical problems, such as those found in automobile engine or computer circuit design, but also toward the solution of such compelling problems of society as are evidenced in energy conservation, urban redevelopment, and pollution control.

Students enrolled in engineering and engineering science pursue a common first year. Much of the second year is common, but two or three courses differ for each curriculum. As a result, students may change their major during the first or second year with little or no lost time. It is strongly suggested that students changing their course of study during the second year consult with an advisor before the end of the spring semester, so that, if necessary, the summer sessions can be used to facilitate transfer between departments.

Humanities and Social Science Requirements Courses in the humanities and social sciences (including "science, technology, and society") constitute a vital component in the education of every engineer. Such courses improve reasoning and communication skills; instill a foundation for understanding and appreciating great art, music, literature, and philosophy; and provide critical insights into human behavior, the principles and forces that underlie and give direction to modern society, and the social causes and effects of science and technology. All engineering students take a program of at least 24 credits in humanities and social science, as specified in the General University Requirements and the particular requirements of each major program.

Minors Engineering majors may declare a minor in any approved minor program in the university. In many cases, minors give students a sense of personal enrichment, demonstrate breadth of knowledge, and provide a competitive edge in industry. For these reasons, qualified students are urged to give serious consideration to electing a minor. See index to find sections of the catalog that refer to minors.

General University Requirements (GUR) Students are advised to refer to the General University Requirements section of the catalog. See index for page.



Cooperative Education and Internships

The university's Cooperative Education and Internship Programs began in 1976 and have increased in scope so that at present matriculated students in all approved majors can participate. The programs enhance the education of the student with the introduction of two full-time work periods (during which up to six additive or degree credits can be earned) in cooperating businesses, industries, and government agencies. In some majors, parallel or concurrent work/study has been approved. Coop education enables the student to examine a major-related professional field while earning a salary that helps defray college and other expenses.

Both work experiences are scheduled after the completion of the sophomore year of the curriculum, which may extend the time required to complete a full-time degree program to up to five years.

In addition to the basic co-op option, NJIT instituted in 1986 the B.S./M.S. internship option. Along with paid internship placements, this accelerated dual-degree program may involve supervised research and varied forms of corporate support. Students in the program graduate with both Bachelor of Science and Master of Science degrees. Students make application for the graduate program as juniors and can complete their Master of Science degrees as full- or part-time students.

Internships are available for architecture students in the fourth and fifth years. Project CAP: Career Advancement Plan, for minority and women students, features individual career counseling, career seminars, summer internships or full-time co-op placements.

Requirements for admission into the basic co-op program include good academic standing and a grade point average of at least 2.2. The B.S./M.S. internship, the architecture internship, and Project CAP internship require higher GPAs.

Students may pre-register for co-op internships as freshmen. Students can apply for admission to co-op as early as the first semester of the sophomore year.

For further information on these programs contact the Office of Cooperative Education and Internships, Division of Career Development Services.

Service Corps

The NJIT Service Corps provides a linkage between students, faculty and staff to a multitude of community and public service programs. Students have the opportunity to participate in a wide variety of community and public service projects as part of their academic course work or extra-curricular activities. They also have the opportunity to earn a federal college work study award by providing their special expertise and skills to community-based organizations or public agencies. Projects are planned with faculty members, interested students, and agency representatives. The NJIT Service Corps is administered by the Office of Community and Public Service of the Division of Career Development Services.

General University Requirements

As New Jersey's technological university, NJIT has a mission which includes both broad academic goals and specific professional education. General University Requirements provide a common core for students in all our curricula. They ensure that NJIT graduates have a thorough understanding of themselves and of the ways their specialized knowledge relates to a broader context. They also require that students develop an understanding of science and technology as intellectual disciplines in themselves and recognize their pervasive influence on contemporary life. Each college may set additional requirements which exceed those listed as General University Requirements.

In addition to the requirements outlined below, all full-time freshmen are required to attend Freshman Seminar. This course not only introduces students to university life, but offers instruction in the use of microcomputers furnished to all full-time freshmen.

ENGLISH (3 credits)The ability to communicate ideas is an essential characteristic of educated individuals; all students are expected to achieve proficiency in both oral and written English and to demonstrate it in courses throughout the curriculum.

MATHEMATICS (6 credits) The ability to reason both qualitatively and quantitatively is fundamental to success in all NJIT programs; students must master mathematics at least through the level of differential and integral calculus and understand the basic principles of probability and statistics.

NATURAL SCIENCES (7 credits) The natural sciences provide the basis for our knowledge of the physical universe and for technological progress; all students are expected to develop a thorough understanding of at least one laboratory science.

COMPUTER SCIENCE (2 credits) The computer has become a vital tool for learning in all academic areas; all students are expected to be computer literate, to be familiar with at least one computer language, and to be able to apply computer skills, including graphics, to their major areas of study.

CULTURAL HISTORY (6 credits) All educated individuals are expected to understand and appreciate their history and the achievements of their culture.

BASIC SOCIAL SCIENCES (6 credits) An understanding of the social sciences is essential in order to understand the economic, social, and political forces at work in our world.

HUMANITIES AND SOCIAL SCIENCE ELECTIVES (9 credits) The ideals of a liberal education transcend particular major fields and career goals; all students are expected to develop an interest in specific areas within the humanities and social sciences. The required lower-level courses provide the background for upper division electives. All humanities and social science courses require an extensive amount of sophisticated reading and writing.

MANAGEMENT (3 credits) All students are expected to develop the management skills needed to function effectively in an organizational setting.

ENGINEERING TECHNOLOGY (6 credits) Regardless of their majors, all graduates of a technological university should be familiar, through first-hand experience, with how engineers and technologists think and work.

PHYSICAL EDUCATION Courses in physical education convey to students the importance of good health and fitness through planned exercise and recreational activities.

Courses that Satisfy GUR

Each academic department requires students to take particular General University Requirement courses. Therefore, it is essential that students find out which courses are required by their departments. To do this, students are strongly urged to refer to the academic programs described in this catalog and to consult their advisors. Students should be aware that the credit requirements specified below are minimums and that credit may be given for equivalent courses taken at other institutions and for special sections of appropriate NJIT courses (e.g., Math 111H is equivalent to Math 111). Furthermore, some courses offered by Rutgers-Newark can be used to fulfill NJIT General University Requirements. Students should refer to the NJIT course registration bulletin and consult with their advisors for guidance in selecting Rutgers courses.

English (3 credits) English Composition (Eng 111)

Mathematics (6 credits) One calculus course and one credit of course work in probability and statistics, or equivalent.

Courses that fulfill the calculus requirement include:
Calculus I (Math 111)
Calculus II (Math 112)
Finite Mathematics and Calculus (Math 113)
General Calculus (Math 138)

Courses that fulfill the probability and statistics requirement include:
Elementary Probability and Statistics (Math 105)
Finite Mathematics and Calculus (Math 113)
Honors Calculus III (Math 213H)
Survey of Probability and Statistics (Math 225)
Statistics for Technology (Math 305)
Probability and Statistics (Math 333)
Applied Statistical Methods (IE 331)
Random Signals and Noise (EE 321)
Industrial Statistics (MNET 315)

Natural Sciences (7 credits) Coursework totaling seven credits in any of the following disciplines: biology, botany, chemistry, geology, and physics (except Phys 100). Students may take a sequence of courses in one of these disciplines or courses in different disciplines. Laboratory credit must be included in the seven credits.

Computer Science (2 credits) A two-credit or three-credit introductory (i.e., 100-level) CIS course.

Cultural History (6 credits) NJIT students take Culture and History I and II (Hum 112 and Hum 231). Students transferring to NJIT may receive credit toward this requirement if they have taken any of a number of approved courses with appropriate cultural/historical content.

Basic Social Sciences (6 credits) Two approved courses in anthropology, economics, geography, political science, psychology, sociology, and general social science. Students may take a two-course sequence in one of these disciplines or two courses in two different disciplines. Acceptable NJIT courses include: Understanding Technological Society (SS 200), Economics (SS 201), Microeconomics (Econ 265), Macroeconomics (Econ 266), Psychology (SS 210), Sociology (SS 221), Political Science (SS 231). Students may also take approved introductory courses offered by Rutgers Newark in anthropology, economics, political science, psychology, and sociology.

Humanities and Social Science (9 credits)

Lit/Hist/Phil (6 credits) All students must take at least two courses chosen from upper division electives in literature, history or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Hum/SS/STS (3 credits) All students must take at least one upper division elective with one of the following designations: anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Management (3 credits) Engineering Management (IE 492) or Principles of Management (Mgmt 390). Leadership in Management I (AS 333) is acceptable only for students taking the aerospace option.

