Institutional Profile Report
2015

Prepared by the Office of Institutional Research and Planning
New Jersey Institute of Technology

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Statement of Accuracy and Completeness

The information contained in this report is, to the best of my knowledge, complete and accurate.

Joel S. Bloom

President

I. Table of Contents

A. Introduction

NJIT enrolled 10,646 students in Fall 2014. NJIT also awarded 2,204 degrees including baccalaureate through doctorate in the 2013-2014 fiscal year in an array of engineering and technology disciplines, computer and information science, architecture, management, applied sciences, mathematics and biotechnology. The university officially offers Ph.D. programs in 19 professional areas, master's programs in 59 specialties, and 51 baccalaureate degree programs; conducts research with important commercial and public policy applications; and performs a broad spectrum of economic development and public service activities. NJIT has one of the most computing-intensive campuses in America. NJIT also contributes significantly to New Jersey's economy and economic development. NJIT's students have provided 150,000 hours of community service over the past five years, and the university serves more than 5,000 elementary and secondary school students and teachers annually through an array of pre-college programs.

NJIT was founded in 1881 as the Newark Technical School. Today, the university has six schools and colleges: Newark College of Engineering (1919), the College of Architecture and Design (1973), the College of Science and Liberal Arts (1982), the School of Management (1988), the Albert Dorman Honors College (1993), and the College of Computing Sciences (2001). From the beginning, NJIT has provided government, industry, and the larger community with a technologically educated workforce. Today's emphasis on graduate studies and research builds upon the fine undergraduate programs that have distinguished the institution since its earliest days. Currently, about one-third of NJIT's students are enrolled in master's and doctoral programs.

NJIT's evolution as a significant research university has been achieved through an aggressive faculty recruitment plan matched by an extensive building effort that doubled the size of the main campus over the past decade and added major research facilities for environmental engineering and science, advanced manufacturing, and microelectronics. Annual research expenditures are now more than $110 million. The strong applications orientation of the university's research program has allowed NJIT to respond to state, federal, and industrial initiatives, to help address pressing public policy issues, and stimulate economic growth. Research activities, often carried out by interdisciplinary teams of investigators, are focused especially on manufacturing systems, infrastructure, information technologies, environmental engineering and science, architecture and building science, and management. Major funding for instructional and research programs is obtained from leading corporations, foundations and government agencies including the National Science Foundation, the United States Department of Defense, the U.S. Environmental Protection Agency, the U.S. Department of Transportation and many others.

NJIT's 45 acre, computing-intensive, residential campus is located in the University Heights section of Newark, less than 10 miles from New York City and Newark International Airport. It is easily reached by interstate highways and public transportation. Graduate, undergraduate, and continuing education classes are offered at the main campus, at extension sites at colleges and other locations throughout New Jersey and increasingly through a variety of electronically mediated distance learning formats.

B. NJIT Mission Statement

NJIT is the state's technological research university, committed to the pursuit of excellence—

- in undergraduate, graduate and continuing professional education, preparing students for productive careers and amplifying their potential for lifelong personal and professional growth
- in the conduct of research with emphasis on applied, interdisciplinary efforts encompassing architecture and the sciences, including the health sciences, engineering, mathematics, transportation and infrastructure systems, information and communications technologies
- in contributing to economic development through the state's largest business incubator system, workforce development, joint ventures with government and the business community, and through the development of intellectual property
- n service to both its urban environment and the broader society of the state and nation by conducting public policy studies, making educational opportunities widely available and initiating community-building projects.

NJIT prepares its graduates for positions of leadership as professionals and as citizens; provides educational opportunities for a broadly diverse student body; responds to needs of large and small businesses, state and local governmental agencies and civic organizations; partners with educational institutions at all levels to accomplish its mission; and advances the uses of science, technology, engineering and mathematics (STEM) as a means of improving the quality of life.

Core Values

Our core values reflect our beliefs, guide our behavior, shape our culture, and in so doing establish a sense of community, common purpose and student focus.

- Excellence—We innovate in the pursuit of excellence in all that we do and continue to improve in order to meet and sustain the highest standards of performance.

- Integrity—We are honest and ethical in all we do, keep our promises and acknowledge our mistakes.

- Civility—We treat each other with respect and with dignity.

- Social Responsibility—We pride ourselves in being an engaged partner enhancing the communities in which we live.

- Diversity—We celebrate the diversity of our university community and are sensitive to cultural and personal differences. We do not tolerate discrimination of any form.

- Communication—We strive to share information and understand each other's perspectives.

C. NJIT Strategic Plan: 2020 Vision

Strategic Priority 1: Students

Goal: In both undergraduate and graduate programs, new initiatives will refine and target admissions processes. Once enrolled at NJIT, students will receive the highest level of academic and social support to enable them to persist through a rigorous curriculum and become leaders in their professions or continue their studies at a more advanced level.

Objective 1.1: Admissions

To admit the students most likely to succeed at NJIT, graduate in a timely manner, and ensure they are capable of assuming leadership positions.

Strategy 1: Expand Communication and Information Channels

Implementation of aggressive marketing and recruitment strategies will help us identify prospective students and those who influence their decisions. These new marketing approached will create awareness of our academic community, articulate the rigor of the NJIT curriculum, and identify the benefits of an NJIT degree. Important to this strategy is the expansion of pipeline programs including pre-college activities and outreach to targeted high schools by departments, schools, and colleges.

Centralization of information using digital technology will increase our ability to manage the information needed to recruit and retain students. A suite of predictive analytics will allow us to further enhance our best practices.

Building of a robust data and analytics system which assembles records for all entering students and implementing an algorithm which uses this detailed applicant information to predict student success will help target the recruitment and admission of students with the preparation and skills needed for academic success at NJIT.

Strategy 2: Improve Graduate Student Recruitment

Recruitment of graduate students will adopt competitive practices including an earlier application deadline, timely offer letters, and competitive graduate stipend.

Recruitment of graduate students at the department level should become the norm, with emphasis on the following: student point of contact; peer outreach; and individual faculty outreach.
Analysis of graduate student success by departments/programs will result in a student success profile, which will inform and guide future admissions.

Strategy 3: Improve the Web Presence

Creation of a high-impact website will improve recruitment and better serve the needs of the NJIT community through increased communication and functionality.

Refinement of our expertise in and use of social networking will enhance communication efforts. Special attention will be given to use of social media in domestic and international recruiting efforts through the development of a market-driven digital plan designed to increase awareness of the NJIT brand through webpages, emails, electronic advertising, and other social media channels.

Objective 1.2: Persistence and Retention

To increase persistence and retention by strengthening student support.

Strategy 1: Design a Connected Academic Community

Expansion of Learning Communities for students across all majors will help undergraduate students receive consistent academic support as part of a cohort of students with similar curricular interests.

Enliven the student community through social media to connect students, faculty and staff and create a stronger NJIT identity.

Strategy 2: Standardize Academic Advisement

Development of university guidelines for advisement across academic departments will lead to timely graduation. Increased use of software tools can assist in tracking students and offering more effective advising.

Intensification of first-year advisement will aid students in selecting an appropriate undergraduate degree. NJIT students will be admitted to a college or school of their choice with the option of indicating a provisional major. University majors will be officially declared at the end of the first year.

Analysis of student data will target assistance for at-risk students and make possible timely intervention by faculty and advisors, followed by appropriate academic and student services support.

Enhancement of sophomore student support, with particular emphasis on the role of the faculty advisor in the major, will offer sophomores the support and resources to foster a smooth transition into their declared major.

Strategy 3: Improve Tutoring, Mentoring, and Student Support

Coordination of tutoring, mentoring, and student support through a *University Commons* will increase the management and effectiveness of these programs across the university.

Training of faculty, instructors, academic advisors, and mentors will ensure that retention is strengthened through uniform approaches to learning experiences, policies, and procedures.

Objective 1.3: Graduation

To ensure that more NJIT students graduate on time and without administrative obstacles.

Strategy 1: Offer Classes as Needed

Offering of all classes and sections required for a degree when students need them is critical for timely graduation.

Expansion of the scope of winter and summer sessions by offering additional sections, particularly online, will also facilitate timely graduation.

Strategy 2: Streamline the Graduation Process

Notification of students when they are nearing graduation should occur automatically, alerting students about the courses they still need.

Graduation of qualified students without a student-initiated graduation process will prevent administrative delays.

Expansion of advising and financial support for senior students will increase their chances of completing the final steps toward their degree.

Objective 1.4: Campus Quality of Life

To enhance the quality of campus life leading to increased student engagement, satisfaction, and pride.

Strategy 1: Improve Administrative Processes and Practices

Examination and modification of university academic and non-academic administrative policies, practices, and procedures will lend consistency and fairness to the continuing process of improving the campus quality of life.

Development of a service-focused message for all faculty and staff following the systematic examination will ensure that a consistent message of student-centeredness is achieved on campus.

Strategy 2: Address Student Issues Quickly

Development of a service center to promptly address student questions and direct students to appropriate departments and administrative offices as needed. This center will use social media and other digital applications, making the most effective use of current technology.

Strategy 3: Support Campus Activities

Facilitation of sustainable and supported campus events and experiences such as intramural athletics and competitive academic teams, such as debating and chess, will engage the entire university community and enhance campus life.

Development of an "events center" will provide space and support for student activities as well as provide venues for large community assemblies.

Strategic Priority 2: Learning

Goal: We will advance student learning success by achieving high standards of student-centered instruction and evidence-based assessment.

Objective 2.1: Curricular Reform

To ensure degree programs meet the needs of students and the demands of employers.

Strategy 1: Reform Undergraduate Education to meet Common Guidelines

Identification of the core learning outcomes for each academic degree and for the General University Requirements (GUR) will ensure that common outcomes are achieved.

Reform of the GUR should result in program that teaches students the general skills needed for professional success and engaged citizenship, and incorporate milestone experiences such as research, internships, service learning, international study, the arts, and civic engagement.

Allowance for modifications of credit requirements and semester load, in the short-term, will facilitate retention and graduation and reduce the costs of attending NJIT.

Implementation of a 4 X 4 curriculum in which students take four courses at four credits across four years of undergraduate study, in the long-term, will further improve retention and graduation rates and reduce degree costs.

Strategy 2: Innovate Graduate Education for Professional Enhancement

Creation of professional science master's (PSM) programs, intended for working professional students, and in collaboration with industrial partners, will provide these students with expertise in their discipline as well as competence in business, management, ethics, policy, and communication skills.

Creation of online applied master's programs will yield additional benefits for the university by attracting professionals and other working students.

Introduction of a doctoral program in the School of Management, the only school/college currently without such a program, will elevate the visibility and stature of the school in industry and academia.

Strategy 3: Continuously Update the Curriculum

Development of a program review process that considers feedback from professional accreditation agencies and input from industry will ensure that our curricula produce graduates with appropriate skills.

Objective 2.2: Convergence through Digital Learning

To embrace digital learning as the transformative strategy for the delivery of instruction across the curriculum, giving students control over time, place, path, and pace of education.

Strategy 1: Create an Instructional Culture of Digital Learning

Acceptance of digital learning will result in all instructors using converged technology to better engage students in the curriculum.

Achievement of the convergence of face-to-face and online modes of instructional delivery by use of advanced instructional technologies will eliminate the boundaries between the physical and virtual classrooms.

Implementation of digital learning technology will be supported, coordinated and refined throughout all levels of responsible university administration, faculty, and support units.

Application of adaptive learning systems will provide students with learning support through personalized digitally-based instruction, especially in the lower-level GUR courses in mathematics, the sciences, and writing.

Strategy 2: Assure Academic Rigor in the Converged Delivery Mode

Uniformity of academic standards, regardless of course delivery mode, will be achieved. All students will be held to the same standards for academic excellence because course content and learning outcomes are independent of the delivery mode.

Creation of a digital repository for learning artifacts will result in sharing of best instructional practice among faculty contribute to digital literacy among students, and facilitate the assessment of courses and degree programs.

Objective 2.3: Milestone Experiences

To give every undergraduate student in good standing credit-bearing unique learning opportunities through milestone experiences.

Strategy 1: Integrate Milestone Experiences into Undergraduate Degree Programs

Expansion of the Undergraduate Research and Innovation program will promote collaboration and will relate knowledge acquired in the classroom to applied research problems.

Development of curricular based co-ops and internships will enhance student opportunities for industry experience.

Integration of service learning projects in the Newark community and beyond into the GUR will involve undergraduate students in meaningful civic engagement.

Expansion of international experiences and integration of them into degree programs will allow undergraduate students to study, live, and work in new cultural environments and develop an understanding of their place in global society.

Strategy 2: Integrate Milestone Experiences into graduate programs

Fostering of research, industrial, service, and international learning experiences will enhance advanced study. New professional science master's programs and applied master's programs will receive special attention under this initiative.

Expansion of research and service, including civic engagement opportunities for graduate students, will advance the presence of the university locally, nationally and internationally.

Strategy 3: Promote Personal Milestone Experiences

Promotion of personal milestone experiences of all kinds will contribute to our student's personal academic development.

Objective 2.4: Professional Success

To provide the knowledge, skills, and experience recognized by employers and graduate schools so that students will be prepared to attain professional success and be prepared for leadership positions as professionals and citizens.

Strategy 1: Promote Paths to Professional Success

Preparation of our students to attain their first choice destination upon degree completion will assist them in gaining professional employment or graduate education.

Provision of professional development workshops will better prepare our students for success after graduation. Career Development Services will work with all

departments and degree programs to develop a workshop curriculum that meets the needs of specific careers.

Objective 2.5: Curricular Assessment

To assess student learning and use the results for course and program improvement, leading to increased rates of retention and graduation.

Strategy 1: Evaluate the Curriculum

Assessment of the curriculum is essential to its sustainability. Assessment resources will be employed to determine the success of implementation and the achievement of program learning outcomes.

Strategy 2: Develop an Academic Assessment Website

Demonstration of curricular assessment and the impact of that assessment must be communicated to the NJIT community. Special attention will be paid to the relationship between degree objectives and course outcomes and how both relate to institutional priorities.

Institution of yearly program self-assessments and cyclical program reviews by creating standardized, efficient, and transparent procedures for submission and assessment of reports through an intuitive, interactive website.

Strategy 3: Assess Student Professional Success

Tracking of recent alumni to periodically assess their success and satisfaction in their professional careers will contribute to improvements in the curriculum.

Strategic Priority 3: Scholarship

Goal: NJIT will build and sustain a national and international presence in research.

Objective 3.1: Promote Multidisciplinary Research

To take a leading research role in three emerging areas of multidisciplinary research: data science and information technology, convergence of the life sciences and engineering, and sustainable systems.

Strategy 1: Adopt Multidisciplinary Research Approaches

Promotion of multidisciplinary research will result in collaborative teams of researchers that will find innovative solutions to research problems.

Support of researchers participating in multidisciplinary research will lead to increased external funding, increased opportunities for publication, increased numbers of high-quality students interested in multi-disciplinary careers, and the increase of multi-disciplinary degree programs.

Collection of information related to current multidisciplinary research activities will provide a baseline upon which to build future multidisciplinary research initiatives.

Strategy 2: Develop Technology and Research Partnerships through the New Jersey Innovation Institute (NJII)

Integration of the private sector through the university's non-profit corporation, NJII, will yield flexibility in hiring non-faculty full-time researchers, advance commercialization and application of research outcomes, and encourage faculty to engage in entrepreneurial activities.

Objective 3.2: Transform the Academic Research Enterprise

To develop a research organization which supports, facilitates, and promotes faculty research success.

Strategy 1: Foster National and International Collaboration

Strengthening of collaboration among researchers at NJIT will increase the amount of multidisciplinary research.