Engineering Technology (6 credits) Two courses selected from among the following: any lower division or upper division courses in engineering (including EG and Mech courses); any upper division courses in architecture, computer science, and engineering technology; Technology and Society I (STS 257); Technology and Society II (STS 258); Management of Information Systems (MIS 345).

Physical Education (2 credits) Students who register as full-time undergraduates for two or more consecutive semesters must take any two PE courses. Students are urged to complete the requirement as soon as possible.

Index to Bachelor's Degree Programs

The university offers many challenging programs leading to the bachelor's degree. The specific degree requirements shown on the following pages are the latest revisions. Degree program sequences are given for day and in some cases evening students. Students may carry less than a full course load by extending their program completion date.

Key to Course Titles In the curriculum listings, the numbers following the course title represent, in order, lecture-recitation hours per week, laboratory hours per week, and credits for the semester.

ACADEMIC MAJORS

ACADEMIC MINORS

Bachelor's Degree Programs: Academic Majors

Applied Chemistry

Administered by: Department of Chemical Engineering, Chemistry and Environmental Science. Tiernan Hall, Room 151.

The B.S. in Applied Chemistry prepares students for careers in industry or for entry to graduate school or professional training in such areas as medicine, dentistry, or law. The primary strength and uniqueness of the applied chemistry program is the involvement of the expertise of both chemistry and chemical engineering faculty who are members of a combined department.

The program places strong emphasis on presenting chemistry as a means of solving problems which have practical application both in and out of the chemical industry. Some of these applications include energy, the environment, health, polymers, and properties of materials.

The program has a heavy emphasis on laboratory skills, science, mathematics, and engineering subjects, and in the practical, industrially oriented areas of chemistry, while not neglecting the basic principles needed to understand the applications. The core of technical electives allows students to specialize in an area of interest or take the necessary courses for a professional school. Thus graduates are able to work in such areas as corporate management, plant production, industrial health and safety, patent law and information sciences, as well as in industrial laboratories. Credit requirements for graduation are 135 credits.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

■ B.S. in Applied Chemistry (135 credit minimum)

FIRST YEAR

1st Semester

Chem 115	Chemistry and Materials I (3½-0-4½)
Chem 115A	Chem 115 Laboratory (0-2-0)
EG 101	Engineering Graphics (1-2-2)
Eng 111	English Composition (3-0-3)
Math 111	Calculus I (4-0-4)
Phys 111	Physics I (3-0-3)
Phys 111A	Physics I Laboratory (0-2-1)
PE - - -	Physical Education (0-1-1)
Frsh Sem	Freshman Seminar (1-0-0)

2nd Semester

Chem 116	Chemistry and Materials II (3½-0-4½)
Chem 116A	Chem 116 Laboratory (0-2-0)
CIS 101	Computer Programming and Problem Solving (2-1-2)
Hum 112	Culture and History I (3-0-3)
Math 112	Calculus II (4-0-4)
Phys 121	Physics II (3-0-3)
Phys 121A	Physics II Laboratory (0-2-1)
PE - - -	Physical Education (0-1-1)

SECOND YEAR

1st Semester

Chem 321	Analytical Chemical Methods (0-4-2)
Chem 343	Organic Chemistry I (3-0-3)
ChE 223	Chemical Process Calculations I (2-0-2)
Math 211	Calculus IIIA (3-0-3)
Hum 231	Culture and History II (3-0-3)
Phys 230	Physics III (4-0-3½)
Phys 230A	Physics III Laboratory (0-1-½)

2nd Semester

Chem 231	Physical Chemistry I (3-0-3)
Chem 344	Organic Chemistry II (3-4-5)
ChE 225	Chemical Process Calculations II (2-0-2)
Math 222	Differential Equations (4-0-4)
Math 225	Survey of Probability and Statistics (1-0-1)
SS 201	Economics (3-0-3)

THIRD YEAR

1st Semester

Chem 335	Physical Chemistry II (3-4-5)
ChE 343	Chemical Engineering Thermodynamics I (3-0-3)
Elective	(Social Science: Lower Division GUR) (3-0-3)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)
Elective	(Technical) (3-0-3)

2nd Semester

Chem 336	Physical Chemistry III (3-0-3)
Chem 448	Preparation and Analysis of Organic Compounds (0-4-2)
ChE 344	Chemical Engineering Thermodynamics II (2-0-2)
ChE 349	Kinetics and Reactor Design (3-0-3)
Elective	(Technical) (3-0-3)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)

FOURTH YEAR

1st Semester

Chem 412	Inorganic Reactions and Processes (2-2-3)
Chem 440	Fundamentals of Polymers (3-0-3)
Chem 491	Research and Independent Study (3-0-3)
IE 334	Engineering Economy and Capital Investment Analysis (3-0-3)
Elective	(Technical) (3-0-3)

2nd Semester

Chem 443	Polymer Laboratory (1-4-3)
Chem 484	Modern Analytical Chemistry (1-4-3)
Elective	(Hum/SS/STS: Upper Division GUR) (3-0-3)
Elective	(Technical) (3-0-3)
Elective	(Management: GUR) (3-0-3)

Note

Eligible students may substitute Math 213H for the combination of Math 211 and Math 225.

Electives

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement: A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

Technical: Consult the departmental associate chairperson for undergraduate studies.

Refer to the General University Requirement section of this catalog for further information on electives.

Co-op

In applied chemistry, ChE 310 and ChE 311 are taken for additive credit only.

Evening Program

Consult the advisor for information on the evening curriculum for applied chemistry.

Applied Mathematics

Administered by: Department of Mathematics. Cullimore Hall, Room 606.

The curriculum offered by the mathematics department has been designed to provide a strong mathematical foundation in conjunction with a broad scientific, engineering, and liberal arts education which will enable the graduate to pursue a professional career in applied mathematics.

Applied mathematics is the application of classical and modern mathematical techniques to solve practical problems in science and engineering. The applied mathematician develops and analyzes mathematical models of physical phenomena, and collects and interprets data in order to identify relationships, patterns, and the likely impact of modifying one or more variables. Many of the specialized courses in this program illustrate exactly how mathematics is used in real applications such as predicting the behavior of physical phenomena.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

■ B.S. in Applied Mathematics (132 credit minimum)

FIRST YEAR

1st Semester

Math 111	Calculus I	(4-0-4)
Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
CIS 113	Introduction to Computer Science I	(3-1-3)
Eng 111	English Composition	(3-0-3)
SS 201	Economics	(3-0-3)
PE - - -	Physical Education	(0-1-1)
Frsh Sem	Freshman Seminar	(1-0-0)

2nd Semester

Math 112	Calculus II	(4-0-4)
Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
CIS 114	Introduction to Computer Science II	(3-1-3)
Hum 112	Culture and History I	(3-0-3)
PE - - -	Physical Education	(0-1-1)
Elective	(Social Science: Lower Division GUR)	(3-0-3)

SECOND YEAR

1st Semester

Math 213	Calculus IIIB	(4-0-4)
Math 337	Linear Algebra	(3-0-3)
Phys 231	Physics III	(4-0-4)
Phys 231A	Physics III Laboratory	(0-2-1)
Hum 231	Culture and History II	(3-0-3)
CIS 105	Computer Programming (FORTRAN)	(1-1-1)
Elective	(Free)	(3-0-3)

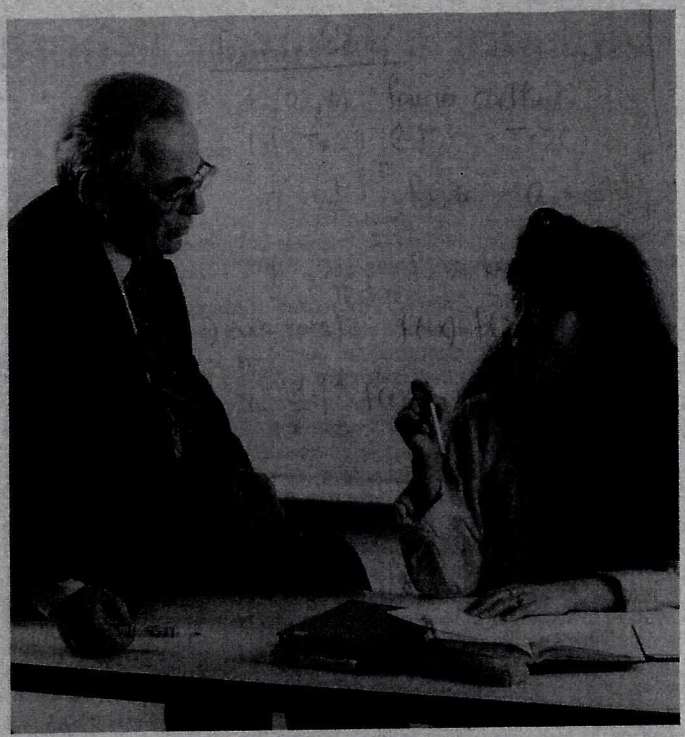
2nd Semester

Math 222	Differential Equations	(4-0-4)
Math 226	Discrete Analysis	(4-0-4)
Math 244	Introduction to Probability	(3-0-3)
CIS 105	Computer Programming (APL)	(1-1-1)
Elective	(Science, Technology and Society)	(3-0-3)
Elective	(Free)	(3-0-3)

THIRD YEAR

1st Semester

Math 331	Partial Differential Equations	(3-0-3)
Math 340	Applied Numerical Methods and Optimization	(3-0-3)
Math 545	Advanced Calculus I	(3-0-3)
Elective	(Free)	(3-0-3)
Elective	(Technical)	(3-0-3)



2nd Semester

Math 332	Functions of a Complex Variable	(3-0-3)
Math 546	Advanced Calculus II	(3-0-3)
Math 573	Intermediate Differential Equations	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)
Elective	(Technical)	(3-0-3)

FOURTH YEAR

1st Semester

Math 560	Methods of Applied Mathematics I	(3-0-3)
R640:441	Introductory Topology	(3-0-3)
Elective	(Management: GUR)	(3-0-3)
Elective	(Free)	(3-0-3)
Elective	(Free)	(3-0-3)

2nd Semester

Math 495	Topics in Applied Mathematics	(3-0-3)
Math 561	Methods of Applied Mathematics II	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)
Elective	(Free)	(3-0-3)
Elective	(Free)	(3-0-3)

Electives

All electives are to be selected in consultation with an advisor.

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

Science, Technology and Society: One upper division STS course.

Technical: Consult the advisor.

Free: Consult the advisor.

Refer to the General University Requirement section of this catalog for further information on electives.

Co-op

Co-op courses bearing degree credit replace a technical elective or another course approved by the faculty advisor in the student's major department. In applied mathematics, Math 310 and Math 410 are taken for degree credit.

Applied Physics

Administered by: Department of Physics. Tiernan Hall, Room 463.

Physics is the study of natural processes. At NJIT, the applied physics program entails the study of natural processes and their application to modern technologies.

The applied physics program is designed to give students a broad background in physics while at the same time relating this background to the work of technology based industries—microelectronics, computers and nuclear reactors in particular. Students obtain a thorough knowledge of classical and modern physics and apply this knowledge to the design and manufacture of large scale integrated circuits and other modern devices (microelectronics option) or the design and application of computers (computer physics option) or the study of nuclear reactors (nuclear science option).

The B.S. in Applied Physics is a cooperative degree program offered by NJIT and Rutgers-Newark.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

■ B.S. in Applied Physics (130 credit minimum)

FIRST YEAR

1st Semester

Eng 111	English Composition	(3-0-3)
Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
Math 111	Calculus I	(4-0-4)
CIS 113	Introduction to Computer Science I	(3-1-3)
Chem 115	Chemistry and Materials I	(3½-0-4½)
Chem 115A	Chem 115 Laboratory	(0-2-0)
PE - - -	Physical Education	(0-1-1)
Frsh Sem	Freshman Seminar	(1-0-0)

2nd Semester

CIS 114	Introduction to Computer Science II	(3-1-3)
Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
Math 112	Calculus II	(4-0-4)
Chem 116	Chemistry and Materials II	(3½-0-4½)
Chem 116A	Chem 116 Laboratory	(0-2-0)
PE - - -	Physical Education	(0-1-1)

SECOND YEAR

1st Semester

Math 211	Calculus IIIA	(3-0-3)
Math 225	Survey of Probability and Statistics	(1-0-1)
Phys 231	Physics III	(4-0-4)
Phys 231A	Physics III Laboratory	(0-2-1)
Hum 112	Culture and History I	(3-0-3)
SS 201	Economics	(3-0-3)

2nd Semester

Math 222	Differential Equations	(4-0-4)
Math 335	Vector Analysis	(3-0-3)
Phys 335	Elementary Thermodynamics	(3-0-3)
Hum 231	Culture and History II	(3-0-3)
Elective	(Social Science: Lower Division GUR)	(3-0-3)

THIRD YEAR

1st Semester

Phys 430	Classical Mechanics I	(3-0-3)
Phys 432	Electromagnetism I	(3-0-3)
Phys 450	Advanced Physics Lab	(0-4-2)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR)	(3-0-3)
Elective	(Phys/CIS/EE)	(3-0-3)

2nd Semester

Phys 446	Solid State Physics	(3-0-3)
Phys 433	Electromagnetism II	(3-0-3)
Phys 442	Introduction to Quantum Mechanics	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)
Elective	(EE/CIS/Math)	(3-0-3)

Co-op

Co-op courses bearing degree credit replace a technical elective or another course approved by the faculty advisor in the student's major department. In applied physics, both Phys 311 and Phys 411 are taken for degree credit with permission of faculty advisor.

FOURTH YEAR: MICROELECTRONICS OPTION

1st Semester

Phys 481	Applied Solid State Physics: Microelectronics I	(3-0-3)
R750:461	Computational Methods in Applied Physics	(3-0-3)
Elective	(Phys/EE)	(3-0-3)
Elective	(Management: GUR)	(3-0-3)
Elective	(Technical)	(3-0-3)

2nd Semester

Phys 482	Applied Solid State Physics: Microelectronics II	(3-0-3)
R750:307	Computer Electronics	(4-0-4)
Elective	(Phys/EE)	(3-0-3)
Elective	(Phys/EE)	(3-0-3)
Elective	(Technical)	(3-0-3)

FOURTH YEAR: COMPUTER PHYSICS OPTION

1st Semester

Phys 485	Computer Modeling of Applied Physics Problems	(3-0-3)
CIS 251	Computer Organization	(3-0-3)
Elective	(Phys/CIS)	(3-0-3)
Elective	(Phys/CIS)	(3-0-3)
Elective	(Technical)	(3-0-3)

2nd Semester

CIS 421	Numerical Algorithms	(3-0-3)
Elective	(Management: GUR)	(3-0-3)
Elective	(Math/Phys/CIS)	(3-0-3)
Elective	(Math/Phys/CIS)	(3-0-3)
Elective	(Technical)	(3-0-3)

FOURTH YEAR: NUCLEAR SCIENCE OPTION

1st Semester

NuSc 461	Nuclear Reactor Physics	(3-0-3)
NuSc 464	Nuclear Reactor Laboratory	(2-2-3)
Elective	(Phys/EE/CIS/Math)	(3-0-3)
Elective	(Phys/EE/CIS/Math)	(3-0-3)
Elective	(Technical)	(3-0-3)

2nd Semester

NuSc 462	Nuclear Reactor Theory	(3-0-3)
NuSc 463	Neutron Transport Theory	(3-0-3)
Elective	(Phys/EE/CIS/Math)	(3-0-3)
Elective	(Technical)	(3-0-3)
Elective	(Management: GUR)	(3-0-3)

Electives

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement: A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

Phys/CIS/EE: Consult the physics department for information about qualifying courses.

EE/CIS/Math: Consult the physics department for information about qualifying courses.

Phys/EE: Consult the physics department for information about qualifying courses.

Phys/CIS: Consult the physics department for information about qualifying courses.

Math/Phys/CIS: Consult the physics department for information about qualifying courses.

Phys/EE/CIS/Math: Consult the physics department for information about qualifying courses.

Technical: Consult the physics department for information about qualifying courses.

Refer to the General University Requirement section of this catalog for further information on electives.

Architecture

Administered by: School of Architecture. Campbell Hall, Room 400.

Accredited by the National Architectural Accrediting Board.

The School of Architecture educates students to assume positions of responsibility and leadership in the architectural profession and in developing areas of opportunity in technology and community design related to the discipline of architecture. An emphasis on studio design in the curriculum is reinforced by courses in history, building science and social concerns. A diverse faculty brings its expertise to bear on issues of architecture, technology and culture and challenges students to prepare for their productive years as practitioners, scholars and researchers. The architecture program builds on the strengths of a technological university with its extensive capacity in computer graphics while emphasizing design directed towards the traditional human-centered values of architecture.