Support of international collaborative research will promote innovative scholarship.

Strategy 2: Improve Communication

Communication of NJIT researchers' achievements in obtaining grants, publishing significant research results, and delivering significant research outcomes will improve the NJIT research image and disseminate the information needed to generate future collaborations.

Dissemination of grant opportunities to interested members of the university community, coupled with support and guidance in developing proposals, will promote increased grant applications and more competitive proposals.

Strategy 3: Management of Research

Development of policies that encourage multidisciplinary research such as the sharing of indirect income among PIs and academic units and establishing seed funding for emerging research topics will provide financial flexibility to research projects and improve faculty morale.

Offering of training and support in grant proposal design and writing will increase research success not only by increasing the number of awards, but also by to develop research ideas into competitive proposals.

Development of a searchable database of all NJIT submitted proposals, funded and not funded, will provide faculty researchers access to information on the research equipment on campus, and the managers of this equipment, and facilitate collaboration across departments and disciplines.

Improvement of the NJIT research data system to more accurately and completely reflect actual research activities will insure that projects with multiple investigators are given appropriate credit.

Reserving of the designation of "center" for consistently successful research initiatives will support research productivity. Strong labs should be developed into centers and unproductive centers should lose that designation.

Objective 3.3: Faculty Roles in Research

To foster increased faculty participation in collaborative research at NJIT.

Strategy 1: Increase Participation of Current Faculty in Research

Sustaining of equitable teaching load based on levels of scholarship and funding at comparable benchmark institutions will allow focused attention to research and research-based instruction.

Establishment of a competitive internal grant-funding program for innovative research that is unlikely to be funded through traditional processes will increase the amount of creative scholarship at the university.

Re-engagement of senior faculty members in scholarship by integrating them into existing or emerging research projects will increase overall research capacity at the university.

Strategy 2: Integrate Research into the Curriculum

Simultaneous advancement of faculty research outcomes and academic curriculum content will help build a community of researchers that include graduate students, and in some cases, undergraduate students.

Development of a faculty research lecture series open to all students will have curricular implications such as fulfilling seminar course requirements in graduate degree programs.

Strategy 3: Promote Graduate Student Research

Encouragement of research by graduate students and offering them appropriate mentoring and support will enhance the quality of research at the university and better prepare our graduate students for research careers.

Objective 3.4: Facilities and Administrative Planning

To optimize existing facilities and equipment while developing new infrastructure as necessary to support research, including multidisciplinary research.

Strategy 1: Optimize Start-up Processes and Resources

Flexibility of start-up funds usage for all new hires throughout their pre-tenure period in support of their scholarly will increase the opportunities for young faculty in establishing their research careers.

Assurance of a fully functional laboratory space for research upon appointment, or within a maximum of six months of the faculty hire date, will jump start new faculty research career at NJIT.

Strategy 2: Assess and Optimize Infrastructure

Assessment of infrastructure and documentation of capacity to determine the capability of this infrastructure to support teaching, learning, and research both within and across the disciplines will yield an understanding of university's research capability, including potential for collaboration across geographic locations.

Optimization of existing infrastructure use, and prioritizing of needs for new facilities, equipment and institutional infrastructure is essential to current and future research initiatives. It is a critical precondition for effective infrastructure investment.

Strategy 3: Share Facilities and Services with Industry and CHEN Institutions

Expansion of shared use facilities, equipment, and institutional support infrastructure with industry and Rutgers-Newark, Rutgers Biomedical and Health Sciences, and Essex County College will advance research by increasing access to research equipment and encouraging joint proposals and projects among institutions and industry-based researchers

Strategic Priority 4: Investments

Goal: To create a sustainable, continuously assessed and refined, multi-year campus plan for education and research investment that will allow NJIT to expand its state, regional, national, and international role as a science and technology research university.

Objective 4.1: Faculty Renewal

To hire, develop, and retain faculty, especially those with excellence in strategic educational and research areas.

Strategy 1: Develop Metrics for Faculty Productivity

Development of discipline-specific metrics for productivity will allow us to better attribute faculty contributions to the university's mission of instruction, research, service, and economic development.

Development of metrics for productivity will allow us to understand the elements of faculty success that can contribute to decisions about future faculty hiring.

Strategy 2: Engage in Strategic Hiring

Development of five-year hiring plans for each department, college, and school will build strength in areas that address departmental, college, and university.

Development of a mentoring plan for both faculty and instructional staff will yield a variety of benefits, from augmented external funding for research to excellence in teaching.

Targeted hiring of tenure track and tenured faculty will strengthen research in the targeted research areas.

Encouragement of joint academic appointments and development of clear guidelines for rewarding faculty participation in education and research activities in multiple departments will strengthen collaborative research and education.

Development of a plan for hiring tenure track and tenured faculty in interdisciplinary areas will enhance multidisciplinary research initiatives and provide collaborative approaches to student learning.

Maintenance of a balance among the three levels faculty appointments will help launch new interdisciplinary initiatives, sustain traditional research directions, and achieve competitiveness among our benchmark institutions.

Implementation of a transition to retirement program where faculty can reduce hours and responsibilities while retaining academic rank and continuing to contribute their expertise to the academic community will help achieve an appropriate balance of faculty at NJIT

Achievement of faculty diversity through a targeted recruitment and retention process by making available a competitive pool of funds for salary and start-ups to departments, schools, and colleges will increase the academic strength of the university.

Objective 4.2: Educational Support

To provide the level of educational support that allows for the achievement of excellence in undergraduate, graduate, and continuing professional education.

Strategy 1: Promote Teaching Excellence

Development of the Institute for Teaching Excellence as proposed in *the NJIT Academic Plan: 2013-2015* will support, promote, and enhance effective teaching. Under the direction of a community of teaching scholars, the Institute will provide consultation, resources, and programs to facilitate the professional development of faculty, lecturers, adjuncts, and graduate students.

Guidance of the Office of Academic Assessment to instructors in developing course learning outcomes and syllabus preparation will facilitate academic course and program assessment.

Strategy 2: Improve Academic Support

Development of a University Commons that serves as the center of academic support at NJIT will create an integrated learning space for academic excellence that encompasses many of the presently disparate locations across campus where advising, collaborative learning, and tutoring take place.

Training of students in the competencies of current digital technology related to their majors, and integrating this into the GUR, will provide graduates with technological knowledge and skills required by industry.

Adjustment of doctoral student support will make us more competitive, and improve graduate student recruitment, enrollment, and retention.

Strategy 3: Revise Non-Tenure Track Compensation and Career Tracks

Revision of the current compensation and advancement structure for non-tenure track instructional positions to ensure competitive salary ranges will improve recruitment and retention of highly qualified instructors.

Creation of a non-tenure-track, full-time Professor of Practice position will bring academic, business, industry, and government leaders into the instructional community of NJIT.

Development of processes to selectively transition experienced adjuncts into full-time, university lecturer positions will enhance instructional quality and longevity, while promoting commitment and loyalty to the university.

Development of processes to selectively transition highly qualified university lecturers into tenure-track faculty positions will foster professional development and promote commitment and loyalty to the university.

Objective 4.3: Research Support

To develop an infrastructure that provides effective support for current and future research in both STEM and non-STEM areas.

Strategy 1: Refine Administrative Research Support

Refinement of the administrative infrastructure for research support will streamline the administrative processes associated with both new multidisciplinary initiatives and traditional disciplinary research.

Strategy 2: Improve Research Services, Equipment, and Facilities

Strengthening of general research services and resources required for all types of will advance both research and economic development. Attention will be given to the following: journal databases competitive with those of benchmark universities; enhanced environmental health and safety support and required training; and special attention to the research needs of non-STEM disciplines.

Updating of existing common equipment through use of the Facilities Master Plan will reduce costs for core facilities use. Specifically, access to and maintenance of the following is required: water purification systems; shared computational resources and technologies; a university-wide large and fast automated data backup/storage system, including a university-wide computer cluster/cloud computing system; and or shared research space for groups of researchers, including students and external collaborators.

Development of a university policy on lab space through use of the Facilities Master Plan will allow administrative allocation and re-allocation of space based upon the researcher's activities as indicated by publications, grants, student advisement, and other appropriate quantitative measures.

Strategy 3: Enhance institutional support for non-faculty research staff

Development of a policy for professional growth, academic participation, and institutional support of post-doctoral fellows, research professors, and other non-faculty research staff will help maintain the quality and productivity of, enhance multidisciplinary research efforts, and contribute to the learning experiences of graduate and undergraduate students.

Objective 4.4: Infrastructure Support for Facilities and Technology

To provide a campus environment that includes state-of-the-art technology and a visually appealing campus environment that supports the needs of top-tiered research university.

Strategy 1: Use the Facilities Master Plan for Physical Planning Decisions

Use of the Facilities Master Plan will allow us to prepare the campus for the demands of contemporary educational, research, and community needs. The Master Plan will include considerations for digitally-enabled common, instructional an; collaborative spaces; short-term major construction projects; construction of an events center; and parking. Life cycle industry standards for facilities maintenance and capital improvements must be followed. .

Strategy 2: Use the Technology Plan for Campus Technology Decisions

Use of the Technology Plan will allow the university to incorporate the latest advances in computing, information, and communications technology. The annual capital budget developed and submitted to the Board of Trustees must include a technology renewal component in addition to capital facilities renewal.

Strategic Priority 5: Community

Goal: To unify the disparate elements of our vibrant and diverse university community.

Objective 5.1: Building a Global Community

To foster a global community at NJIT and improve the university's standing by developing an international presence.

Strategy 1: Acceptance of Diversity

Acceptance of diversity as a core value of NJIT will be achieved by focusing on the creation of visible activities in support of diversity and multi-cultural affairs on the campus.

Strategy 2: Offer College/School-based International Students Support in their own colleges

Training of selected staff in departments, schools, and colleges to better communicate with international students to address their unique issues will promote integration, address international student concerns, and foster a more engaged international community.

Strategy 3: Simplify the Process for International Collaboration and Exchanges

Establishment of a larger scale, long term exchange programs with international universities will offer important overseas milestone experiences for NJIT students while bringing students from other cultural and academic traditions to NJIT.

Standardization of a streamlined approval process and assignment of individual responsibility for international agreements will simplify procedures and make them more effective.

Encouragement and simplification of visiting and courtesy appointments will promote global collaboration, enhance research, and improve the university's international standing.

Encouragement of significant research projects between NJIT and international researchers will increase creativity and innovation.

Strategy 4: Appoint NJIT Faculty as International Community Representatives

Leveraging of globally diverse NJIT faculty as spokespersons will enhance the university's global presence and communicate the needs and concerns of the international community of students and scholars on our campus.

Objective 5.2: Diverse Faculty Leadership

To achieve a significant, meaningful increase in the number of women and underrepresented minority tenure and tenure-track faculty and instructors in non-tenure track positions.

Strategy 1: Institutionalize Support for Diversity

Establish an informed baseline for diversity assessment.

Build on the Affirmative Action Plan to develop a comprehensive NJIT Diversity Plan that addresses the needs of faculty, staff, and students.

Strategy 2: Coordinate Recruitment and Retention

Increase coordination of efforts to recruit and retain women and minority faculty by appointing a diversity liaison officer at college and university levels charged with coordinating and assessing NJIT's efforts to recruit and retain women and URM faculty.

Coordination of resources and information to recruit diverse faculty at college, school, and department levels will meet local needs while promoting institutional diversity.

Engagement of college and school deans to develop plans for achieving faculty diversity. These plans should describe how the increased recruitment and retention of women and URM faculty and instructors will be achieved, while ensuring that that they are consistent with Federal and State laws and employment regulations.

Continuous development of potential faculty through conferences and speaking engagements to increase the likelihood of successful diversity hiring.

Training of search committee for accountability, especially in implicit bias awareness, will increase effectiveness of diversity recruitment and improve search outcomes.

Objective 5.3: Diverse Administrator Leadership

To achieve a significant, meaningful increase in the number of women and underrepresented minority administrators.

Strategy 1: Utilize Existing Databases Containing Administrator Rank and Diversity Data

Better utilization of university databases that contain both administrator rank and diversity data to accurately assess diversity within and across established bands of administrative rank and identify departmental gaps that need to be corrected.

Strategy 2: Develop and Sustain a Diverse Talent Pool

Establishment of a diverse administrative talent pool to yield opportunities and pathways for professional growth and advancement that will, lead to robust diversity in institutional leadership at all administrator levels.

Establishment of relationships with professional organizations to cultivate diverse participation on the university's volunteer leadership boards. Inclusion of a statement of commitment to diversity in all volunteer boards will facilitate the attraction of diverse leadership.

We celebrate the diversity of our university community and are sensitive to cultural and personal differences. We do not tolerate discrimination of any form.

D. Undergraduate Recruitment and Admissions Policies

As a public institution, NJIT strives to achieve three complementary and mutually reinforcing goals through its undergraduate recruitment and admissions policies:

- To attract highly talented students who are fully prepared for the university's rigorous curricular demands and can satisfy the highest academic standards;
- To enroll students from population groups that are under-represented in the professions, while providing the extra academic support they may need; and
- To recruit and admit students who will successfully complete one of NJIT's curricula in numbers large enough to make a substantial contribution toward meeting state and national demands for technological and managerial professionals.

These three goals are complementary and mutually reinforcing. They clearly reflect the responsibilities of a public institution with a public mission. And they are consistent with NJIT's long-range vision of joining the ranks of the nation's leading technological research universities.

There are four avenues to undergraduate admission:

- Admission to the Albert Dorman Honors College
- Regular admission
- Admission to the Educational Opportunity Program (EOP)
- Admission as a transfer student from another college or university

NJIT uses multiple methods to determine an applicant's admissibility. No single measure is sufficient to predict success. Therefore, all of the following are considered: high school transcripts and rank-in-class data; college or university transcripts where applicable; recommendations; SAT scores; interviews of candidates seeking admission to the Honors College or admission through

the Educational Opportunity Program; and portfolios for candidates seeking admission to the College of Architecture and Design.

The *Albert Dorman Honors College* program is designed to attract exceedingly able and highly motivated students to NJIT, to provide a rich and challenging educational experience, and to prepare them for positions of leadership. Some NJIT courses are open only to honors students, but most include both honors and non-honors students; by participating in classes and laboratories with others, the honors students raise the level of discourse in all of NJIT's curricula. The SAT profile of the honors students (required minimum composite score of 1250) falls within the range that many people believe is not served by New Jersey's institutions. Enrollment in the *Albert Dorman Honors College* increased from 209 scholars in Fall 1993 to 718 in Fall 2014. The university's plans call for further significant expansion of the Honors College.

NJIT also has an outstanding *Educational Opportunity Program* (EOP) with an enrollment of 701 undergraduates in Fall 2014. It is a program of extraordinary importance to the state and nation because the people it typically serves are under-represented in the fields which NJIT prepares students to enter, and successful completion of an NJIT degree program generally leads to a productive career. The success of EOP graduates over a quarter century is further proof that multiple criteria should be used in determining who can benefit from the higher education experience. It should also be noted that the state, through its Educational Opportunity Fund, has by regulation required institutions to admit educationally and economically disadvantaged students in numbers equal to at least ten percent of the New Jersey high school graduates in each entering class. Because of NJIT's specialized mission and sense of commitment, NJIT has historically exceeded this percentage. NJIT firmly believes holding open this door to opportunity is one of the strengths of our state system of higher education.

NJIT is proud of the results achieved with its undergraduate recruitment and admissions policies. *Diversity* is a hallmark of the campus community. As the state's public technological research university, NJIT admits individuals who want to study in the fields it offers, regardless of personal background or family finances. Of all senior public institutions in NJ, NJIT serves the highest percentage of economically challenged students. It also offers 65% of undergraduate students financial aid. NJIT selects those who indicate a strong desire to succeed. For those who do succeed, the experience is life transforming. We believe this is what a public university should be about in a democratic society.