The total time needed to earn a Bachelor of Architecture degree (the first professional degree) at NJIT is five years.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

Credit distribution for the Bachelor of Architecture degree:

Required Architecture Credits	*99*
Architecture Electives	*12*
Free Electives	*4*
Rutgers Drawing Course	*3*
General University Requirements	*46*
	**164*

■ Bachelor of Architecture (164 credit minimum)

FIRST YEAR

1st Semester

Arch 103	People and Their Environment	(3-0-3)
Arch 155	Architectural Graphics	(2-3-3)
Arch 163	Introduction to Design I	(1-9-4)
Eng 111	English Composition	(3-0-3)
Math 113	Finite Mathematics and Calculus	(4-0-4)
Frsh Sem	Freshman Seminar	(1-0-0)

2nd Semester

R080:121	Introduction to Drawing	(0-6-3)
Arch 164	Introduction to Design II	(1-9-4)
Arch 172	Architectural Programming	(3-0-3)
Hum 112	Culture and History I	(3-0-3)
Math 116	Mathematics of Design	(3-0-3)
CIS 104	Computer Programming and Graphics Problems	(2-1-2)

SECOND YEAR

1st Semester

Arch 241	Architectural Construction I	(3-0-3)
Arch 251	History of Architecture I	(3-0-3)
Arch 263	Architecture Studio I	(1-12-5)
Hum 231	Culture and History II	(3-0-3)
Phys 102	General Physics	(3-0-3)
Phys 102A	General Physics Laboratory	(0-2-1)

2nd Semester

Arch 242	Architectural Construction II	(3-0-3)
Arch 252	History of Architecture II	(3-0-3)
Arch 264	Architecture Studio II	(1-12-5)
Arch 282	Structures I	(3-0-3)
Phys 103	General Physics	(3-0-3)
Phys 103A	General Physics Laboratory	(0-2-1)

THIRD YEAR

1st Semester

Arch 331	Landscape Architecture	(3-0-3)
Arch 363	Architecture Studio III	(1-12-5)
**Arch 381	History of Architecture III	(3-0-3)
Arch 383	Structures II	(3-0-3)
Arch 386	Building Performance	(3-0-3)

2nd Semester

**Arch 342	Construction III	(3-0-3)
Arch 364	Architecture Studio IV	(1-12-5)
**Arch 382	History of Architecture IV	(3-0-3)
Arch 384	Structures III	(3-0-3)
Arch 387	Environmental Control Systems	(3-0-3)

**pending approval

FOURTH YEAR

1st Semester

Arch 463	Architecture Studio V	(1-12-5)
Elective	(Architecture)	(3-0-3)
Elective	(Social Science: Lower Division GUR)	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)
PE - - -	Physical Education	(0-1-1)

2nd Semester

Arch 464	Architecture Studio VI	(1-12-5)
SS 201	Economics	(3-0-3)
Elective	(Architecture)	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)
PE - - -	Physical Education	(0-1-1)

FIFTH YEAR

1st Semester

Arch 563	Architecture Studio VII	(1-12-5)
Elective	(Architecture)	(3-0-3)
Elective	(Management: GUR)	(3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR)	(3-0-3)

2nd Semester

Arch 558	Professional Architecture Practice	(3-0-3)
Arch 564	Architecture Studio VIII	(1-12-5) *or*
†Arch 566	Senior Thesis	(0-15-5)
Elective	(Architecture)	(3-0-3)
Elective	(Free)	(3-0-3)
Elective	(Free)	(1-0-1)

Electives

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement: A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

Architecture: Any architecture course.

Free: Select in consultation with curriculum advisor.

*The minimum credit requirement for graduation is the successful completion of 164 credits of prescribed courses within the curriculum; *and* the maintenance of a 2.0 (C) average. See the General University Requirements section of this catalog for more information on basic university requirements.

†This option is subject to prior approval. See SOA Handbook.

Co-op

Co-op courses replace architecture or free electives. In architecture, Arch 310 and Arch 410 are taken for degree credit.

Chemical Engineering

Administered by: Department of Chemical Engineering, Chemistry, and Environmental Science. Tiernan Hall, Room 151.

Chemical engineering requires a mastery of the principles of chemistry, as well as physics and mathematics. Because it stands on a strong foundation in three sciences, it is particularly adaptable to solving the technological problems of modern society. Chemical engineers are employed by government, academia, and industry. They make an invaluable contribution to improving the quality of life in the production of pharmaceuticals to ward off disease, fertilizers and pesticides to grow an abundance of food, fabrics to clothe us, and petroleum products to warm our homes and move our cars. Their expertise is being applied to such diverse areas as the production of beverages and semiconductors, the design of heart/lung machines, and the design of treatment facilities for pollution control. Modern society could not exist without chemical engineers.

The chemical engineering curriculum at NJIT provides students with the skills necessary to find employment immediately upon graduation, or to continue studies in graduate school. Our alumni have gone on to medical school, law school, and even careers as university professors, as well as more traditional avenues of employment.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

■ B.S. in Chemical Engineering (138 credit minimum)

DAY PROGRAM

FIRST YEAR

1st Semester

Chem 115	Chemistry and Materials I	(3½-0-4½)
Chem 115A	Chem 115 Laboratory	(0-2-0)
*EG 101	Engineering Graphics	(1-2-2)
Eng 111	English Composition	(3-0-3)
Math 111	Calculus I	(4-0-4)
Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
PE - - -	Physical Education	(0-1-1)
Frsh Sem	Freshman Seminar	(1-0-0)

2nd Semester

Chem 116	Chemistry and Materials II	(3½-0-4½)
Chem 116A	Chem 116 Laboratory	(0-2-0)
*CIS 101	Computer Programming and Problem Solving	(2-1-2)
Hum 112	Culture and History I	(3-0-3)
Math 112	Calculus II	(4-0-4)
Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
PE - - -	Physical Education	(0-1-1)

SECOND YEAR

1st Semester

ChE 223	Chemical Process Calculations I	(2-0-2)
ChE 224	Chemical Process Industries I	(1-0-1)
Chem 321	Analytical Chemical Methods	(0-4-2)
Chem 343	Organic Chemistry I	(3-0-3)
Math 211	Calculus III A	(3-0-3)
Math 225	Survey of Probability and Statistics	(1-0-1)
Hum 231	Culture and History II	(3-0-3)
SS 201	Economics	(3-0-3)

2nd Semester

ChE 225	Chemical Process Calculations II	(2-0-2)
ChE 226	Chemical Process Industries II	(1-0-1)
Chem 231	Physical Chemistry I	(3-0-3)
Chem 344	Organic Chemistry II	(3-4-5)
Math 222	Differential Equations	(4-0-4)
Elective	(Social Science: Lower Division GUR)	(3-0-3)

*Paired courses. Half of the students will take these courses in reverse order.

THIRD YEAR

1st Semester

ChE 343	Chemical Engineering Thermodynamics I	(3-0-3)
ChE 363	Transport Operations I	(3-0-3)
ChE 364	Transport Operations II	(3-0-3)
Chem 335	Physical Chemistry II	(3-4-5)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

2nd Semester

ChE 344	Chemical Engineering Thermodynamics II	(2-0-2)
ChE 349	Kinetics and Reactor Design	(3-0-3)
ChE 366	Diffusional Systems	(2-0-2)
Phys 233	Physics III	(3-0-3)
Mech 330	Mechanics of Rigid and Deformable Bodies	(4-0-4)
Elective	(Management: GUR)	(3-0-3)

FOURTH YEAR

1st Semester

ChE 471	Equilibrium Stage Processes	(3-0-3)
ChE 478	Process Dynamics and Control I	(3-0-3)
ChE 487	Chemical Engineering Laboratory I	(2-4-4)
Elective	(ChE/Technical)	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

2nd Semester

ChE 472	Process and Plant Design	(4-0-4)
ChE 479	Process Dynamics and Control II	(1-2-2)
ChE 488	Chemical Engineering Laboratory II	(0-6-3)
Elective	(ChE/Technical)	(3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR)	(3-0-3)

Note

Eligible students may substitute Math 213H for the combination of Math 211 and Math 225.

Electives

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement: A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

ChE/Technical: In general, one elective must be a ChE course while the other is open. For a list of qualifying courses and special options, consult the departmental associate chairperson for undergraduate studies.

Refer to the General University Requirement section of this catalog for further information on electives.

Department Regulations

For departmental regulations on prerequisites, grades and repeating courses, consult the departmental associate chairperson for undergraduate studies.

Co-op

In chemical engineering, ChE 310 and ChE 311 are taken for additive credit.

CHEMICAL ENGINEERING EVENING PROGRAM

FIRST YEAR

1st Semester

EG 101	Engineering Graphics	(1-2-2)
Eng 111	English Composition	(3-0-3)
Math 111	Calculus I	(4-0-4)

2nd Semester

CIS 101	Computer Programming and Problem Solving	(2-1-2)
Hum 112	Culture and History I	(3-0-3)
Math 112	Calculus II	(4-0-4)

SECOND YEAR

1st Semester

Chem 115	Chemistry and Materials I	(3½-0-4½)
Chem 115A	Chem 115 Laboratory	(0-2-0)
Math 211	Calculus III A	(3-0-3)
Math 225	Survey of Probability and Statistics	(1-0-1)

2nd Semester

Chem 116	Chemistry and Materials II	(3½-0-4½)
Chem 116A	Chem 116 Laboratory	(0-2-0)
Math 222	Differential Equations	(4-0-4)

THIRD YEAR

1st Semester

Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
SS 201	Economics	(3-0-3)
Hum 231	Culture and History II	(3-0-3)

2nd Semester

Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
Elective	(Social Science: Lower Division GUR)	(3-0-3)

FOURTH YEAR

1st Semester

ChE 223	Chemical Process Calculations I	(2-0-2)
ChE 224	Chemical Process Industries I	(1-0-1)
Chem 231	Physical Chemistry I	(3-0-3)
Chem 321	Analytical Chemical Methods	(0-4-2)
Phys 233	Physics III	(3-0-3)

2nd Semester

ChE 225	Chemical Process Calculations II	(2-0-2)
ChE 226	Chemical Process Industries II	(1-0-1)
Chem 335	Physical Chemistry II	(3-4-5)
Mech 330	Mechanics of Rigid and Deformable Bodies	(4-0-4)

FIFTH YEAR

1st Semester

ChE 343	ChE Thermodynamics I	(3-0-3)
Chem 343	Organic Chemistry I	(3-0-3)
Elective	(Management: GUR)	(3-0-3)

2nd Semester

ChE 344	ChE Thermodynamics II	(2-0-2)
Chem 344	Organic Chemistry II	(3-4-5)

SIXTH YEAR

1st Semester

ChE 363	Transport Operations I	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

2nd Semester

ChE 349	Kinetics and Reactor Design	(3-0-3)
ChE 364	Transport Operations II	(3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR)	(3-0-3)

SEVENTH YEAR

1st Semester

ChE 366	Diffusional Systems	(2-0-2)
ChE 478	Process Dynamics and Control I	(3-0-3)

2nd Semester

ChE 472	Process and Plant Design	(4-0-4)
ChE 479	Process Dynamics and Control II	(1-2-2)

EIGHTH YEAR

1st Semester

ChE 471	Equilibrium Stage Processes	(3-0-3)
ChE 487	Chemical Engineering Laboratory I	(2-4-4)
Elective	(ChE/Technical)	(3-0-3)

2nd Semester

ChE 488	Chemical Engineering Laboratory II	(0-6-3)
Elective	(ChE/Technical)	(3-0-3)

Civil Engineering

Administered by: Department of Civil and Environmental Engineering. Campbell Hall, Room 211.

Civil engineering is concerned with the planning, design, and construction of engineering projects, including energy, environmental and economic considerations. It involves dealing with people and cities, producing clean air and water, providing for the disposal of wastes, and developing efficient transportation, housing and water supply systems.

The undergraduate program includes work in field measurements, construction materials and procedures, structural analysis and design, soil behavior, transportation engineering, water supply, and pollution control. The department offers a set of elective courses through which the student can specialize in such areas as environmental control, soils and foundations, urban planning and urban systems, construction engineering, and surveying. Students are encouraged to participate in the Cooperative Education program.

The civil engineering graduate is well prepared for employment with federal, state, and municipal agencies, in the many consulting firms in the metropolitan area and throughout the country, or with the major industrial firms involved with aspects of planning design, construction, or environmental control. Students may also pursue careers in research and development.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

■ B.S. in Civil Engineering (143 credit minimum)

DAY PROGRAM

FIRST YEAR

1st Semester

Chem 115	Chemistry and Materials I	(3½-0-4½)
Chem 115A	Chem 115 Laboratory	(0-2-0)
*EG 101	Engineering Graphics	(1-2-2)
Eng 111	English Composition	(3-0-3)
Math 111	Calculus I	(4-0-4)
Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
PE - - -	Physical Education	(0-1-1)
Frsh Sem	Freshman Seminar	(1-0-0)

2nd Semester

Chem 116	Chemistry and Materials II	(3½-0-4½)
Chem 116A	Chem 116 Laboratory	(0-2-0)
*CIS 101	Computer Programming and Problem Solving	(2-1-2)
Hum 112	Culture and History I	(3-0-3)
Math 112	Calculus II	(4-0-4)
Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
PE - - -	Physical Education	(0-1-1)

SECOND YEAR

1st Semester

CE 200	Surveying I	(2-0-2)
CE 200A	Surveying I Laboratory	(0-3-1)
Math 211	Calculus III A	(3-0-3)
Math 225	Survey of Probability and Statistics	(1-0-1)
Mech 235	Statics	(3-0-3)
SS 201	Economics	(3-0-3)
Phys 230	Physics III	(4-0-3½)
Phys 230A	Physics III Laboratory	(0-1-½)

*Paired courses. Half of the students will take these courses in reverse order.

2nd Semester

CE 201	Surveying II (2-0-2)
CE 210	Construction Materials and Procedures (3-0-3)
CE 231	Strength of Materials (4-0-4)
CE 231A	Strength of Materials Laboratory (0-3-1)
Hum 231	Culture and History II (3-0-3)
Math 222	Differential Equations (4-0-4)
Mech 236	Dynamics (2-0-2)

THIRD YEAR

1st Semester

CE 320	Fluid Mechanics (4-0-4)
CE 321	Water Resources Engineering (3-0-3)
CE 332	Structures I (3-2-4)
CE 342	Geology (3-0-3)
Elective	(Social Science: Lower Division GUR) (3-0-3)

2nd Semester

CE 322	Hydraulic Engineering (3-0-3)
CE 333	Structures II (3-0-3)
CE 341	Soil Mechanics (3-0-3)
CE 341A	Soil Mechanics Laboratory (0-3-1)
CE 350	Transportation Engineering (3-0-3)
CE 360	Civil Engineering Methods (2-0-2)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)

FOURTH YEAR

1st Semester

CE 432	Structural Design (3-0-3)
CE 443	Foundation Design (3-0-3)
CE 494	Civil Engineering Design I (3-0-3)
EE 405	Electrical Engineering Principles (3-0-3)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)
Elective	(Technical) (3-0-3)

2nd Semester

CE 460	Civil Engineering Seminar (1-0-1)
CE 461	Civil Engineering Special Topics (1-0-1)
CE 495	Civil Engineering Design II (3-0-3)
ME 435	Thermodynamics (3-0-3)
Elective	(Management: GUR) (3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR) (3-0-3)
Elective	(Technical) (3-0-3)

EVENING PROGRAM

A full-service evening program is offered by the department. Consult the academic coordinator for information on the evening curriculum for civil engineering.

Note

Eligible students may substitute Math 213H for the combination of Math 211 and Math 225.

Electives

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement: A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 433 may be substituted only by those students taking the aerospace option.

Technical: Must be chosen from a list of courses available from the civil and environmental engineering department.

Refer to the General University Requirement section of this catalog for further information on electives.

Co-op

In civil engineering, CE 311 and CE 413 are taken for additive credit.

Computer Engineering

Administration: Computer engineering is an interdisciplinary program that is overseen by a director in the Department of Electrical and Computer Engineering. Tiernan Hall, Room 150.

The new interdisciplinary profession of computer engineering has evolved over the last two decades. Computer engineering professionals develop, design, and test computer systems. They understand both computer hardware and software and possess enough engineering breadth to skillfully design computers for a variety of applications. Economics and inherent flexibility have led to the widespread use of computer engineering technology. The career potential for graduates with this knowledge has been strong for many years.

Computer engineering consists of basic electrical engineering and computer science curricula combined with a set of special courses in computer systems. The curriculum generally follows a model program promulgated by the Institute of Electrical and Electronic Engineers (IEEE) Computer Society, and it conforms to ABET requirements for computer engineering. ABET accreditation, conditionally retroactive when granted, will be sought in 1992. Computer engineering students will have a broad engineering background combined with in-depth knowledge of computer hardware, software, and application tradeoffs, and the basic modeling techniques representing the computing process. The core subject areas of computer engineering are discrete mathematics, fundamentals of computing, data structures, system software and software engineering, computing languages, operating systems, logic design, digital systems design, computer architecture, interfacing and communications, and laboratory work to support the above including a project.