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II. Data by Category

II.A. Accreditation Status

II.A.1. Institutional Accreditation

- The Middle States Association of Colleges and Schools (2002)
    - Additional Middle States accredited site in Beijing, China

In its session of June 28, 2012, the Middle States Commission on Higher Education acted to reaffirm accreditation for NJIT until the time of its next Periodic Review Report in 2017.

The report of the Middle States Commission evaluation team, led by Dr. Robert Palazzo, says:

"The New Jersey Institute of Technology meets or exceeds all fourteen standards outlined in the Characteristics of Excellence in Higher Education."

"The New Jersey Institute of Technology is making a disproportionate impact in higher education given its means. In particular, NJIT is providing an admirable service to first-in-family students attending college. The students are excellent, well trained, and graduates are highly successful after leaving the university. NJIT's success in providing a first-class education and college experience to a diverse student body is enviable."

The full report of the evaluation team may be found on the NJIT Middle States Accreditation home page at http://www.njit.edu/middlestates/evaluation.php

II.A.2. Professional Accreditation

- American Assembly of the Collegiate Schools of Business (AACSB)
- Computer Accreditation Commission of the Accreditation Board for Engineering and Technology (CAC/ABET)
- Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET)
- National Architecture Accrediting Board (NAAB)

II.B. Number of Students Served

II.B.1. Number of Undergraduate Students by Attendance Status

Table II.B.1:
Undergraduate Enrollment by Attendance Status, Fall 2014

Full-time		Part-time		Total
Num	Pct	Num	Pct	
5,923	78.5%	1,627	21.5%	7,550

Source: IPEDS Fall Enrollment Survey

II.B.2. Number of Graduate Students by Attendance Status

Table II.B.2:
Graduate Enrollment by Attendance Status, Fall 2014

Full-time		Part-time		Total
Num	Pct	Num	Pct	
1,802	58.2%	1,294	41.8%	3,096

Source: IPEDS Fall Enrollment Survey

II.B.3. Number of Non-Credit Students Served

NJIT served 576 non-credit students in fiscal year 2014.

II.B.4. Unduplicated Number of Students for Entire Academic Year

Table II.B.4:
Unduplicated Enrollment, FY 2014

	Headcount Enrollment	Credit Hours	FTE
Undergraduate	8,345	198,890	8,287
Graduate	3,610	44,034	2,446
TOTAL	11,955	242,924	10,733

Source: IPEDS 12-Month Enrollment Survey

II.C. Characteristics of Undergraduate Students

II.C.1. Mean Math, reading and writing SAT Scores

Table II.C.1:
Mean Math, Reading and Writing SAT Scores for First-Time Freshmen, by Admission Status and Overall, Fall 2014

	Full-Time Students							Part-Time Students					
	Math	N	Reading	N	Writing	N		Math	N	Reading	N	Writing	N
Regular Admits	631.7	814	569.2	814	561.5	814		541.3	91	450.7	91	461.3	91
EOF Admits	555.2	48	446.7	48	434.5	48		0.0	0	0.0	0	0.0	0
Special Admits	0.0	0	0.0	0	0.0	0		0.0	0	0.0	0	0.0	0
All Admits	627.5	862	562.4	862	554.5	862		541.3	91	450.7	91	461.3	91
Missing Scores		77		77		77			5		5		5

Source: SURE Fall Enrollment file

II.C.2. Enrollment in Remediation Courses by Subject Area

IIC.2 ENROLLMENT IN REMEDIATION COURSES

Total Number of Undergraduate Students Enrolled in Fall 2014

Total Undergraduate Enrollment	Number of Students Enrolled in One or More Remedial Courses	% of Total
7,550	109	1.4%

Total number of First-time, Full-time (FTFT) students enrolled in remediation in Fall 2014

Total Number of FTFT Students	Number of FTFT Students Enrolled in One or More Remedial Courses	Percent of FTFT Enrolled in One or More Remedial Course
953	69	7.2%

First-time, Full-time students (FTFT) enrolled in remediation in Fall 2014 by subject area

Subject Area	Number of FTFT Enrolled In:	Percent of all FTFT Enrolled In:
Computation	0	0.0%
Algebra	0	0.0%
Reading	0	0.0%
Writing	0	0.0%
English	69	7.2%

Source: SURE Fall Enrollment file

II.C.3 Race/ Ethnicity, Gender, and Age

Table II.C.3.a

Undergraduate Enrollment by Race/Ethnicity, Fall 2014

	White		Black		Hispanic		Asian*		American Ind.		Alien		Race Unknown*		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Full-time	1970	33.3%	527	8.9%	1173	19.8%	1365	23.0%	2	0.0%	286	4.8%	600	10.1%	5,923	100.0%
Part-time	396	24.3%	143	8.8%	302	18.6%	230	14.1%	1	0.1%	53	3.3%	502	30.9%	1,627	100.0%
Total	2,366	31.3%	670	8.9%	1,475	19.5%	1,595	21.1%	3	0.0%	339	4.5%	1,102	14.6%	7,550	100.0%

* Note: Asian includes Pacific Islanders and Unknown includes 2 or More Races.

Table II.C.3.b

Undergraduate Enrollment by Sex, Fall 2014

Full-time					Part-time					Total				
Male	Pct	Female	Pct	Total	Male	Pct	Female	Pct	Total	Male	Pct	Female	Pct	Total
4,653	78.6%	1,270	21.4%	5,709	1,088	69.3%	500	30.7%	1,627	5,780	76.6%	1,770	23.4%	7,550

Table II.C.3.c

Undergraduate Enrollment by Age, Fall 2014

		LT 18	18-19	20-21	22-24	25-29	30-34	35-39	40-49	50-64	65+	Unknown	Total
Full-time	Num	13	1,658	1,892	1,571	544	159	55	21	10	0	0	5,923
	Pct	0.2%	28.0%	31.9%	26.5%	9.2%	2.7%	0.9%	0.4%	0.2%	0.0%	0.0%	100%
Part-time	Num	85	264	270	418	278	138	82	59	25	3	5	1,627
	Pct	5.2%	16.2%	16.6%	25.7%	17.1%	8.5%	5.0%	3.6%	1.5%	0.2%	0.3%	100%
Total	Num	98	1,961	2,162	1,989	822	297	137	80	35	3	5	7,550
	Pct	1.3%	26.8%	28.6%	26.3%	10.9%	3.9%	1.8%	1.1%	0.5%	0.0%	0.1%	100%

Source: IPEDS Fall Enrollment Survey

II.C.4. Numbers of Students Receiving Financial Assistance under Each Federal-, State-, & Institution-Funded Aid Program

Table II.C.4:
Financial Aid from Federal, State & Institution-Funded Programs, AY 2014-15

	Recipients	Dollars($)	$/Recipient
FEDERAL PROGRAMS			
Pell Grants	2,937	12,119,000	4,126.32
College Work Study	239	326,000	1,364.02
Perkins Loans	778	430,000	552.70
SEOG	742	272,000	366.58
PLUS Loans	212	2,803,000	13,221.70
Stafford Loans (Subsidized)	3,166	13,932,000	4,400.51
Stafford Loans (Unsubsidized)	2,774	10,956,000	3,949.53
SMART & ACG or other	0	0	--
STATE PROGRAMS			
Tuition Aid Grants (TAG)	2,357	17,053,000	7,235.04
Educational Opportunity Fund (EOF)	461	520,000	1,127.98
Outstanding Scholars (OSRP)	5	54,000	--
Distinguished Scholars	1	1,000	1,000
Urban Scholars	18	18,000	1,000
NJ STARS	28	54,000	1,928.57
NJCLASS Loans	185	2,371,000	12,816.22
INSTITUTIONAL PROGRAMS			
Grants/Scholarships	2,254	19,890,000	8,824.31
Loans	0	0	--

Source: NJIPEDS Form #41 Student Financial Aid Report

II.C.5. Percentage of Students who are New Jersey Residents

Table II.C.5
Fall 2014 Full-time First-time Undergraduate Enrollment by State Residence

State Residents	Non-State Residents	Total	% State Residents
891	159	1,050	84.9%

Source: IPEDS Fall Enrollment Survey

Table II.C.5
Fall 2014 Undergraduate Enrollment by State Residence

State Residents*	Non-State Residents	Total	% State Residents
7,220	330	7,550	95.6%

*includes State unknown
Source: IPEDS Fall Enrollment Survey

II.D. Student Outcomes

II.D.1. Graduation Rates

II.D.1.a. Four-, Five- and Six-Year Graduation Rate by Race/Ethnicity

Table II.D.1.a
Four-, Five- and Six-Year Graduation Rates of Fall 2008 Full-time First-time Degree-Seeking Undergraduates by Race/Ethnicity

	White		Black		Hispanic		Asian		Alien		Other *		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Fall 2008 Cohort	326		64		151		177		28		33		779	
Graduates after 4 years	78	23.9%	8	12.5%	25	16.6%	60	33.9%	8	28.6%	6	18.2%	185	23.7%
Graduates after 5 years	170	52.1%	20	31.3%	71	47.0%	97	54.8%	14	50.0%	14	42.4%	386	49.6%
Graduates after 6 years	202	62.0%	25	39.1%	90	59.6%	107	60.5%	16	57.1%	16	48.5%	456	58.5%

* Other includes American Indians, Native Hawaiian & Pacific Islanders, 2 or More Races and Unknown.

Source: IPEDS Graduation Rate Survey

II.D.2. Third-Semester Retention Rates

II.D.2.a. By Attendance Status

Table II.D.2
Third Semester Retention of First-time Undergraduates, Fall 2013 to Fall 2014

Full-Time				Part-Time		
Fall 2013 First-Time Undergraduates	Retained in Fall 2014	Retention Rate		Fall 2013 First-Time Undergraduates	Retained in Fall 2014	Retention Rate
957	802	83.8%		72	62	86.1%

SOURCE: IPEDS Fall Enrollment Survey, Part E

II.E. Faculty Characteristics

II.E.1 Full-Time Faculty by Race/Ethnicity, Sex, and Tenure Status

Table II.E.1:
Full-Time Faculty by Race/Ethnicity, Sex, Tenure Status and Academic Rank, Fall 2014

	White		Black		Hispanic		Asian*		American Ind.		Alien		Race Unknown*		Total	
	Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom
Tenured																
Professors	53	10	3	1	1	0	18	0	0	0	0	0	14	1	89	12
Associate Prof.	51	7	2	2	1	1	17	6	0	0	2	1	13	1	86	18
Assistant Prof.	10	4	1	0	2	2	11	3	0	0	6	2	0	0	30	11
All Others	12	1	2	2	0	0	6	0	0	0	0	0	3	0	21	1
TOTAL	126	22	8	5	4	3	52	9	0	0	8	3	30	2	228	42
Without Tenure																
Professors	10	0	1	0	0	0	1	2	0	0	2	0	1	0	15	2
Associate Prof.	2	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0
Assistant Prof.	0	0	0	0	0	0	1	0	0	0	3	0	0	0	4	0
All Others	52	32	3	1	4	0	6	2	0	0	4	0	8	0	77	35
TOTAL	64	32	4	1	4	0	8	4	0	0	9	0	10	0	99	37
Total																
Professors	63	10	4	1	1	0	19	2	0	0	2	0	15	1	104	14
Associate Prof.	49	7	2	2	1	1	17	6	0	0	2	1	14	1	85	18
Assistant Prof.	10	4	1	0	2	2	12	3	0	0	9	2	0	0	34	11
All Others	64	33	3	3	4	0	12	2	0	0	4	0	6	0	93	38
TOTAL	190	54	10	6	8	3	60	13	0	0	17	3	40	2	327	79

Source: IPEDS Human Resources Survey
* Note: Asian includes Pacific Islanders and Unknown includes 2 or More Races.

II.E.2.Percentage of Course Sections Taught by Full-Time Faculty

Fall 2013

Total Number of Course Sections	Taught by Full-time Faculty		Taught by Part-time Faculty		Taught by Others*	
	Number	Percent	Number	Percent	Number	Percent
	912	64%	301	21%	213	15%

Note: Others includes Full-time Administrators and Teaching Assistants

II.E.3.Ratio of full- to part-time faculty

Fall 2014

Full-time		Part-time		Total	
Num	**Pct**	**Num**	**Pct**	**Num**	**Pct**
406	60%	272	40%	678	100%

Source: IPEDS Human Resources Survey

II.F. Characteristics of the Trustees or Governors

II.F.1. Race/ Ethnicity and Sex

Board of Trustees by Gender and Ethnicity

	B	AI/AN	A/PI	H	W	Total
Male	0	0	1	0	11	12
Female	0	0	1	1	0	2
Total	0	0	0	0	0	14

B : Black/African American, Non-Hispanic
AI/AN : American Indian/Alaskan Native
A/PI : Asian/Pacific Islander
NRA : Non-Resident Alien
H : Hispanic
W : White, Non-Hispanic
U : Unknown

II.F.2. List of Trustees/ Governors with Titles and Affiliations

- Hon. Christopher J. "Chris" Christie, ex-officio,
  Governor of the State of New Jersey
- Hon. Ras J. Baraka, ex-officio,
  Mayor of the City of Newark
- Stephen P. DePalma, PE, PP, CME '72, (Chair)
  Chairman and CEO (Ret.),
  Schoor DePalma, Inc.,
- Dr. Vincent L. DeCaprio ' 72 (Co-Vice Chair)
  President (Ret.),
  Vyteris, Inc.
- Philip K. Beachem,
  President,
  New Jersey Alliance for Action
- Dennis M. Bone ,
  President (Ret.),
  Verizon New Jersey, Inc.
- Peter A. Cistaro '68,
  Vice President, Gas Delivery (Ret.)
  Public Service Electric and Gas Company
- C. Stephen Cordes '72 (Co-Vice Chair)
  Managing Director (Ret.)
  Clarion Partners
- Gary C. Dahms, PE, PP, CME,
  President & CEO
  T&M Associates
- Elizabeth ("Liz") Garcia, PE '73, (Co-Vice Chair)
  Manager, Public Affairs (Ret.)
  Infineum USA, LP

- Anthony J. Knapp Jr.,
  Proprietor (formerly),
  Black Horse Restaurant Group
- Ranjini Poddar
  President
  Artech Information Systems, LLC
- Lawrence A. Raia, P.E. '65,
  Partner,
  Raia Properties
- Anthony R. Slimowicz, Esq.
  Sr. VP/ Chief Claims Officer
  Crum & Forster
- Dr. Binay Sugla,
  Chairman
  Vesta LLC
- Joseph M. Taylor
  Chairman & CEO
  Panasonic Corporation of North America

II.F.3. URLs of WebPages with Information on Trustees/ Governors

- http://www.njit.edu/about/boards/trustees/members.php

II.G. Profile of the Institution

II.G.1. Degree and Certificate Programs

NJIT offered 129 degree programs (51 Bachelor's degree programs, 59 Master's programs, and 19 Doctoral programs) during fiscal year 2014:

Bachelors Degrees (51 programs, CIP Code listed after program name)