Students graduating from NJIT with a bachelor of science in computer engineering and a good academic record will be able to pursue further study leading to advanced degrees in computer engineering, electrical engineering, or computer science. Some universities offer advanced degrees explicitly in computer engineering.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

■ B.S. in Computer Engineering (141 credit minimum)

FIRST YEAR

1st Semester

Chem 115	Chemistry and Materials I (3½-0-4½)
Chem 115A	Chem 115 Laboratory (0-2-0)
*EG 101	Engineering Graphics (1-2-2)
Eng 111	English Composition (3-0-3)
Math 111	Calculus I (4-0-4)
Phys 111	Physics I (3-0-3)
Phys 111A	Physics I Laboratory (0-2-1)
PE - - -	Physical Education (0-1-1)
Frsh Sem	Freshman Seminar (1-0-0)

2nd Semester

Chem 116	Chemistry and Materials II (3½-0-4½)
Chem 116A	Chem 116 Laboratory (0-2-0)
*CIS 101	Computer Programming and Problem Solving (2-1-2)
Hum 112	Culture and History I (3-0-3)
Math 112	Calculus II (4-0-4)
Phys 121	Physics II (3-0-3)
Phys 121A	Physics II Laboratory (0-2-1)
PE - - -	Physical Education (0-1-1)

SECOND YEAR

1st Semester

EE 231	Circuits and Systems I (3-0-3)
EE 251	Digital Design (3-0-3)
CIS 105	Computer Programming (Pascal) (1-1-1)
Math 211	Calculus III A (3-0-3)
Phys 231	Physics III (4-0-4)
Phys 231A	Physics III Laboratory (0-2-1)
Hum 231	Culture and History II (3-0-3)

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*Paired courses. Half of the students will take these courses in reverse order

2nd Semester

EE 232	Circuits and Systems II	(3-0-3)
EE 271	Electronic Circuits I	(3-0-3)
EE 291	Electrical Engineering Laboratory I	(0-3-1)
Math 222	Differential Equations	(4-0-4)
Mech 230	Statics and Dynamics	(4-0-4)
SS 201	Economics	(3-0-3)

THIRD YEAR

1st Semester

EE 372	Electronic Circuits II	(3-0-3)
CoE 351	Computer Systems Organization	(3-0-3)
CoE 391	Computer Engineering Lab I	(1-3-2)
CIS 335	Data Structures and Algorithm Design	(3-0-3)
Math 226	Discrete Analysis	(4-0-4)
Elective	(Social Science: Lower Division GUR)	(3-0-3)

2nd Semester

CoE 327	Signal Transmission	(3-0-3)
CoE 392	Computer Engineering Lab II	(1-3-2)
CIS 332	Principles of Operating Systems	(3-1-3)
Math 333	Probability and Statistics	(3-0-3)
CoE 302	Engineers in Society	(1-0-1)
Elective	CIS 421 Numerical Calculus *or* Math 337 Linear Algebra	(3-0-3)
Elective	(Management: GUR)	(3-0-3)

FOURTH YEAR

1st Semester

CoE 421	Digital Data Communications	(3-0-3)
CoE 451	Computer Architecture	(3-0-3)
CoE 493	Computer Engineering Lab III	(2-4-4)
Elective	(Technical)	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

2nd Semester

CoE 494	Computer Engineering Lab IV	(0-3-1)
CoE 495	Computer Engineering Project	(3-0-3)
Elective	(CIS)	(3-0-3)
Elective	(ME 435 Thermodynamics *or* another technical elective)	(3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR)	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

Electives

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement: A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

Technical: Chosen from a list of courses available from the faculty of the program or a CIS course from the list below.

CIS: Choose from the following list.

CIS 333	Introduction to the Unix Operating System
CIS 341	Introduction to Logic and Automata
CIS 352	Parallel Computers and Programming
CIS 370	Introduction to Artificial Intelligence
CIS 432	Advanced Operating Systems and Computer Architecture
CIS 435	Advanced Data Structures and Algorithm Design
CIS 438	Programming for Interactive Computer Graphics
CIS 461	Systems Simulation
CIS 490	Guided Design in Software Engineering

Refer to the General University Requirement section of this catalog for further information on electives.

Co-op

Co-op courses bearing degree credit replace a technical elective or another course approved by the faculty advisor in the student's major department. In computer engineering, EE 310 is taken for additive credit, and EE 411 is taken for degree credit.

Computer Science

Administered by: Department of Computer and Information Science. Guttenberg Information Technologies Center, Room 4400.

Computer science is the study of information: its structure, its representation, and its utilization. This includes the theory, analysis, design, efficiency, implementation, and application of computer programs (software) and computer equipment (hardware) for developing computerized information processing systems in response to users' needs.

The use of computers can be characterized as augmenting a person's mental skills and intelligence. The dramatic use of computers in problem solving and in support of human cognitive processes has resulted in a change in the thinking of professionals in every discipline. Modern enterprises are also dependent on computers for automating their industrial and office procedures and practices. In order to keep pace with these sophisticated technological uses of computers, professionals in the computer field must understand and employ advanced scientific concepts in their work.

The Bachelor of Science in Computer Science provides the student with the most comprehensive treatment of computers, with considerable breadth and depth in computer science topics, the sciences, mathematics and supporting interdisciplinary studies. This degree program, which is fully accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board, Inc., is taken by most students interested in computer science. For the student who wishes to have a strong foundation in computer science, but with more opportunity for elective choices and with slightly fewer technical requirements, the department offers the Bachelor of Arts in Computer Science, a joint degree program with Rutgers-Newark.

All students with majors in the Department of Computer and Information Science are required to prepare a Program of Study Form, an approved copy of which must be on file with the department. The form should be prepared as early as possible in the student's career. Computer science majors should enroll in CIS 113 and CIS 114 in the freshman year.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.

■ B.S. in Computer Science (135 credit minimum)

FIRST YEAR

1st Semester

CIS 113	Introduction to Computer Science I	(3-1-3)
Math 111	Calculus I	(4-0-4)
Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
Eng 111	English Composition	(3-0-3)
Elective	(Social Science: Lower Division GUR)	(3-0-3)
PE - - -	Physical Education	(0-1-1)
Frsh Sem	Freshman Seminar	(1-0-0)

2nd Semester

CIS 114	Introduction to Computer Science II	(3-1-3)
Math 112	Calculus II	(4-0-4)
Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
Hum 112	Culture and History I	(3-0-3)
Elective	(Social Science: Lower Division GUR)	(3-0-3)
PE - - -	Physical Education	(0-1-1)

SECOND YEAR

1st Semester

CIS 231	Machine and Assembly Language Programming	(3-1-3)
CIS 251	Computer Organization	(3-0-3)
Math 211	Calculus IIIA	(3-0-3)
Phys 231	Physics III	(4-0-4)
Phys 231A	Physics III Laboratory	(0-2-1)
Elective	(General)	(3-0-3)

2nd Semester

CIS 280	Programming Language Concepts	(3-0-3)
CIS 332	Principles of Operating Systems	(3-1-3)
Math 226	Discrete Analysis	(4-0-4)
Hum 231	Culture and History II	(3-0-3)
Elective	(General)	(3-0-3)

THIRD YEAR

1st Semester

CIS 341	Introduction to Logic and Automata (3-0-3)
CIS 350	Computers and Society (3-0-3)
Math 333	Probability and Statistics (3-0-3)
Elective	(CIS) (3-0-3)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)
Elective	(Interdisciplinary) (3-0-3)

2nd Semester

CIS 432	Advanced Operating Systems and Computer Architecture (3-0-3)
CIS 435	Advanced Data Structures and Algorithm Design (3-0-3)
Elective	(CIS) (3-0-3)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)
Elective	(Interdisciplinary) (3-0-3)

FOURTH YEAR

1st Semester

CIS 431	Introduction to Database Systems (3-0-3)
CIS 490	Guided Design in Software Engineering (3-0-3)
Elective	(CIS) (3-0-3)
Elective	(Interdisciplinary) (3-0-3)
Elective	(General) (3-0-3)
Elective	(Management: GUR) (3-0-3)

2nd Semester

CIS 491	Computer Science Project (3-0-3)
Elective	(CIS) (3-0-3)
Elective	(Math) (3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR) (3-0-3)
Elective	(General) (3-0-3)

B.A. in Computer Science (124 credit minimum)

FIRST YEAR

1st Semester

CIS 113	Introduction to Computer Science I (3-1-3)
Math 111	Calculus I (4-0-4)
Eng 111	English Composition (3-0-3)
Elective	(Science) (3-1-4)
Elective	(Social Science: Lower Division GUR) (3-0-3)
PE - - -	Physical Education (0-1-1)
Frsh Sem	Freshman Seminar (1-0-0)

2nd Semester

CIS 114	Introduction to Computer Science II (3-1-3)
Math 112	Calculus II (4-0-4)
Hum 112	Culture and History I (3-0-3)
Elective	(Social Science: Lower Division GUR) (3-0-3)
Elective	(Science) (3-1-4)
PE - - -	Physical Education (0-1-1)