Applied Mathematics (W/ Rutgers-Nwk) (B.A.) 270301	Electrical Engineering (B.S.) 141001
Applied Physics (W/ Rutgers-Newark) (B.S.) 400801	Engineering Science (B.S.) 141301
Architecture (B.Arch.) 040201	Engineering Technology (B.S.) 150000
Architecture (B.S.) 040201	Enterprise Development (B.S.) 529999
Bachelor of General Studies (B.G.S.) 240102	Environmental Engineering (B.S.) 141401
Biochemistry (B.S.) 260202	Environmental Sciences (W/ Rutgers-Nwk) (B.S.) 030104
Bioinformatics (B.S.) 261103	Fine Arts (B.F.A.) 500701
Biology (W/ Rutgers) (B.A.) 260101	Geoscience Engineering (W/ Rutgers-Nwk) (B.S.) 143901
Biology (W/ Rutgers) (B.S.) 260101	History (W/ Rutgers-Nwk) (B.A.) 540101
Biomedical Engineering (B.S.) 140501	Human Computer Interaction (W/ Rutgers-Nwk) (B.S.) 110401
Biophysics (B.S.) 260203	Industrial Design (B.S.) 049999
Business (B.S.) 520201	Industrial Engineering (B.S.) 143501
Business & Information Systems (B.S.) 110401	Industrial Engineering [Dual W/ Rutgers-Nwk B.A. In Physics] (B.S.) 143501
Chemical Engineering (B.S.) 140701	Information Systems (W/ Rutgers) (B.A.) 110401
Chemistry (B.S.) 400501	Information Technology (B.S.) 110103
Civil Engineering (B.S.) 140801	Interior Design (B.A.) 500408
Clinical Laboratory Sciences (w/Rutgers) (B.S.) 511099	International Business (B.S.) 521101
Communication and Media (B.A.) 231303	Law/Technology and Culture (B.A.) 229999
Communication and Media (B.S.) 231303	Manufacturing Engineering (B.S.) 143601
Computational Sciences (B.S.) 261103	Mathematical Sciences (B.S.) 270101
Computer Engineering (B.S.) 140901	Mechanical Engineering (B.S.) 141901
Computer Science (B.S.) 110101	Science/Technology & Society (B.S.) 301501
Computer Science (W/ Rutgers) (B.A.) 110101	Science/Technology & Society (W/ Rutgers) (B.A.) 301501
Computing and Business (B.S.) 110701	Theater Arts & Technology (B.A.) 500502
Digital Design (B.A.) 100304	Web & Information Systems (B.S) 110401
General Studies (B.G.S)	

NJIT's accelerated programs

NJIT offers or participates in 9 accelerated programs:

- B.S./M.S.
- B.Arch./M.S.
- B.S./M.S. with Kean University
- B.S./D.M.D. with Rutgers Biomedical and Health Sciences
- B.S./M.D. with Rutgers Biomedical and Health Sciences
- B.S./D.P.T. with Rutgers Biomedical and Health Sciences
- B.S./M.D. with St. George's University School of Medicine
- B.S./O.D. with the State University of New York-New York School of Optometry
- B.S./J.D. with Seton Hall University School of Law-Newark

Masters Degrees (59 programs, CIP Code listed after program name)

Applied Mathematics (M.S.) 270301	History (W/ Rutgers) (M.A.) 540101
Applied Physics (W/ Rutgers-Newark) (M.S.) 400801	History (W/ Rutgers) (M.A.T.) 540101
Applied Science (M.S.) 409999	Industrial Engineering (M.S.) 143501
Applied Statistics (M.S.) 270501	Information Systems (M.S.) 110401
Architecture (M.Arch.) 040201	Infrastructure Planning (M.I.P.) 040301
Architecture (M.S.) 040201	Interdisciplinary Studies (M.S.) 309999
Bioelectronics (M.S.) 140501	International Business (M.S.) 521101
Bioinformatics (M.S.) 261103	Internet Engineering (M.S.) 110901
Biology (W/ Rutgers) (M.S.) 260101	IT Administration and Security (M.S.) 110103
Biomedical Engineering (M.S.) 140501	Management (M.S.) 520201
Biostatistics (M.S.) 261102	Management of Technology (M.B.A.) 520299
Business and Information Systems (M.S.) 110401	Manufacturing Systems Engineering (M.S.) 143601
Chemical Engineering (M.S.) 140701	Materials Science & Engineering (M.S.) 141801
Chemistry (M.S.) 400501	Mathematical and Computational Finance (M.S.) 270301
Civil Engineering (M.S.) 140801	Mechanical Engineering (M.S.) 141901
Computational Biology (W/ Rutgers-Nwk) (M.S.) 261103	Occupational Safety & Health Engineering (M.S.) 142701
Computer Engineering (M.S.) 140901	Occupational Safety & Industrial Hygiene (M.S.) 150701
Computer Science (M.S.) 110101	Pharmaceutical Bioprocessing (M.S.) 144301
Computing and Business (M.S.) 110701	Pharmaceutical Chemistry (M.S.) 512004
Critical Infrastructure Systems (M.S.) 142701	Pharmaceutical Engineering (M.S.) 140701
Cyber Security & Privacy (M.S.) 111003	Pharmaceutical Materials Processing (M.S.) 141801
Electrical Engineering (M.S.) 141001	Pharmaceutical Systems Management (M.S.) 142701
Emergency Management & Business Continuity (M.S.) 110199	Power & Energy Systems (M.S.) 141001

Engineering Management (M.S.) 151501	Professional & Technical Communication (M.S.) 231303
Engineering Science (M.S.) 141301	Public Health (W/ UMDNJ & Rutgers) (M.P.H.) 512201
Enterprise Development (M.S.) 529999	Software Engineering (M.S.) 140903
Environmental and Sustainability Policy (M.S.) 440501	Telecommunications (M.S.) 141001
Environmental Engineering (M.S.) 141401	Transportation (M.S.) 140804
Environmental Science (W/ Rutgers-Nwk) (M.S.) 030104	Web Systems (M.S.) 111004
Healthcare Systems Management (M.S.) 510702	

Doctoral Degrees (19 programs, CIP Code listed after program name)

Applied Physics (W/ Rutgers-Newark) (Ph.D.) 400801
Biology (W/ Rutgers) (Ph.D.) 260101
Biomedical Engineering (W/ UMDNJ) (Ph.D.) 140501
Chemical Engineering (Ph.D.) 140701
Chemistry (Ph.D.) 400501
Civil Engineering (Ph.D.) 140801
Computer & Information Science (Ph.D.) 110101
Computer Engineering (Ph.D.) 140901
Computer Science (Ph.D.) 110701
Electrical Engineering (Ph.D.) 141001
Environmental Engineering (Ph.D.) 141401
Environmental Science (W/ Rutgers-Nwk) (Ph.D.) 030104
Industrial Engineering (Ph.D.) 143501
Information Systems (Ph.D.) 110401
Materials Science & Engineering (Ph.D.) 141801
Mathematical Sciences (W/ Rutgers) (Ph.D.) 270101
Mechanical Engineering (Ph.D.) 141901
Transportation (Ph.D.) 140804
Urban Systems (W/ Rutgers & UMDNJ) (Ph.D.) 459999

NJIT teaches, advises, and mentors doctoral students in one degree program where Rutgers University is the degree-granting institution:

- Management *(Ph.D.)* 520201

Graduate Certificates (17 programs, CIP Code listed after program name)

Applied Mathematics (Grad.Cert.) 270301
Architectural Studies (Grad. Cert.) 040201
Architecture (Grad.Cert.) 040201
Business Administration (Grad.Cert.) 520201
Chemical Engineering (Grad.Cert.) 140701
Chemistry (Grad.Cert.) 400501
Civil Engineering (Grad.Cert.) 140801
Computer & Information Sciences (Grad.Cert.) 110101
Computer Engineering (Grad.Cert.) 140901
Electrical/Electronics & Communications Engineering (Grad.Cert.) 141001
English/Technical & Business Writing (Grad.Cert.) 231303
Industrial Engineering (Grad.Cert.) 143501
Information Sciences & Systems (Grad.Cert.) 110401
Mechanical Engineering (Grad.Cert.) 141901
Miscellaneous Biological Specialties (Grad.Cert.) 269999
Pharmaceutical Technology/Management (Grad.Cert.) 149999
Public Policy Studies (Grad.Cert.) 440501

NJIT's 2+2 and 3+2 programs

NJIT offers 2+2 programs through a joint admissions agreement with 10 county colleges:

- Bergen Community College
- Brookdale Community College
- Burlington County College
- County College of Morris
- Essex County College
- Hudson County Community College
- Mercer County College
- Middlesex County College
- Ocean County College
- Raritan Valley Community College
- Union County College

NJIT offers 3+2 programs through a joint admissions agreement with 3 colleges:

- Kean University
- Seton Hall University
- Stockton State College
- William Paterson University

NJIT's articulation arrangements

NJIT currently has articulation arrangements with the following 19 institutions:

- Bergen Community College
- Brookdale Community College
- Burlington County College
- Camden County College
- County College of Morris
- Cumberland County College
- Essex County College
- Hudson County Community College
- Kean University
- Mercer County College
- Middlesex County College
- Ocean County College
- Paul Smith's College
- Passaic County Community College
- Raritan Valley County College
- Union County College
- Seton Hall University
- Stockton State College
- William Peterson University

NJIT currently offers an accelerated B.S. in Information Technology at Camden County College and partners with Camden County College to offer courses leading to masters degrees in Engineering Management, Computer Science, and Information Systems

Collaborative Academic Degree Programs

Joint Degree Programs

- Rutgers - The State University, Newark Campus
- Rutgers Biomedical and Health Sciences

Joint programs with Rutgers - The State University, Newark Campus include:

- Applied Physics *(B.S.)* 400899
- Biology *(B.A.)* 260101
- Biology *(B.S.)* 260101
- Computer Science *(B.A.)* 110101
- Environmental Science *(B.S.)* 030102
- History *(B.A.)* 450801

- Human Computer Interaction (B.S.) 110401
- Information Systems *(B.A.)* 110401
- Applied Physics *(M.S.)* 400899
- Biology *(M.S.)* 260101
- Environmental Science *(M.S.)* 030102
- History *(M.A.T.)* 131328
- History *(M.A.)* 450801
- Applied Physics *(Ph.D.)* 400899
- Biology *(Ph.D.)* 260101
- Environmental Science *(Ph.D.)* 030102
- Mathematical Sciences *(Ph.D.)* 270101
- Urban Systems (*Ph.D.*) 459999

Joint programs with the Rutgers Biomedical and Health Sciences include:

- Biomedical Engineering (Ph.D.) 104501
- Urban Systems (Ph.D.) 459999

II.H. Major Research and Public Service Activities

NJIT continues to grow its research enterprise. It completed a record year in FY2015, with research expenditures of over $110 million. Based on FY2011 data, the most recently available public rankings, NJIT placed 6th in the United States for research expenditures among all polytechnical universities. The top performers of the full list are shown in the table below. NJIT's growth in research since then makes it likely that this position will remain unchanged in the next available ranking.

NJIT's research has been accorded other accolades recently for productivity in leveraging federal research dollars. NJIT was cited as 12th among all universities in the country for the proportion of industrially sponsored R&D to federally funded R&D expenditures in a Triple Helix Innovation article using 2010 Association of University Technology Managers (AUTM) data. In the same article, NJIT was ranked 4th among all US universities for the number of inventions disclosed per dollar of federally funded research and development. No other New Jersey located university was in the top 20 in either of these metrics.

NJIT's research brings together faculty from across the disciplines to explore issues and address problems of critical concern to New Jersey and the nation. NJIT's new strategic plan organizes its research initiatives around four research clusters that form a strong applications agenda, in which investigators seek responsible solutions to society's problems. These topical areas are inter-disciplinary and each involves participation from virtually every college within the university. The four research cluster areas are: Sustainable Systems; Life Science and Engineering; Data Science and Information Technology; and Trans-Disciplinary Areas. These clusters serve to unify faculty research efforts across the campus and connect to many real-world, campus-wide demonstration

environments that will enhance our student learning experience and attract industrial collaboration. Examples of current efforts in some of these areas appear below.

II.H.1. Sustainable Systems

There can be no greater challenge of our time than to seek a sustainable balance to preserving the natural environment while providing the expanding global population all the benefits and conveniences of a modern, technology rich society. From the creation of energy without reliance upon finite natural resources to providing civil infrastructure that is both reliable and secure, NJIT researchers are creating solutions for tomorrow.

Carbon Nanotube Solar Cells
Researcher Somenath Mitra, PhD, Professor and Executive Director of York Center for Environmental Engineering and Sciences at NJIT, has been working on inexpensive polymer solar cells that can be painted or printed on flexible plastic sheets. The solar cell developed at NJIT uses a carbon nanotube-Buckyball complexes, both of which are molecular configurations of nano-scale carbons. The mechanism is as follows: The sunlight excites the polymers, and the Buckyballs serve as electron acceptors while the nanotubes serve as electron transporters for enhancing charge transport. This is a fundamentally novel approach for enhancing the performance of polymer solar cells which are considered as the 3rd generation after silicon and thin-film cells. The approach is based on years of fundamental research carried out in his laboratory on microwave induced functionalization of carbon nanotubes, for which he received the Thomas Elva Edison award from the state of New Jersey (2014). This technology allows his group to synthesize nanotube-Buckyball complexes for solar cell applications. Some representative papers are "Fullerene single wall carbon nanotube complex for polymer bulk heterojunction photovoltaic cells", featured as the June 21, 2007 cover story of the Journal of Materials Chemistry published by the Royal Society of Chemistry, and "Enhanced charge-carrier transport through shorter carbon nanotubes in organic photovoltaics" published in American Chemical Society's Applied Materials and Interfaces in February 2014.

CdTe Thin Film Solar Cell Technology
NJIT received from Apollo Solar Energy, Inc. a three-year, $1.5 million grant to establish a solar research center, led by Physics Professor Ken Chin. The company, based in Chengdu, the People's Republic of China, mines tellurium (Te) and refines high-purity tellurium-based metals for specific segments of the global electronic materials market. The new solar research center focuses on improving the applications of Cadmium Telluride semiconductor materials for use in thin-film solar cells. Solar arrays using thin-film technology have already proven to reduce the cost per watt to one-third of the cost of conventional systems. Through diligent improvement in the production process, research can solar power a legitimate contender for much more than the small percentage of global need that is now projected for photovoltaics.

Understanding the Sun
NJIT's solar physicists are working on a range of technologies to better understand the behavior of the sun, and its connection to our conditions on Earth that affect everything from weather patterns to wireless communications. Professor Phil Goode directs the Big Bear Solar Observatory

(BBSO) at Big Bear Lake, CA. He recently completed construction of the world's largest ground-based, optical solar telescope and continues to phase-in advanced image processing technologies for further image clarity. The images of the Sun's surface already produced are by far the highest resolution pictures ever recorded. They have produced new insights to the dynamics of the Sun's magnetic fields and the origins of solar flares.

A bit farther north from BBSO at Owens Valley, Professor Dale Gary is constructing the pilot for the world's largest array of radio telescopes for solar observation. The Frequency Agile Solar Radiotelescope (FASR) is concept for a multi-frequency (0.03 - 30 GHz) imaging array composed of many (~100) antennas designed specifically for observing the Sun. Under ARRA funding, a $7 million construction project is underway to create a smaller demonstration array that will still yield the most detailed insights to the sun's upper atmosphere.

Professor Andrew Gerrard's primary research focus is in upper atmospheric physics and space sciences. The US Air Force Office of Scientific Research recently awarded Gerrard an $820,000 grant to lead a collaborative effort involving Clemson University, Cornell University, the University of Illinois at Urbana-Champaign, and the Geophysical Institute of Peru to study the ESF development in South America. The effort will focus on developing and operating a one-of-a-kind, Fabry-Perot Doppler imager designed for 24-hour observations of thermospheric and mesospheric winds and temperatures in a campaign spanning South America. Gerrard is also involved with a multi-institutional project in Antarctica led by NJIT Distinguished Research Professor Louis Lanzerotti, a former Bell Labs researcher. The effort accounts for much of the US involvement in space weather research at high latitudes.