SECOND YEAR

1st Semester

CIS 231	Machine and Assembly Language Programming (3-1-3)
Math 211	Calculus IIIA (3-0-3)
Hum 231	Culture and History II (3-0-3)
Elective	(General) (3-0-3)
Elective	(General) (3-0-3)

2nd Semester

CIS 251	Computer Organization (3-0-3)
CIS 280	Programming Language Concepts (3-0-3)
Math 226	Discrete Analysis (4-0-4)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)
Elective	(General) (3-0-3)

THIRD YEAR

1st Semester

CIS 332	Principles of Operating Systems (3-1-3)
Math 333	Probability and Statistics (3-0-3)
Elective	(CIS) (3-0-3)
Elective	(Interdisciplinary) (3-0-3)
Elective	(General) (3-0-3)

2nd Semester

CIS 435	Advanced Data Structures and Algorithm Design (3-0-3)
Elective	(CIS) (3-0-3)
Elective	(Lit/Hist/Phil: GUR) (3-0-3)
Elective	(Interdisciplinary) (3-0-3)
Elective	(General) (3-0-3)

FOURTH YEAR

1st Semester

CIS 490	Guided Design in Software Engineering (3-0-3)
Elective	(Management: GUR) (3-0-3)
Elective	(CIS) (3-0-3)
Elective	(Interdisciplinary) (3-0-3)
Elective	(General) (3-0-3)

2nd Semester

CIS 491	Computer Science Project (3-0-3)
Math 340	Applied Numerical Methods (3-0-3) *or*
CIS 421	Numerical Algorithms (3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR) (3-0-3)
Elective	(General) (3-0-3)

Electives

Social Science Lower Division General University Requirement (B.S. and B.A.): Choose two courses from SS 200, SS 201, SS 210, SS 221, SS 231, Econ 265, Econ 266, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement (B.S. and B.A.): A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement (B.S. and B.A.): Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement (B.S. and B.A.): Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

Interdisciplinary (B.S. and B.A.): A sequence of three 300 and 400 level courses focusing on aspects of a discipline related to computer science. A list of approved course sequences in a variety of disciplines offered at NJIT and the Newark campus of Rutgers University is available from the department. Courses that are not acceptable for a major in a given department are not to be used for interdisciplinary studies.

CIS (B.S. and B.A.): Can be chosen from any approved computer science courses numbered 300 or above.

General (B.S. only): A minimum of 4 courses (12 credits). Courses should be chosen to meet prerequisite requirements of other courses. Three of the four elective courses must be from any combination of the following: mathematics, science, computer science, engineering, student's interdisciplinary area, or studies required for graduate professional schools (e.g., business, pre-med or pre-law). Two of the four electives must be upper division courses. All students must have at least one science/engineering course as either an interdisciplinary or general elective. A list of approved science/engineering courses to fulfill this requirement is available from the department.

General (B.A. only): A minimum of 7 courses (21 credits). Courses should be chosen to meet prerequisite requirements of other courses. Four elective courses must be from any combination of the following: mathematics, science, computer science, engineering, student's interdisciplinary area, or studies required for graduate professional schools (e.g., business, pre-med or pre-law). Four of the seven electives must be upper division courses.

Mathematics (B.S. only): Math 222 or one 300 or 400 level course in mathematics.

Science (B.A. only): A two-course sequence (8 credit minimum) of laboratory science in physics, chemistry, biology, or as approved by advisor; both from same field.

Except as noted above, courses developed for the Engineering Technology programs may not be included in this program.

Refer to the General University Requirement section of this catalog for further information on electives.

Co-op

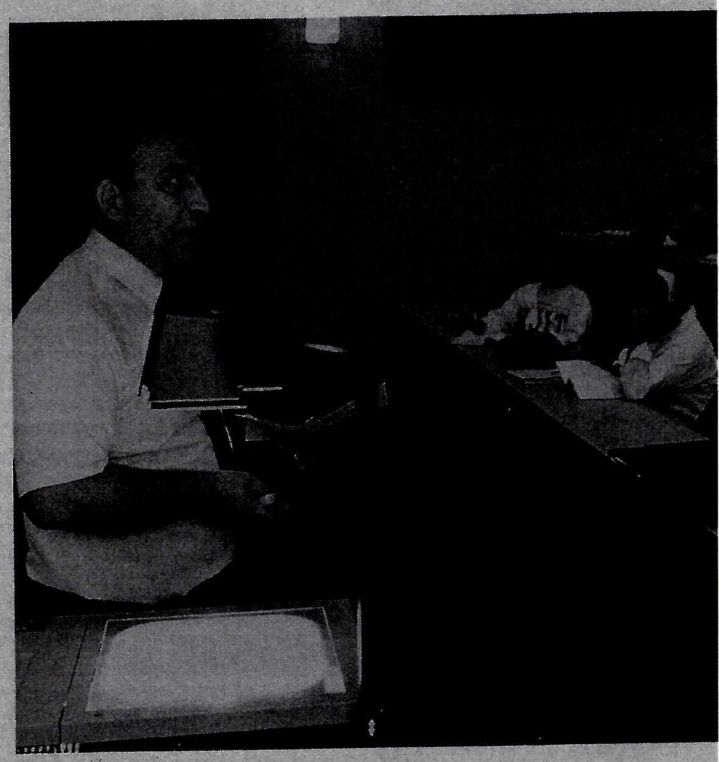
In computer science, CIS 310 and CIS 410 are taken for additive credit. With departmental approval, students may extend the project developed in CIS 410 to be used as an individual research project in CIS 491.

Electrical Engineering

Administered by: Department of Electrical and Computer Engineering. Tiernan Hall, Room 150.

Electrical engineering is a diversified and challenging profession concerned with the design, development, fabrication, and control of the electrical devices upon which our technological society so largely depends. Electrical engineers utilize their knowledge of devices and systems design in a multitude of areas. These include: integrated circuits, computers, environmental and biomedical instrumentation, energy conversion and distribution, space vehicle control, microprocessors, and satellite communications. The curriculum provides a broad education in mathematics, the physical sciences, humanities, and social sciences. Upon this foundation is built a depth of understanding in electrical engineering and related fields. In the senior year, students may emphasize an area of interest by selecting from a broad range of electives, including a systems pair in communications, control, computers, power, medical instrumentation or microwave/optics. The program seeks to produce an electrical engineer who can think analytically and creatively, work effectively, and communicate clearly with others. Electrical engineering graduates may enter industry in professional engineering work or pursue advanced studies in electrical engineering or a related field, such as biomedical engineering. They may also use their electrical engineering background as the basis for further study in a different field such as law or medicine.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the department to learn which curriculum applies.



■ B.S. in Electrical Engineering (141 credit minimum)

DAY PROGRAM

FIRST YEAR

1st Semester

Chem 115	Chemistry and Materials I	(3½-0-4½)
Chem 115A	Chem 115 Laboratory	(0-2-0)
*EG 101	Engineering Graphics	(1-2-2)
Eng 111	English Composition	(3-0-3)
Math 111	Calculus I	(4-0-4)
Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
PE - - -	Physical Education	(0-1-1)
Frsh Sem	Freshman Seminar	(1-0-0)

2nd Semester

Chem 116	Chemistry and Materials II	(3½-0-4½)
Chem 116A	Chem 116 Laboratory	(0-2-0)
*CIS 101	Computer Programming and Problem Solving	(2-1-2)
Hum 112	Culture and History I	(3-0-3)
Math 112	Calculus II	(4-0-4)
Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
PE - - -	Physical Education	(0-1-1)

SECOND YEAR

1st Semester

EE 231	Circuits and Systems I	(3-0-3)
EE 251	Digital Design	(3-0-3)
Math 213	Calculus III B	(4-0-4)
Phys 231	Physics III	(4-0-4)
Phys 231A	Physics III Laboratory	(0-2-1)
Hum 231	Culture and History II	(3-0-3)

2nd Semester

EE 232	Circuits and Systems II	(3-0-3)
EE 271	Electronic Circuits I	(3-0-3)
EE 291	Electrical Engineering Laboratory I	(0-3-1)
Math 222	Differential Equations	(4-0-4)
Mech 230	Statics and Dynamics	(4-0-4)
SS 201	Economics	(3-0-3)

THIRD YEAR

1st Semester

EE 333	Circuits and Systems III	(3-0-3)
EE 352	Microprocessors	(3-0-3)
EE 361	Electromagnetic Fields I	(3-1-3)
EE 372	Electronic Circuits II	(3-0-3)
EE 392	Electrical Engineering Laboratory II	(1-2-2)
Elective	(Social Science: Lower Division GUR)	(3-0-3)

2nd Semester

EE 321	Random Signals and Noise	(3-0-3)
EE 341	Energy Conversion	(3-0-3)
EE 362	Electromagnetic Fields II	(3-0-3)
EE 373	Electronic Circuits III	(3-0-3)
EE 393	Electrical Engineering Laboratory III	(1-2-2)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

FOURTH YEAR

1st Semester

EE 481	Communications Systems	(3-0-3)
EE 482	Control and Instrumentation Systems	(3-0-3)
EE 494	Electrical Engineering Laboratory IV	(1-2-2)
Elective	(EE)	(3-0-3)
Elective	(Management: GUR)	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

2nd Semester

EE 415	Electrical Engineering Project	(3-0-3)
**EE 484-9	EE Systems Elective	(3-0-3)
***EE 493-9	EE Systems Laboratory	(0-4-2)
ME 435	Thermodynamics	(3-0-3)
Elective	(Hum/SS/STS: Upper Division GUR)	(3-0-3)
Elective	(Approved)	(3-0-3)

*Paired courses. Half of the students will take these courses in reverse order.

EVENING PROGRAM

FIRST YEAR

1st Semester

Chem 115	Chemistry and Materials I	(3½-0-4½)
Chem 115A	Chem 115 Laboratory	(0-2-0)
Eng 111	English Composition	(3-0-3)
Math 111	Calculus I	(4-0-4)

2nd Semester

Chem 116	Chemistry and Materials II	(3½-0-4½)
Chem 116A	Chem 116 Laboratory	(0-2-0)
Hum 112	Culture and History I	(3-0-3)
Math 112	Calculus II	(4-0-4)

SECOND YEAR

1st Semester

Math 213	Calculus III B	(4-0-4)
Phys 111	Physics I	(3-0-3)
Phys 111A	Physics I Laboratory	(0-2-1)
EG 101	Engineering Graphics	(1-2-2)

2nd Semester

Math 222	Differential Equations	(4-0-4)
Phys 121	Physics II	(3-0-3)
Phys 121A	Physics II Laboratory	(0-2-1)
CIS 101	Computer Programming and Problem Solving	(2-1-2)

THIRD YEAR

1st Semester

EE 231	Circuits and Systems I	(3-0-3)
EE 251	Digital Design	(3-0-3)
SS 201	Economics	(3-0-3)

2nd Semester

EE 232	Circuits and Systems II	(3-0-3)
EE 271	Electronic Circuits I	(3-0-3)
Hum 231	Culture and History II	(3-0-3)

FOURTH YEAR

1st Semester

EE 291	Electrical Engineering Laboratory I	(0-3-1)
EE 352	Microprocessors	(3-0-3)
Mech 230	Statics and Dynamics	(4-0-4)

2nd Semester

EE 372	Electronic Circuits II	(3-0-3)
Phys 231	Physics III	(4-0-4)
Phys 231A	Physics III Laboratory	(0-2-1)

FIFTH YEAR

1st Semester

EE 361	Electromagnetic Fields I	(3-1-3)
EE 392	Electrical Engineering Laboratory II	(1-2-2)
Elective	(Social Science: Lower Division GUR)	(3-0-3)

2nd Semester

EE 333	Circuits and Systems III	(3-0-3)
EE 341	Energy Conversion	(3-0-3)
EE 362	Electromagnetic Fields II	(3-0-3)

SIXTH YEAR

1st Semester

EE 373	Electronic Circuits III	(3-0-3)
EE 393	Electrical Engineering Laboratory III	(1-2-2)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

2nd Semester

EE 321	Random Signals and Noise	(3-0-3)
EE 494	Electrical Engineering Laboratory IV	(1-2-2)
Elective	(Hum/SS/STS: Upper Division GUR)	(3-0-3)

SEVENTH YEAR

1st Semester

EE 481	Communications System	(3-0-3)
EE 482	Control and Instrumentation Systems	(3-0-3)
Elective	(Lit/Hist/Phil: GUR)	(3-0-3)

2nd Semester

**EE 484-9	EE Systems Elective	(3-0-3)
***EE 493-9	EE Systems Laboratory	(0-4-2)

EIGHTH YEAR

1st Semester

EE 415	Electrical Engineering Project	(3-0-3)
Elective	(EE)	(3-0-3)
Elective	(Management: GUR)	(3-0-3)

2nd Semester

ME 435	Thermodynamics	(3-0-3)
Elective	(Approved)	(3-0-3)

Notes

**One must be taken toward degree together with corresponding laboratory.

***Except EE 494. Only one can be taken toward degree.

Electives

Social Science Lower Division General University Requirement: Choose one course from SS 200, SS 210, SS 221, SS 231, or approved introductory courses offered by Rutgers-Newark in anthropology, political science, psychology, and sociology.

Hum/SS/STS Upper Division General University Requirement: A humanities or social science elective numbered 300 or higher. Acceptable course designations include anthropology, arts, economics, English (except Eng 342), history, humanities, literature, philosophy, political science, psychology, sociology, and STS (science, technology and society).

Lit/Hist/Phil General University Requirement: Two courses chosen from upper division electives in literature, history, or philosophy, but it is recommended that both not be from the same field. Qualified students may take Honors Seminars in the Humanities (Hum 491H-499H) to fulfill all or part of this requirement.

Management General University Requirement: Choose IE 492 or Mgmt 390. AS 333 may be substituted only by those students taking the aerospace option.

EE: Consult the department.

EE Systems: Chosen from one of six systems electives, such as computer, communication, power, control, medical instrumentation, and microwave/optics.

Approved: Consult the department.

Refer to the General University Requirement section of this catalog for further information on electives.

Co-op

Co-op courses bearing degree credit replace an elective or another course approved by the faculty advisor in the student's major department. In electrical engineering, EE 310 is taken for additive credit, and EE 411 is taken for degree credit.

Engineering Science

(Incorporating B.S./M.D. and B.S./D.M.D. Options)

Administration: Engineering science is an interdisciplinary program. It is overseen by a director in the Department of Chemical Engineering, Chemistry and Environmental Science. Tiernan Hall, Room 151.

The complexity of modern engineering problems often requires a team effort involving both scientists and engineers. For students interested in interdisciplinary problem solving, the B.S. in Engineering Science offers challenging, customized learning opportunities. In this program, students build upon a core curriculum with an individualized course of study in an interdisciplinary concentration. Popular concentrations include premedicine, predentistry, biomedical engineering, environmental science, and materials engineering. Students consult with the program director in developing their courses of study, which can be particularly suitable as preparation for graduate studies or professional work.

In addition, qualified students may enter accelerated joint degree programs that lead to the B.S. in Engineering Science from NJIT and either the M.D. degree from the University of Medicine and Dentistry of New Jersey (UMDNJ) New Jersey Medical School or the D.M.D. degree from the UMDNJ New Jersey Dental School. These seven-year joint degree programs are administered by the NJIT Honors Program and the engineering science program, in cooperation with the Honors Premedical and Predental Committees at NJIT. Students must be accepted into the accelerated programs in the senior year of high school.

The curriculum as described below is for students entering NJIT as freshmen in the fall of 1991 or after that date. Students entering before that date may have a different program and should consult the program director to learn which curriculum applies.

■ B.S. in Engineering Science Basic Program

(136 credit minimum)

A minimum of 136 credits is required for the B.S. in Engineering Science. Of those 136 credits, at least 30 credits are in a field of concentration that is developed with the approval of and in close consultation with the program director. Approval from the director is required prior to admission to the program.

Fields of concentration consist of advanced undergraduate courses that show a progression in depth of knowledge in a given area of study, culminating with a senior project or undergraduate thesis. Concentration courses may be from different departments, but they must comprise a coherent program of study. Specific courses required by the engineering science curriculum may be counted among the 30 credits if appropriate.

Courses in biological sciences are available at the adjacent Newark Campus of Rutgers University. Students who demonstrate exceptional ability may choose from offerings at the graduate level at NJIT, Rutgers, or the University of Medicine and Dentistry of New Jersey.

FIELDS OF CONCENTRATION

The following fields of concentration are available to engineering science students. Other fields of concentration may be formulated by individual students with the approval of the program director.

Materials Sciences and Engineering The materials sciences concentration will provide a strong background in the principles underlying the development of novel engineering materials that will be needed for the advanced technologies of the future.

Biomedical Engineering The biomedical engineering concentration will train students to understand how engineering principles are applied to the development of new medical diagnostic tools and treatment techniques.

Environmental Sciences The environmental sciences concentration will provide a facility for understanding the nature of environmental problems and for applying the latest technology to solve those problems.

Premedical/Predental These concentrations provide students with excellent preparation for medical or dental school.