Research Professor and National Academy of Science Member Louis Lanzerotti has been principal investigator or co-investigator on a number of NASA Earth-orbiting, interplanetary and planetary missions including IMP, Voyager, Ulysses, Galileo, and Cassini. He is currently a Principal Investigator for instruments just launched from Cape Kennedy in August 2012 on NASA's Radiation Belt Storm Probes mission in Earth's magnetosphere (RB-SPICE). This is a $100 million satellite development program in conjunction with Johns Hopkins Advanced Physics Lab (APL). The scientific mission of this twin probe effort is expected to begin in October 2012 and last for two years. The data on the Van Allen Radiation Belts is invaluable as all geo-stationary satellites used for GPS and telecommunications applications orbit in this difficult environment.

Professor Haimin Wang researches Solar physics and phenomena of the atmosphere of the Sun and solar-like stars, including solar/stellar flares, sunspots, active regions, filaments and prominences, quiet Sun network. His Space Weather Laboratory focuses on measurements of physical parameters of the solar atmosphere, such as magnetic fields, density, temperature, and energy distribution of electrons and ions in the photosphere, chromosphere and corona. His recent research work on solar storms was published in "Nature" as "Noteworthy" research in 2015.

Sustainable Building Design

Deane M. Evans, FAIA, a Research Professor and Executive Director of the Center for Building Knowledge in the College of Architecture and Design is an accomplished architect with more than

25 years of experience in architectural design, construction technology, and building performance research. Evans, who has had experience in both private practice and the federal government, has dedicated his career to creating innovative ways to improve the built environment - through better design, through the development and use of better technology, and through the creation and dissemination of new knowledge. His current focus is on high-performance, sustainable buildings; particularly housing and schools. Evans, who also is Vice-Chairman of the Sustainable Buildings Industry Council (SBIC), has served as an instructor for workshops sponsored by the Council on high-performance schools.

Evans' team and Building Media Inc. (BMI), a DuPont subsidiary, will lead one of 15 research and deployment partnerships to help dramatically improve the energy efficiency of American homes ─ the Building America Retrofit Alliance (BARA). The 15 teams, appointed by the U.S. Department of Energy, will receive a total of up to $30 million for the initial 18 months to deliver innovative energy efficiency strategies to the residential market and address barriers to bringing high-efficiency homes within reach of all Americans. Each team will receive between $500,000 and $2.5 million depending on performance.

NJIT partnered with Rutgers University in the first-ever New Jersey entry to the US Department of Energy's biannual Solar Decathlon in Washington, DC in September 2011. ENJoy: A Generation House, has been more than a two-year collaborative effort to design, build, and operate solar-powered homes that are cost-effective, energy-efficient, and attractive. The all-concrete, beach-inspired eNJoy house featured an inverted-hip roof design for rainwater collection to support irrigation and grey water systems, an 8.2kW photovoltaic system that allowed the house to be completely powered by the sun, and the application of universal design principles, which allowed the house to be accessible to people of all ages and levels of mobility. More than a dozen-plus graduate and undergraduate students from NJIT's College of Architecture and Design and Rutgers-The State University of New Jersey labored on the project.

Bio-renewable Materials

Michael Jaffe, a Research Professor of biomedical engineering at NJIT, has developed a suite of technologies for replacement of petro-chemicals using natural sugars. One of these new materials is a derivative of isosorbide and may be able to replace bisphenol A (BPA) in a number of consumer products, including the lining of tin cans. Jaffe has been developing the material in conjunction with the Iowa Corn Promotion Board (ICPB) in an effort to promote and create new, commercially attractive, sustainable chemistries from wider uses of corn. This new sugar derivative can be obtained from corn. Much attention has recently focused on BPA, which has been known to have estrogenic properties since the 1930s. BPA is widely used in processes that result in the lining for tin cans and key ingredients in plastics ranging from baby bottles to nail polish.

The new invention is an epoxy resin. These are polymers widely used as adhesives, paints and as coatings to protect food in cans. This invention describes a renewable resource epoxy, derived, for example, from isosorbide, a sustainable chemical that can be synthesized from corn starch. Both components of the epoxy—the resin and the hardener—are from water-soluble, plant-derived chemistries. The epoxy is cured by baking at an elevated temperature.

Coastal Water Quality
Establishing remote sensing as an operational management tool in assessing the quality of New Jersey's near shore waters is the focus of research under a NASA Airborne Oceanographic LIDAR (light detection and ranging) remote sensing data acquisition over the East Coast. The program remotely measures biological and chemical substances in the world's oceans and coastal zones, using sensors that are flown in aircraft to make measurements. The research supports satellite measurements of water quality parameters important in global warming, carbon flux, and climate change research. In conjunction with the mission, the data collected over New Jersey during the flight is being used to calibrate bio-optical models developed in a related National Science Foundation project.

Improving New Jersey's Drinking Water
The New Jersey Applied Water Research Center has been established by NJIT in partnership with the American Water Works Association to unite industry, government and academia in a common effort to research and improve the state's drinking water. Researchers from NJIT and the Water Works Association, a non-profit group dedicated to providing the state with safe drinking water, expect to have a significant impact on the state's water infrastructure. The center's emphasis on applied research specific to New Jersey will fill in the gaps that national research programs have not addressed. Researchers will also work to assure that the region's water supply is safe from bio-terrorist attacks, developing monitoring systems to identify biological agents deposited in the water infrastructure.

Other aims of the center include investigating methods for combating drought; encouraging state utilities and universities to conduct drinking water research; providing state agencies with research ideas on water supply; and establishing a public service center that will inform residents about research on water supply.

Protecting the Power Grid
Microscopic sensors that will prevent disruptions in electrical power are the focus of a project in the Microelectronics Research Center. A joint effort between the New Jersey MEMS (microelectromechanical systems) Initiative and Public Service Enterprise Group, the project is developing fiber optical MEMS devices that will alert utilities of irregularities or deterioration within the power grid that may signal a system failure. The research partnership will submit a funding proposal to the US Department of Energy to support a project that will expand the utility application of MEMS devices and demonstrate the concept of a "smart" utility.

Monitoring Emissions in Real Time
A new technique has been invented by researchers for on-line monitoring of toxic chemicals, such as solvents and organic vapors, in air emissions at very low levels. The new device is an automated instrument for continuous monitoring of NMOC - the non-methane organic carbon analysis - which is a measure of all carbon emissions except methane. Monitoring occurs real-time and can be carried out at the site of contamination.

The key element in the device is a "microtrap" that gathers organics from the air stream in a sorbent. Rapid (1 to 1.5 seconds) electrical heating of the microtrap releases the chemicals in a concentrated pulse that serves as an injection for the detector. The technique works much faster

than any conventional monitoring system and increases sensitivity by two or three orders of magnitude, allowing analysis of very low concentrations.

Traffic Congestion
NJIT assisted the New Jersey Department of Transportation in developing the "Congestion Relief Plan for the Garden State Parkway". The study highlights traffic congestion impacts as part of the development of the ten-year plan to remove toll barriers on the Garden State Parkway.
Researchers at NJIT completed the second iteration of its study "Mobility and the Costs of Congestion in New Jersey" that was funded by the US Department of Transportation and a grant from the Foundation of the New Jersey Alliance for Action. NJIT's analysis builds on a 1996 study by the Texas Transportation Institute which made state-to-state comparisons using national highway data. By using more detailed data on traffic volume and roadway characteristics in New Jersey and an enhanced methodology, we were able to determine the cost of congestion on the roadway network throughout the state.

The NCTIP research team analyzed data from the NJ Department of Transportation to measure and compare congestion in terms of traffic volumes, travel speeds, trip lengths, fuel consumption and truck flows. The study assessed a dollar value for delays experienced by drivers under current conditions, on a statewide and county level, as well as corridor and project level.

Detecting Concealed Explosives
A team of researchers at NJIT is working to develop a technology capable of monitoring and detecting concealed explosives and biological agents that may pose a threat to people, buildings, mass transportation or other environments. With funding from the National Science Foundation and the Army Research Office, the investigators are exploring the use of terahertz (THz) electromagnetic radiation to detect and identify explosives and biological agents by means of a spectroscope. Picometrix, Inc., Ann Arbor, Michigan, a manufacturer of high-speed optical receivers and ultrafast instrumentation, is collaborating on the project.

II.H.2. Life Science & Engineering

If any field of study is to experience a fundamental change in the coming decades, it is those topics related to the life sciences and healthcare. Our ability to understand the origins of life and the onset of disease from the scientific understanding of bio-chemical origins at the sub-cellular level will transform the life sciences from an "outlier" relative to the physical sciences to a discipline amenable to all of the tools and techniques used in those other areas. Consequently, every traditional discipline has a contribution to make in addition to the core work done by our researchers in Biology and Biomedical Engineering.

Harnessing Stem Cells
Two NJIT biomedical researchers are doing pioneering work on the application of human stem cells to regenerative medicine that may someday extend peoples' lives. Both biomedical engineering department researchers have recently received the prestigious Coulter Foundation Translational Awards for their promising patent applications.

NJIT Associate Professor Treena Arinzeh's research focuses on tissue engineering, the application of principles and methods of engineering and life sciences toward a fundamental understanding and development of biological substitutes to restore, maintain, and improve human tissue functions. Bone regeneration may be achieved by the use of osteogenic cells and/or factors to induce bone growth in combination with an appropriate scaffold to guide and support the laying down of new bone tissue. Professor Arinzeh has developed composite material can be combined with stem cells to enhance the rate of bone repair.

NJIT Research Professor Cheul Cho Cho's research focuses on designing a clinically-scaled bio-artificial liver. Embryonic stem cells are considered a potential source of cells for hepatic therapies due to their limitless capacity for self-renewal and proliferation, and their ability to differentiate into all major cell lineages. Cho's novel method differentiates embryonic stem cells into hepatocytes with high purity. Incorporating these cell-derived hepatocytes into a device to treat fulminant hepatic failure has improved animal survival, thereby underscoring the cells' therapeutic potential.

Bio-power

Research Professor Zafar Iqbal has developed patented technology to create a functioning nano-dimensioned fuel cell. The fuel cell is small enough to be used to power implanted bio-electromechanical devices or sensors. Furthermore, the fuel cell draws its power from sugars metabolized in the bloodstream. In essence, it draws its chemical energy the same way as the rest of the body. As a consequence, bio-implants never need to be removed to replace battery packs. The research has already produced a fuel cell that can power a conventional pacemaker.

Improving Treatment for Hydrocephalus

NJIT Professor Gordon Thomas and NJIT Research Professor Reginald Farrow, both in the department of physics, and NJIT alumnus Sheng Liu, formerly a doctoral student of both researchers were awarded a patent for the NJIT SmartShunt™, a unique device to help patients with brain injuries. The patent, entitled "No Clog Shunt Using a Compact Fluid Drag Path" (US Patent Number 8,088,091), discloses a device that enables the non-invasive wireless monitoring of both the extremely slow flow of cerebrospinal fluid as well as tiny changes in pressure in a shunt that drains fluid out of the brain. Ordinary shunts are commonly used by patients suffering from severe excess pressure in the brain due to hydrocephalus or brain injury.The technology will enable patients and physicians to determine whether cerebrospinal fluid flow is in fact, impaired and the device will also allow those involved to determine better what medical procedures should be performed. It is designed to have a lifetime of more than a decade because it needs no internal power.The team recently received a multi-year, multi-million dollar grant to partner with Boston Children's Hospital/Harvard Medical school physicians and a commercial firm to take the device to animal testing as the next step in the FDA approval process.

Understanding Neuron Growth

Biomedical Engineering Research Professor Bryan Pfister, an NSF Career Award winner, uses his cellular stretching technique to find clues to repairing traumatic injuries to the spinal cord and other nerve tissue. Pfister studies how nerves grow in response to the stimuli of stretching. His research is so significant and so advanced that it could soon help tissue engineering experts learn how to repair damaged nerves. A breakthrough of that magnitude would of course be of immense

solace to the millions of patients who have nerve or spinal cord damage. His team includes investigators from Rutgers-Newark Biology and the VA Hospital.

Center for Brain Imaging

In the Center for Brain Imaging, Dr. Bharat Biswal and his group are pursuing research to better understand human brain function using integrative neuroimaging, statistical, and computational modeling methods. Research projects focus on four research themes: 1) human brain functional patterns and its development in health, 2) reliable neuroimaging measures 3) functional patterns in animal models, and 4) statistical and big data science analytics to explore how specific aspects of psychological processes associate with brain function and mental and neurodegenerative diseases disrupt normal brain functioning. The data is collected using neuroimaging techniques (MRI, fMRI, PET, fNRIS) to map three levels of the intrinsic architecture within the brain function (i.e., region, subnetwork and entire brain). Researchers are investigating the process of brain development within different life spans, computational simulation on brain connectome and clinical psychology/psychiatry guided by our neuroimaging results. Several diseased models including aging, Alzheimers, Schizophrenia, Autism, and Spinal cord injury subjects are being developed with external funding from National Institute of Aging (NIA/NIH), National Institute of Biomedical Imaging and Bioengineering (NIBIB/NIH), New Jersey Commission on Spinal Cord Injury, National Science Foundation and New Jersey Governor's Council on Autism.

Characterizing Traumatic Brain Injury

Researchers in the Center for Injury Biomechanics, materials and medicine (CIBM3) under the leadership of Professor Namas Chandra use both computational and unique experimental facilities to understand the origin of blast and blunt traumatic brain injury (TBI). TBI is a major concern among US soldiers and veterans; Mild TBI and concussion in sports injury has raised serious health hazard, and the Center is involved in both. In specific, through novel blast tube and drop tower facilities, we examine what type of helmets, pads and configurations offer the right protections to soldiers and players. We study when and how concussions are caused and if there are simple diagnostic methods to determine concussions. We use animal models and mechanical surrogates to examine the role of blast pressures and height of fall to relate insult to injury to medical outcomes. Some of our recent funded efforts include examining the effect of blast overpressures on the dose-response curve of animal models. Another effort involves inquiring into the mechanisms of blast induced brain injury. In an additional project, we use experimental methods to study the effect of eyewear and hear protection on the TBI susceptibility of warfighters.

Neural Prostheses for Spinal Injuries

Professor Mesut Sahin's research conducts pioneering work in the field of Neural Prostheses where he conceived the idea of using the neural activity of the descending tracts in the spinal cord as a form of brain-computer interface. His current project, funded by a grant from the National Institute of Neurological Disorders and Stroke, is to develop and test a technology known as FLAMES -- floating light activated micro-electrical stimulators -- for wireless activation of the central nervous system. Energized by an infrared light beam through an optical fiber located just outside the durameter, the tough, fibrous membrane forming the outermost of the three coverings of the brain and spinal cord, these micro-stimulators allow victims of spinal cord injuries to regain self-mobility, environmental control and computer access. FLAMES is a small device that is remotely

controlled by an external unit via a near-infrared laser. The FLAMES device is implanted into the spinal cord, and is then allowed to float in the tissue with no wires attached. A patient would send the command to the external unit to activate the laser, the laser would excite the FLAMES device, which would in turn stimulate the neuron via an electrical current.

Protecting the Blood-Brain Barrier to Prevent Progression of Neurological Diseases

Disruption of the blood-brain barrier (BBB), the interface between the blood and the brain, is a hallmark of neurological diseases such as Alzheimer's, Parkinson's, Amyotropic Lateral Sclerosis (Lou Gehrig's disease), stroke, neurological disorders in drug abuse, and neuro-AIDS. James Haorah's research objective is to protect the integrity of the BBB in order to prevent neurological diseases stemming from substance abuse, neuro-AIDS, and traumatic brain injury. He proposes that oxidative damage of the BBB enhances infiltration of unhealthy cells into the brain, which promotes neuroinflammation and interrupts the brain cells' bioenergetic interactions. He uses human brain cells, animal models and human subjects to test the hypothesis of neurovascular alterations caused by substance abuse.

Bio/Micro-Nano Interface: From Diagnostic Devices to Investigating Cellular Dynamics

In collaboration with other life science researchers, Dr Sagnik Basuray's research group with its expertise in nano/microfluidics, spectroscopic techniques like SERS, Plasmonics, optofluidics, electrodynamic and electrohydrodynamic simulations from bulk to nano, is developing transformative and disruptive new technologies. The current research thrusts are: 1) developing a multidisciplinary platform for single cell analysis; 2) μTRANS – Micro Total-Analytical Neurological System, using Micro/Nanofluidics, Optofluidics, Impedance Spectroscopy, and Galvanotactics; 3) combining Surface Dielectrophoresis with microfluidic Lego blocks for developing a sweat sensor; and 4) an optical/electro-chemical, label-free, cost-effective and shear discrimination based on a real-time diagnostic (monitoring) device to study water contamination, predict heavy metal ions, biological entities.

Combating Eye Disease

NJIT biomedical researchers are collaborating with physicians as well as private companies to develop new medical devices to combat eye diseases through the New Jersey Vision Technology Center. The Center was established with a one-year seed grant from the New Jersey Commission on Science and Technology. In addition to improving the diagnosis and management of diseases such as glaucoma and diabetes, the center aims to spur economic development in the state's biotechnology industry, by developing useful medical devices with promising commercial prospects. Current projects include a device to allow simplified eye pressure testing for glaucoma patients, and another to measure blood sugar. In each of the Center's research projects, scientists and clinicians work closely with a New Jersey firm whose R&D staff help to turn prototypes into products.

The Vision Center is also funded by grants from the NIH, NSF, National Medical Technology Testbed (Department of the Army), the Gustavus, and Louise Pfeiffer Research Foundation, of Denville, NJ, as well as by funds from Becton Dickinson, Inc. and Lucent Technologies.

Understanding Neural Networks

A better understanding of the cellular mechanisms that allows a neural network to produce stable behavior while retaining the flexibility to respond to the disruptions produced by growth, learning, sensory input and injury is the focus of research at NJIT. In a five-year project funded by the National Institutes of Mental Health, research centers around the mechanism known as activity-dependent regulation of voltage-sensitive ionic currents which may underlie the expression of these two seemingly paradoxical aspects of neuronal activity, namely flexibility and stability. Ionic currents produce the electrical changes that characterize neuronal activity, and individual neurons and neural networks carry signals throughout the nervous system that are responsible for the generation of behavior. This mechanism is potentially of great importance as it may underlie a new form of learning and memory via its stabilizing effect on neural network activity.

Designing Computer Therapies

Research involving human-computer interaction has developed an audio browser that allows information access for blind users. Users provide input to the browser by stroking their fingers on a touch pad. The browser responds with spoken output based on the particular cell touched by the user. The device allows users to search an address book, a collection of music or read a downloaded copy of the current news.

Another project, in collaboration with Rutgers Biomedical and Health Sciences, Rutgers University, developed a Virtual Reality system for rehabilitating hand function in stroke patients. The PC-based desktop system uses two hand input devices, a CyberGlove and a RMII force feedback glove, to allow the user to interact with one of four rehabilitation exercises. Specific exercises work on each of the specific parameters of hand movement—range of motion, speed of motion, fractionation (the ability to move individual fingers separately) or strength. The patient receives performance-based target levels that adapt between sessions in order to induce the user to improve.

Identifying Harmful Biological Agents

The development of a portable MEMS (microelectromechanical systems) device as part of a biological detection system is the focus of a joint research project between NJIT and Sandia National Laboratories in Albuquerque, N.M., the government facility charged with developing technologies to support national security. The device - known as a trigger - is the key component in a system for the rapid and accurate identification of harmful biological agents in field and urban environments. The new approach in this research involves the use of electro-hydrodynamic phenomena in a suspension subject to electric fields to control and manipulate microscopic particles in flowing fluids for the segregation and concentration of biological material in microfluidics. Other potential applications of electro-micro-technologies include tiny separation devices for a wide variety of systems for environment monitoring, healthcare, and medical diagnostics. The electro-microfluidics are currently being tested at NJIT and Sandia.

II.H.3. Data Science and Information Technology

Digital convergence has been a popular buzz word for over twenty years. It conveyed the promise of fundamentally new concepts in communication that would arise from the transformation of telephony, broadcast and data transmission from analog to digital. We have certainly seen the

transition of voice, video, print and music to digital formats, but the emergence of exciting new applications and industries has been overstated – until now. The advent of wireless, broadband connectivity and the emergence of highly functional, portable devices – mainly smartphones or PDAs – have taken computing out of the office and opened the door to innovation that touches every aspect of life.

Healthcare Informatics

NJIT received more than $23 million of the $2 billion allocated by the American Recovery and Reinvestment Act of 2009 to achieve widespread meaningful use of health IT and facilitate use of an electronic health record (EHR) by every person by the year 2014. The New Jersey Health Information Technology Extension Center (NJ-HITEC) initiative proposed by NJIT Senior Vice President for Research and Development Donald H. Sebastian, PhD, principal investigator, will assist New Jersey's 20,000 health care providers to achieve "meaningful use" use of health information technology through outreach, consultation and user support for the state's primary care providers serving at-risk population centers. The Center has already enrolled over 6000 physicians, exceeding its funded target of 5000, and moved more than half of them through the second programmatic milestone of meaningful use. It has become a practice leader across the national program and its director, William O'Byrne now chairs the team charting the course of the national program beyond its four-year launch under the ARRA stimulus funding. It is collocated and will interoperate with Health-e-cITi-NJ one of 3 major health information exchanges in the state, and the Healthcare Innovation Center an NJIT program to foster new products and services that bring advanced information technology together with process innovation to achieve improved healthcare delivery.

Location-Aware, Personalized Computing

Think about the most popular Web sites of the past two years: MySpace, Facebook, Friendster, Flickr, YouTube.... They're all forms of virtual social networks. People create profiles and share opinions, pictures, and movies—all in an effort to meet new people, even if they never really meet in person. A research team led by Professor Quentin Jones wants to "put the place back in social networks." The SmartCampus project aims to turn the NJIT campus into one of the world's first locations to have a suite of "People to People to Geographical Places" systems (P3 for short) that covers the entire area.

Students and faculty create user profiles, listing personal information, hobbies, tastes, opinions, pictures, movies, etc. Users select the information they want to share and the types of people with whom they want to share it. Using wireless-enabled devices like laptops, PDAs, cell phones, BlackBerries, etc., users can tap into a campus-wide virtual social network that adapts to their physical location.

The SmartCampus project has received $1.8 million in direct funding from the National Science Foundation, a Hewlett-Packard Technology for Teaching Grant, and support from NJIT's NSF Industry/University Collaborative Research Center for Information Protection (I/UCRC).

Securing the Cloud

At the early stage in the development of cloud computing, we have a chance to break the typical pattern where security is added only as an afterthought, usually after attacks happen. Since cloud

platforms are still in their infancy, security can be part of the initial design. College of Computing Sciences Assistant Professor Reza Curtmola works on this problem with the support of a Faculty Early Career Development grant of more than $500,000 from the National Science Foundation. Curtmola is seeking to make the relationship between data owners and what they've entrusted to the clouds more secure. In large measure, when data is outsourced to a cloud storage provider, the owner of the data loses control over its integrity. He intends to build a practical remote-data-checking (RDC) framework to assure long-term integrity and reliability of remotely stored data. Overcoming the limitations of current RDC protocols and existing cloud-storage architectures will mean that you won't have to rely just on the word of your provider that all is well with your data.

Securing Wireless Communications

With the proliferation of laptops, tablets, smart phones and other devices, computing power is everywhere and very much on the go. The combination of computing, mobility and wireless connectivity offers a wealth of new capabilities – and new security challenges. Meeting these challenges is basic to the work of Associate Professors Cristian Borcea and Guiling Wang.

Borcea is exploring ways to enhance the intelligence of smart phones with sensors designed to monitor pollution, traffic conditions and other aspects of our environment. He is also researching systems that enable social interaction with superior performance, trust and privacy. In addition to exploring the capabilities of peer-to-peer networks, Borcea is teaming with NJIT colleagues, researchers at other universities and industry experts to address security issues unique to wireless interconnection. These include authenticating a mobile user's location and maximizing trust in ad hoc, or decentralized, networks, since familiar safeguards such as firewalls do not work for wireless communication.

Most recently, Associate Professor Grace Wang's research has focused on the potential and security of wireless sensor networks. The sensors that interest Wang are typically designed to collect data about the environment in which they are deployed, store that information, and transmit it to a central database. Capable of forming self-organizing networks, these devices can collect data in remote or inhospitable areas about weather or pollutants, warn drivers of traffic congestion when embedded in roads, or signal that a bridge or other structure has deteriorated to an unacceptable degree. As with ad hoc and peer-to-peer computing networks, the wireless foundation of remote sensing presents special security issues. Wang and her colleagues are working to develop encryption techniques that are both more effective and economical, methods to detect whether data collected by sensors has been tampered with, transmission technology that makes unauthorized access as difficult as possible, and network architecture that minimizes damage after an attack.

Making Cloud Computing Secure

Kurt Rohloff, an Associate Professor of computer science, is making cloud computing secure, enhancing privacy online and making secure information systems practical. His areas of technical expertise include practical encryption, large-scale distributed computing and scalable algorithm design. He was the principal investigator for the DARPA PROCEED program, developing practical Fully Homomorphic Encryption (FHE). FHE enables secure computing on encrypted data, but has been too inefficient to be practical until now. Dr. Rohloff's team increased FHE

efficiency by orders or magnitude and has shown the first practical applications of FHE. Prior to NJIT, he worked in industry for nine years at Raytheon BBN Technologies.

Improving Face Recognition
A new technology that can verify a person's identity using facial images is the goal of research involving a face recognition system developed by an NJIT researcher that improves on previous technology by taking into account such factors as lighting and facial expressions. The system has tested 100 percent effective in matching videotaped images to those stored in government databases by comparing 62 features or facial landmarks. Such a technology can be used as a security system with facial identification replacing a physical key or a password. An effective face recognition system could also assist law enforcement officials in locating fugitives by means of video cameras strategically placed in public places such as airports. NJIT recently received funding from the Department of Defense to support this research as part of the government's effort for combating terrorism using face recognition technologies.

Leading the Way in CAD Design
For an unprecedented seventh consecutive year, students from New Jersey School of Architecture took top prizes in the annual CADDIES Competition for Excellence in Design Visualization. Sponsored in part by Cadalyst magazine, the annual international competition celebrates excellence in digital imaging and presents awards in student and professional categories for both still images and animation.

Next-Generation Wireless Communications
Technologies to enable the next generation of wireless digital communications are the focus of research at the Center for Communications and Signal Processing. The group addresses issues such as privacy and security, interference and jamming, ever-heavier user traffic, and rapid transmission of data through wireless networks.

Developing Technologies for Defense and Homeland Security
Recognizing that technology is the best way to defend against bioterrorism, secure our borders and protect critical infrastructure such as power systems, bridges and airports, NJIT has established a new Homeland Security Technology Center, led by Dr. Donald H. Sebastian, Vice President for Research and Development. The Center coordinates defense-related projects in the university and forges partnerships with agencies like Picatinny Arsenal, the Center for Disease Control, the New Jersey Department of Health and Senior Services, the National Guard, and the New Jersey State Police for homeland security initiatives. The software systems use Global Information Systems (GIS)-based information to support simulations used to coordinate a response to a disaster. People who would benefit from these simulations include members of emergency response teams, hospital workers, public and private transportation administrators and others. The software gives New Jersey a system to prepare for anything from a natural disaster to a chemical, biological or radiological attack.

Memory Management for Big-Data Processing in the Cloud
The major challenge for big-data processing is performance. Due to the huge volumes of data and irregular data access patterns, the performance of big-data applications is largely determined by how fast they access their data. For high performance, in-memory technology has become a

growing trend in which data sets are completely loaded and processed in memory without accessing slow disks. Xiaoning Ding, an Assistant Professor of computer science and his colleagues are developing new systems to make in-memory technology more affordable and better performing in the cloud.

Machine Learning and GPU Solutions for Problems in Comparative Genomics and Data Science

Comparative genomics and data science pose problems of considerable difficulty both in terms of accuracy and runtimes. We consider two specific problems for which we have been developing new Graphics Processing Unit (GPU) and machine learning algorithms: the comparison of large genomic sequences and the prediction of cancer and disease risk from genomic data. Both have broad applications that lead to a better understanding of biology and accurate medical diagnosis. For both problems, we propose new GPU and machine learning methods that will be developed by the PI and his team of graduate students. The internal funding will cover costs for equipment (GPUs and disk-space), open-access publication, and travel to conferences and research institutions.

Transdisciplinary Areas

CalC ("Calcium Calculator") Software for Modeling Cell Calcium Dynamics

Intracellular calcium ions regulate all fundamental cell processes, from gene transcription to muscle contraction, synaptic transmission, and immune cell response. In order to simultaneously control multiple physiological mechanisms inside a cell, calcium concentration elevations have to be compartmentalized in time and space. Understanding such localized calcium signals is impossible without mathematical and computational modeling. Victor Matveev, an Associate Professor of applied mathematics, has created and continues to develop modeling software called CalC (Calcium Calculator) to model calcium dynamics resulting from the interplay between its diffusion and its binding by intracellular buffering molecules. Today, CalC is used to study a variety of biological phenomena, in particular synaptic neurotransmitter release.

Navigating Energy Landscapes

A wide variety of materials minimize their associated energies by forming crystals and ordered structures. The resulting microstructures are important to predict and engineer as they often dictate larger material properties, such as strength and stiffness. Mathematically, the material's energy can be very complicated making it difficult to predict phases of matter and material structures. David Shirokoff, an Assistant Professor in mathematical sciences, is working on combining computational and analytic techniques to find new, accurate methods for predicting these phases. The methods rely on first approximating the complicated material energy with a simpler energy that can then be analyzed using computation tools.

Soft Sustainability – Understanding Human Factors of Sustainable Systems

Dr. Yvette Wohn is an Assistant Professor in information systems whose research area is in human-computer interaction (HCI), where she studies the "soft" aspects of why people continue to interact with social systems over a long period of time, such as habits, motivations, and social capital. Understanding the social and psychological elements of sustainable technology use is especially

important in the context of education and health, as these systems require prolonged engagement for effectiveness. Her current focus is developing and understanding technology to improve mental health.

Exploration of Unity 3D as a Physics and Animation Engine for Therapeutic Gaming and Rehabilitation Robotics

This project advances the state of the art in therapeutic gaming and rehabilitation robotics by seeding collaboration between the College of Architecture and Design (COAD) and the Department of Biomedical Engineering. Capitalizing on the significant NJIT expertise in computer gaming, digital design, virtual reality (VR), and robotics, the project demonstrates that gaming software (COAD) can be an effective animation and physics engine for a newly developed upper extremity exoskeleton (BME). The result will be a user-controlled haptic manipulator that allows individuals with neurological impairment (e.g. stroke, cerebral palsy) to be therapeutically assisted by the exoskeleton while haptically interacting with virtual objects in a 3-D animated environment.

Managing Inventories for Agricultural Products: Coffee Supply Chain

Many of the world's poor still depend directly or indirectly on agricultural commodities for their livelihoods. Most of them are small-scale farmers in the developing countries in Africa. To achieve the Millennium goal of eradicating extreme hunger and poverty in Africa, Jim Shi, an Assistant Professor of supply chain management, studies the coffee industry in Africa and attempts to answer two research questions about storable agricultural products under price fluctuations: 1) How can inventory to hedge price risk be effectively managed? 2) How do diverse cost structures and harvest/price processes affect the results? Applying the optimal policies to practices in Kenya, it is possible to outperform the prevailing practice.

Developing Community Informatics Systems

The development of community informatics systems as a broad economic, social and political force is the focus of a research project supported by a grant from the Ford Foundation; the project aims to expand research, policy, programming, commercial and teaching activities supporting the development of the community informatics sector.

Community informatics is the application of information technologies to enable the achievement of community objectives. Initially used in geographical communities, the concept is now being applied to virtual communities based on common interests, industries or marketplaces. The project will bring together the best current thinking of practitioners, academics and industry experts. Results will be presented in book form, potentially supplemented by a web site and CD-ROM. This comprehensive “living document” can provide an initial electronic architecture and resources for creating and maintaining a vertical community informatics sector as well as horizontal “thematic” sub-sectors. It is anticipated that the project will also help to refocus policy attention on how the Internet is used and how it could be used to enable the betterment of communities—community wealth creation; community social, economic and cultural development; and community empowerment.

II.H.4. Research Centers and Specialized Labs

NJIT's research program focuses on applied research in the most promising of emerging technologies, with emphasis on technology transfer and commercialization. Research at NJIT is organized around multi-disciplinary centers of excellence that encourage partnerships among various disciplines, as well as with other educational institutions, private enterprise and government agencies.

Big Bear Solar Observatory
Dale Gary, Distinguished Professor of Physics
The Big Bear Solar Observatory (BBSO) in Big Bear Lake, California, boasts the largest aperture solar optical telescope in the world (1.6 meters). With its state-of-the-art adaptive optics and science instrumentation, the telescope obtains the highest resolution views of the Sun's surface features, such as sunspots, filaments, faculae and granulation. Its instruments measure the magnetic fields and motions of these features to understand the basic physics of solar activity, which affect the Earth and near-Earth technological systems.

Center for Applied Mathematics and Statistics
Michael Siegel, Professor of Mathematical Sciences
The Center for Applied Mathematics and Statistics (CAMS) is an interdisciplinary research center dedicated to supporting research in the mathematical sciences at NJIT. CAMS brings researchers from academia, industry, and government to NJIT by organizing the annual "Frontiers in Applied and Computational Mathematics" meeting and other workshops. CAMS activities include support for the submission of interdisciplinary research proposals and a summer program for graduate students.

Center for Brain Imaging
Bharat Biswal, Professor of Biomedical Engineering
The Center for Brain Imaging focuses on developing and advancing techniques to understand brain processes in healthy and patient populations. We use multimodal imaging including MRI, PET, and fNRS to study the brain. We use these techniques in a number of diseased populations including Alzheimer's disease, Traumatic Brain Injury (TBI), stroke, and ADHD.

Center for Building Knowledge
Deane Evans, Research Professor of Architecture
The Center for Building Knowledge (CBK) is a 25-year-old research, training and technical assistance institute affiliated with the College of Architecture and Design at NJIT. CBK is dedicated to generating new knowledge to improve the built environment and enhance the planning, design, construction and operation of facilities. Led by Executive Director Deane Evans, CBK's mission is to help individuals and communities make better-informed decisions concerning the performance, sustainability and resilience of buildings nationwide.

Center for Injury Biomechanics
Namas Chandra, Professor of Biomedical Engineering
The Center for Injury Biomechanics, Materials and Medicine (CIBM3) is a multi- and inter-disciplinary research center focused on understanding, diagnosing and treating brain injuries and

concussions using experimental and computational methods. Namas Chandra, Bryan Pfister and James Haorah, along with colleagues from NJIT, medical schools and veterans, administration facilities take a holistic approach to offer new measurement techniques, diagnostics/prognostic tools to address sports injury and military medicine.

Center for Manufacturing Systems
Wayne Chaneski, Executive Director
The Center for Manufacturing Systems (CMS) is an advanced technology center with a dual mission of offering manufacturing expertise to small and mid-size companies and providing machining and fabrication support for university research programs. The Center is staffed with professionals who have spent many years in industry. This experience, combined with state-of-the-art manufacturing equipment, enables the Center to transform concepts into reality.

Center for Membrane Technologies
Kamalesh Sirkar, Distinguished Professor of Chemical, Biological and Pharmaceutical Engineering
The Membrane Science, Engineering and Technology (MAST) Center, a NSF I/UCRC, and the Center for Membrane Technologies investigate problems where membrane technologies can achieve separation and purification of water, air, industrial fluid streams, solvents, pharmaceuticals, proteins, biopharmaceuticals, cells, particles and nanoparticles.

Center for Natural Resources Development and Protection
Michel Boufadel, Professor of Civil and Environmental Engineering
The Center for Natural Resources Development and Protection investigates sensible approaches to environmental and energy resource utilization. Directed by Dr. Michel Boufadel, research projects at the NRDP Center include assessment and remediation studies of pollution in natural settings, and the evaluation of natural resources for the potential production of energy, especially the production of renewable energy.

Center for Resilient Design
Thomas Dallessio, Director
Through applied research, field testing and community outreach, the Center for Resilient Design provides residents, business owners, design professionals, non-profit leaders, government officials and researchers with actionable 21st- century ready-to-build designs and expertise for disaster recovery in areas that have experienced or anticipate natural or man-made disasters.

Center for Solar-Terrestrial Research
Andrew Gerrard, Professor of Physics
The Center for Solar-Terrestrial Research (CSTR) at NJIT is an international leader in ground- and space-based solar and terrestrial physics, with interest in understanding the effects of the Sun on the geospace environment. CSTR operates the Big Bear Solar Observatory (BBSO) and Owens Valley Solar Array (OVSA) in California, the Jeffer Observatory at Jenny Jump State Forest in New Jersey, and the Automated Geophysical Observatories (AGOs) distributed across the Antarctic iceshelf. The Center also manages a large number of instruments at South Pole Station, McMurdo Station, across South America, and across the United States. CSTR is also a PI organization in the NASA Van Allen Probes mission and houses the Space Weather Research

Laboratory, which does scientific research in the area of space weather with the mission to understand and forecast the magnetic activity of the Sun and its potential influence on Earth. Such instrumentation and data resources enable scientific studies spanning from the Sun's surface, into the Sun's extended atmosphere, and onwards into the Earth's atmosphere.

New resources coming online within CSTR in the next year include new instrumentation at BBSO (e.g., the 10830-He spectropolarimeter), OVSA (e.g., status of the OVSA Expansion effort), and at the AGOs (e.g., higher power availability and data telemetry). The Center plans to site a solar radio telescope at South Pole Station, as well as the lidar observatory in New Jersey.

Center for Transportation
Lazar Spasovic, Professor of Civil and Environmental Engineering
The Center for Transportation conducts interdisciplinary research, education, and technology transfer designed to improve safety and mobility of the nation's transportation system. Research projects include the development of intelligent transportation systems technologies, transportation network modeling and management, traffic simulation, transportation, land use and economic policy analysis, freight planning, and traffic data warehousing.

Center for Wireless Communications and Signal Processing
Alexander Haimovich, Distinguished Professor of Electrical and Computer Engineering
The Elisha Yegal Bar-Ness Center for Wireless Communications and Signal Processing Research (CWCSPR) engages in a broad range of research ranging from wireless communications, radar, sensor networks, cloud radio, information theory, and signal processing. A unifying theme of the Center's research is that of 5G wireless mobile networks. The Center seeks new collaborations with the wireless communications industry.

Enterprise Development Center
Jerry Creighton, Sr., Executive Director
The Enterprise Development Center (EDC) at NJIT is a business development and commercialization center with an ecosystem designed to advance high-tech and life-science entrepreneurial initiatives. The array of service programs available at the EDC combine the student, faculty and NJIT resources with a "know-how" network of subject matter experts, partnerships, resident company interactions, university/business/government collaborations as needed to assist resident companies with R&D tasks, meeting milestones, scaling their business and preparing to obtain access to capital.

Expanded Owens Valley Solar Array Science Data Center
Dale Gary, Distinguished Professor of Physics
The EOVSA Science Data Center handles the unprecedented data volume that is now being generated by NJIT's Expanded Owens Valley Solar Array (EOVSA) radio telescope. ESDC will provide the infrastructure for combining radio maps of magnetic field strength and direction in the Sun's corona, derived from EOVSA data, with observations from other wavelengths such as mm/sub-mm, EUV, and X-rays, to model the magnetic/plasma structure in solar flares and active regions. Dale Gary, distinguished professor of physics, leads this pilot study to investigate the use of Graphics Processing Units (GPUs) for performing the required calculations fast enough to keep up with the expected demand.

Leir Center for Financial Bubble Research
William Rapp, Henry J. Leir Professor of International Trade and Business
The Leir Center for Financial Bubble Research seeks to understand through quantitative and qualitative research how financial bubbles can be identified including their stages of development, their relation to financial crises and what policies can best manage their adverse impacts.

Nanotechnology and Opto-electronics at the Electronic Imaging Center
Haim Grebel, Distinguished Professor of Electrical and Computer Engineering
The Electronic Imaging Center at NJIT promotes unique structures (nano- and sub-wavelength structures) for effective interfaces between photons (light) and matter for the purpose of: multi-spectral imaging in the visible, infrared (IR) far-IR and microwave with better sensing and light filtration; nano-based elements to aid detection of pollutants and viruses (e.g., swine and avian flu) for portable molecular biology instruments; nano-optical antennas for accurate molecular detection; ultra-short pulse (USP) antennas for secured communication links and environmental monitoring; and unique electronically controlled ion devices (the ion transistor).

New Jersey Center for Engineered Particulates
Rajesh Dave, Distinguished Professor of Chemical, Biological and Pharmaceutical Engineering
The creation of advanced particulate materials through the engineering of particles is a major research focus of the New Jersey Center for Engineered Particulates (NJCEP). The Center is engaged in fundamental research that combines experimental, computational and theoretical studies to achieve an understanding of the particle properties at the individual particle scale, in order to predict powder behavior at the macro-scale. As the size of particles becomes smaller and smaller, down to the nano-scale, the particle properties at the particle scale can change drastically and significantly affect the bulk properties, sometimes resulting in unique added value to the particulate materials. These value-added particles are called engineered particulates, which is the central focus of NJCEP.

NJ-HITEC
William O'Byrne, Executive Director
As part of the New Jersey Innovation Institute Healthcare Delivery Systems iLab, NJ-HITEC was formed in 2010 as New Jersey's regional exchange to support health information technology use by New Jersey providers. HITEC has the most successful Regional Extension Centers, established by the Office of the National Coordinator for Health Information Technology, in the country and is considered by New Jersey doctors to be their "trusted health IT advisor."

New Jersey Homeland Security Technology Systems Center
William Marshall, Director
The Homeland Security Technology Systems Center (NJHSTSC) at NJIT was created by Executive Order 111 expressly to work in collaboration with state government, serving as consultant for technology evaluation against performance standards and engaging in prototype deployment of integrated systems for testing, demonstration and training. It has contributed to all areas of the Homeland Security mission throughout the state.

New Jersey Innovation Institute

Timothy Franklin, Vice President
The New Jersey Innovation Institute (NJII) is an NJIT corporation that applies the intellectual and technological resources of the state's science and technology university to challenges identified by industry partners. NJII is comprised of innovation labs that follow industry-led agendas, these include: Healthcare Delivery Systems; Bio-Pharmaceutical Production; Civil Infrastructure; Defense and Homeland Security; and Financial Services.

Neural Interface Laboratory
Mesut Sahin. Professor of Biomedical Engineering
The Neural Interface Laboratory focuses on the field of neural prosthetics within a broader area of neural engineering. The long-term objective is to develop devices implantable in the central nervous system that can improve functioning for disabled individuals with spinal cord injury, traumatic brain injury, ALS, or stroke.

Neuromuscular Engineering Laboratory
Richard Foulds, Associate Professor of Biomedical Engineering
Researchers study the blending of neural motor control and muscular activity, promoting improvement of ambulation, reaching and manipulation, and speech, as well as exploring the modulation of incorrect neural signals producing spasticity and dystonia; the development of upper and lower extremity exoskeletons; and physiologically sound human-robot interaction.

Structural Analysis of Biomedical Ontologies Center
Yehoshua Perl and James Geller, Professors of Computer Science
The Structural Analysis of Biomedical Ontologies Center (SABOC) is devoted to research exploring structural issues in medical terminologies and ontologies such as the Unified Medical Language System (UMLS), SNOMED CT, and the biomedical ontologies located in the NCBO BioPortal. We are working on summarizing, visualizing and auditing medical terminologies.

Tissue Engineering and Applied Biomaterials Laboratory
Treena Arinzeh, Professor of Biomedical Engineering
The laboratory develops novel tissue engineering approaches to treating damaged tissues in orthopedic and neural applications. The laboratory primarily uses functional biomaterials to stimulate cells to regenerate tissues and evaluates these therapies using in vitro and in vivo models.

Vision and Neural Engineering Laboratory
Tara Alvarez, Professor of Biomedical Engineering
Convergence insufficiency (CI) is a prevalent binocular vision disorder that negatively impacts the activities of daily living. Symptoms include double/blurred vision, eyestrain, and headaches during reading or other near work that negatively impacts activities of daily living. CI is present in 4 percent of the population where approximately 27 percent of CI patients do not improve even with validated therapy. This project studies two potential mechanisms causing CI which may be improved via validated therapy by quantifying phoria adaptation, neural substrates and behavioral eye movements. This knowledge can lead to targeted therapeutic interventions, improved success rates, reduction in the time to remediation, and reduced healthcare costs.

York Center for Environmental Engineering
Somenath Mitra, Distinguished Professor of Chemistry and Environmental Science
The Otto York Center is the home of core laboratory facilities at NJIT. It serves the university and the industrial community by offering facilities for material characterization, chemical analysis, and environmental measurements.

II.H.5. NJIT Intellectual Property

NJIT has grown its patent activity significantly over the last decade and is now ranked 4th in the US among all universities for its productivity in turning federal research dollars into invention disclosures. Inventions stem primarily from grant funded research, but also from classroom activities that feature open-ended design challenges. The inventiveness is distributed across all of the academic units, and includes student inventors. Resources do not permit filing for patent coverage on every internal disclosure. A standing committee of senior university official meets every month to evaluate the list of new disclosures and recommend those most suitable for university investment based on likelihood of commercial adoption.

NJIT has grown its patent activity significantly over the last decade generating over $3.4 million in licensing revenues. As of June 30, 2015 NJIT had 187 unexpired US patents and 122 pending patent applications. Inventions stem primarily from grant funded research, but also from classroom activities that feature open-ended design challenges. The inventiveness is distributed across all of the academic units, and includes student inventors. Resources do not permit filing for patent coverage on every internal disclosure. A standing committee of senior university official meets periodically to evaluate new disclosures and recommend those most suitable for university investment based on likelihood of commercial adoption. A list of the Invention Disclosures received in FY15 follows:

15-001 Antibacterial Foley Catheter with Electrical Stimulus | Hussain, Syed A. / Jani, Maulik M. / Nazir, Ikramah / Jaffe, Michael / Budinoski, Kristian | NCE_Biomedical Engineering

15-002 All Plant-Derived Construct to Mimic the Fibrous Protein in Articular Cartilage | Nasim, Sana / Collins, George / Arinzeh, Treena L. | NCE_Biomedical Engineering

15-003 A Wireless Sensor Network-Based Pattern Matching Technique for the Circumvention of Environmental and Stimuli-related Variability in Structural Health Monitoring | Ziavras, Sotirios G. / Contreras, William C. | NCE_Electrical & Computer Engineering

15-004 Methods and Procedures for Signal and Interfere Alignment via Message Passing | Fouladgar, Ali Mohammad / Sahin, Onur / Simeone, Osvaldo / Zeira, Ariela | NCE_Electrical & Computer Engineering

15-005 From Hip-Knee-Ankle Orthosis to Pediatric Exoskeleton | Androwis, Ghaith J. | NCE_Biomedical Engineering

15-006 Topology Discovery for Linear Wireless Networks with Application to Train Backbone Inauguration | Liu, Yu / Feng, Jianghua / Simeone, Osvaldo / Tang, Jun / Wen, Zheng / Haimovich, Alexander M. / Zhou, Mengchu | NCE_Electrical & Computer Engineering

15-007 Poly-TCDA/ZnO Nano Composites Thin Film Sensor Fabricated by Inkjet Printing | Wu, Aide / Federici, John F. / Iqbal, Zafar | CSLA_Physics

15-008 Systems and Methods for Fault Diagnosis in Molecular Networks | Abdi, Ali / Emamian, Effat | NCE_Electrical & Computer Engineering

15-009 Anti-Jamming System | Grebel, Haim | NCE_Electrical & Computer Engineering

15-010 Dynamic-Enzyme Artificial Pancreas | Thomas, Gordon A. / Farrow, Reginald C. / Kanwal, Alokik | CSLA_Physics

15-011 Algal Cell Rupture Using Viral Infection for Biolipid Extraction and Bioefuel Production | Zhang, Wen | NCE_Civil & Environmental Engineering

15-012 Nail Finder | Blackadar, John R. | NCE_Mechanical Engineering

15-013 Mimic of Natural Nerve Guidance Conduit by Co-Electrospinning | Collins, George / Earley, Mary Sage / Hochstein, Jon / Rajabi Zamani, Amir Hossein / Jaffe, Michael | NCE_Biomedical Engineering

15-014 Cartilage Regeneration Scaffolds Containing Dietary Supplements | Tripathi, Lakshit / Collins, George / Mantilla, Bruno A. / Arinzeh, Treena L. | NCE_Biomedical Engineering

15-015 Asymmetric Error Correction and Flash-Memory Rewriting Using Polar Codes | Kliewer, Joerg / En Gad, Eyal / Li, Yue / Langberg, Michael / Bruck, Jehoshua / Jiang, Anxio | NCE_Electrical & Computer Engineering

15-016 Brain Interface Motion Arm (BIMA) | Okeke, Ikechukwu E. / Hoxha, Armand / Lad, Dipan S. / Megalla, Bola | NCE_Biomedical Engineering

15-017 "Go Away" Snow Kit, "Your Most Reliable Snow-Removing Kit" | Weli, Nnebuchi | NCE_Biomedical Engineering

15-018 Method and Device for Molecular Profiling Generation | Sarker, Md Mosharrof Hossain / Zhou, Mengchu | NCE_Electrical & Computer Engineering

15-019 Paint-On-Piste | Competitive Fencing Invention | Hrapsky, Ryan J. | NCE_Mechanical Engineering

15-020 Method of Growing Germanium on Silicon | Tsybeskov, Leonid | NCE_Electrical & Computer Engineering

15-021 Arch Capsule | Camacho, Chrystoff M. | NCE_Engineering Technology

15-022 Real-Time Haptic Method of Human Exoskeleton Ambulation | Foulds, Richard A. / Kiranukaran, Kiran K. | NCE_Biomedical Engineering

15-023 Light Conduits Made from PDMS for Implantation | Sahin, Mesut / Ersen, Ali | NCE_Biomedical Engineering

15-024 Microfluidic Chip-Based Disease Diagnosis Device | Lee, Eon Soo / Nunna, Bharath Babu | NCE_Mechanical Engineering

15-025 New Non-Platinum Group Metal (PGM) Catalysts for Fuel Cells and Electrochemical Systems | Lee, Eon Soo / Zhuang, Shiqiang | NCE_Mechanical Engineering

15-026 Physical Security Safety Wristband | Rolands, Henry / Verga, Adrianne C. / Mushtaq, Farah | NCE_Engineering Technology

15-027 PIER: Physical-Therapy Individual Exercise Recorder | SanFilippo, Anthony / Faldu, Jasmine / Scanlon, Kyle / Caulfield, Christopher J. | NCE_Biomedical Engineering

15-028 Parallel Plate Electrode Array Configuration and Geometry for High-Throughput Dielectric Spectroscopy Measurements | Prodan, Camelia / Kanwal, Alokik / Farrow, Reginald C. / Dobiszewski, Kyle F. | CSLA Physics

15-029 High Precision TOA-Based Direct Technique for Localizing Multiple RF Emitters over Multipath Channels | Garcia Garcia, Nil / Haimovich, Alexander M. | NCE_Electrical & Computer Engineering

15-030 Polynitrogen, a Novel Catalytic Material for Oxygen Reduction Reactions in Fuel Cells | Wang, Xianqin / Iqbal, Zafar / Wu, Zhiyi | CSLA_Chemistry & Environmental Science

15-031 Compact Pneumatic Nail Gun with Multi-Firing Track Assembly | Hadam, Matthew J. / Hoffman, Christopher | NCE_Mechanical Engineering

15-032 Encapsulated Metal-Based Energy Storage Materials and Method of Their Preparation | Dreizin, Edward L. / Schoenitz, Mirko / Abraham, Ani | NCE_Chemical, Biological & Pharmaceutical Engineering

15-033 Dichroic Camera for Facial Recognition under Low Light Conditions and Sunglasses | Federici, John F. / Gatley, Ian | CSLA_Physics

15-034 New Graphene-Based Non-Platinum Group Metal (PGM) Catalysts with High Porosity Carriers for Electrochemical and Industrial Applications | Lee, Eon Soo / Zhuang, Shiqiang | NCE_Mechanical Engineering

15-035 Electroactive Polymer Membrane for Haptic, Audio and Visual Interfaces | Decker, Martina / Zarzycki, Andrzej / Merz, Lisa / Bartel, Christopher | CoAD_Architecture

15-036 Integration of New AFM Modules for Determination of Electronic Structures (Bandgaps, Conduction and Valence Band Positions) of Semiconductor Materials at Nanoscale | Zhang, Wen | NCE_Civil & Environmental Engineering

15-037 …Range Finder Multi-Tool | Ness, David M. | CCS_Computer Science

15-038 Communication Efficient Secret Sharing | Huang, Wentao / Langberg, Michael / Kliewer, Joerg / Bruck, Jehoshua | NCE_Electrical & Computer Engineering

15-039 A Method of Fabricating Low-Defect Density GaN-on-Silicon | Nguyen, Hieu P. / Tsybeskov, Leonid | NCE_Electrical & Computer Engineering

15-040 Asynchronous Wireless Sensing Using Ultra Wideband Impulse Radio with FSK-OOK Modulation | Tang, Wei / Kliewer, Joerg | NCE_Electrical & Computer Engineering

15-041 Conventional and Flexible Biofuel Cells with Pressure-Fabrication Bioelectrodes | Zhong, Qin / Iqbal, Zafar | CSLA_Chemistry & Environmental Science

15-042 Methodologies for Personalized Cancer Treatment | Prodan, Camelia / Prodan, Emil V. | CSLA_Physics

NEW LICENSES & OPTIONS

In FY15 NJIT participated in the licensing of the following asset to Medgenics Medical Israel, Ltd.:

Compositions and Methods for Diagnosing Genome Related Diseases and Disorders [Inventors: Zhi Wei (NJIT); and Hakon Hakonarson and Kai Wang, both with CHOP] NJIT Reference Number 10-016

In addition NJIT entered into an Option Agreement with EnzoNano, LLC, a new venture formed by research professors Reginald Farrow and Alokik Kanwal, for the following IP:

1) NJIT Reference # 07-059: US Patent # 7,964,143 Issued 6/21/2011 entitled, "Nanotube Device and Method of Fabrication" invented by Reginald C. Farrow, Sheng Liu, Amit Goyal and Zafar Iqbal;
2) NJIT Reference # 07-059 EP: European Patent Application # 08826831.3 Filed 6/20/2008 entitled, "Nanotube Device and Method of Fabrication" invented by Reginald C. Farrow, Sheng Liu, Amit Goyal and Zafar Iqbal;
3) NJIT Reference # 07-059 JP: Japanese Patent Application # 2010-513427 Filed 6/20/2008 entitled, "Nanotube Device and Method of Fabrication" invented by Reginald C. Farrow, Sheng Liu, Amit Goyal and Zafar Iqbal;
4) NJIT Reference # 07-059 KR: South Korean Patent # 10-1464283 Issued 11/17/2014 entitled, Nanotube Device and Method of Fabrication" invented by Reginald C. Farrow, Sheng Liu, Amit Goyal and Zafar Iqbal;
5) NJIT Reference # 07-059 DIV: US Patent # 8,257,566 Issued 9/4/2012 entitled, "Nanotube Device and Method of Fabrication" invented by Reginald C. Farrow, Zafar Iqbal, Amit Goyal and Sheng Liu;
6) NJIT Reference # 07-060: US Patent # 7,736,979 Issued 6/15/2010 entitled "Method of Forming Nanotube Vertical Field Effect Transistor" invented by Reginald C. Farrow and Amit Goyal;
7) NJIT Reference # 07-060 EP: European Patent Application # 08836707.3 Filed 6/20/2008 entitled "Method of Forming Nanotube Vertical Field Effect Transistor" invented by Reginald C. Farrow and Amit Goyal;
8) NJIT Reference # 07-060 JP: Japanese Patent # 5378369 Issued 10/4/2013 entitled "Method of Forming Nanotube Vertical Field Effect Transistor" invented by Reginald C. Farrow and Amit Goyal;
9) NJIT Reference # 07-060 KR: South Korean Patent # 10-1464284 Issued 11/17/2014 entitled "Method of Forming Nanotube Vertical Field Effect Transistor" invented by Reginald C. Farrow and Amit Goyal;
10) NJIT Reference # 07-060 CON: US Patent Application # 12/772,669 Filed 5/3/2010 entitled "Method of Forming Nanotube Vertical Field Effect Transistor" invented by Reginald C. Farrow and Amit Goyal;
11) NJIT Reference # 09-035: US Patent # 8,546,027 Issued 10/1/2013 entitled, "System and Method for Directed Self-Assembly Technique for the Creation of Carbon Nanotube Sensors and Bio-Fuel Cells on Single Plane" invented by Reginald C. Farrow, Alokik Kanwal and Zafar Iqbal;
12) NJIT Invention Disclosure # 12-065: US Provisional Patent Application, Application No. 61/983,832 filed on: 04/24/2014 entitled "System And Method For Nano-Sensor Based Artificial Pancreas" invented by Gordon A. Thomas, Reginald C. Farrow and Alokik Kanwal;
13) NJIT Invention Disclosure # 13-046: US Application # 14/206,191 and international application # PCT/US2014/024092 Filed on 3/12/2014 entitled "Nanoprobe And Methods Of Use" invented by Reginald C. Farrow, Alokik Kanwal, Camelia Prodan, and Gordon A. Thomas

Marketing Initiatives

Consistent with a national trend, NJIT's Office of Technology Development (OTD)'s overall marketing efforts continue to focus not just on generating licensing revenue, but also on generating new sponsored research projects for faculty. The existing NJIT IP portfolio is often an enabler for

industrial sponsored research agreements, including these relationships in FY15: Coloran (Dave), Compact Membrane Systems (Sirkar), Huawei (Ansari) United Soybean (Jaffe), Regencin (Arinzeh), EPRI (Mitra), Soligie (Federici) and Sherwin-Williams (Jaffe). It is our expectation that these research programs will also lead to subsequent licensing agreements.

OTD has also been instrumental in getting NJIT faculty to apply and receive five NSF I-Corps grants, which are focused on identifying the commercialization opportunities of technologies previously funded by NSF. A recent NJIT I-Corps team led by Puspendra Singh is moving ahead with exploring commercial application of films with particle monolayers embedded on the surface in the photomask market. We have also worked on two Science Center QED Proof-of-Concept applications, each of which has led to identifying new licensing targets for medical device technology (tonometer and stem cell scaffolds). These efforts are in addition to the NJII initiatives.

To identify licensing targets and sponsored research collaboration partners OTD continues to participate in several external venues to showcase various NJIT technologies available for licensing: TechConnect2015 World and National Innovation Summit & Showcase in DC, New Jersey Entrepreneurial Network Poster Exhibit @ Princeton, Pharmaceutical Consultants Consortium International of New Jersey; and New Jersey Technology Council's Venture Conference and Regional Commercialization Conference. These venues have resulted in our attracting several new parties with whom we are now in early licensing and/or sponsored research discussions.

NJIT is a founding member of Innovation NJ, the state public/private/academic partnership focused on promoting policies that expand and strengthen the culture of innovation in New Jersey including the commercialization of new medicines, technologies and products to improve the quality of life globally. NJIT is co-chairing with AT&T a sub-committee that is examining university IP policies with the respect to industry sponsored research.

The Capital One Innovation Acceleration Challenge and TechQuest invention competitions provide students with the opportunity to explore entrepreneurship and commercialization of their ideas during the summer. We also work closely with the faculty that teach the various undergraduate capstone studio courses and each year we review their inventions for possible patenting. To help understand the commercial potential of these early concepts we bring students to industry showcases and forums. Additionally NJIT was just recently named an NSF I- Corps Site. This $300k grant will fund a number of small ($2.5k) awards over the next 3 years to student and faculty inventor teams so they can utilize the Lean Launchpad methodology to conduct extensive customer interviews to validate the commercialization prospects for their technology. Such awardees will qualify as "NSF awardees" and can then pursue SBIR and full fledge I-Corps grants to further commercialize their technology. NJIT joins 35 other I-Corps sites around the country.

IP Stats

As of June 30, 2015 NJIT had the following pending and issued patent assets:

187 Unexpired US Patents
- 111 Licensed
- 21 Jointly Owned
- 11 Optioned or Reserved

44 Unencumbered and available for licensing
101 Pending NonProvisional Patent Applications
58 funded by NJIT
43 funded by Others

II.H.6. Business Incubation

NJIT's Enterprise Development Center is New Jersey's oldest and largest small business incubation program. It has become one of the largest university run, technology business incubators in the nation. It hosts more than 95 portfolio companies with combined revenues of over $82M that have attracted over $67M in third-party investment. Collectively they have created almost 800 jobs in Newark and provided work experiences for over 300 students. EDC has been granted the status of "Soft Landings International Incubator" by the National Business Incubation Association, making it a preferred location for international companies seeking to establish a US base of operations. In related efforts, EDC leader, and NJIT Assoc. VP Judith Sheft has been instrumental in assisting government and university officials in Lima, Peru as well as in Spain and Portugal to establish incubator programs with the prospect of flowing those companies back through EDC when their needs grow.

EDC, founded in 1988 by NJIT, with assistance along the way from Prudential, the New Jersey Commission on Science and Technology, the New Jersey Economic Development Authority, and the U.S. Economic Development Administration, is the oldest and largest incubator facility in New Jersey, which is currently serving more than 80 client businesses. EDC provides a broad base of support and acts as a "proving ground" for new and developing high-tech products. Many client companies are developing commercial enterprises that reflect the university's major thrusts in information technology, health sciences, environmental science and engineering, and materials science and engineering. The university provides the latest technical information, including access to the university's specialized equipment, faculty experts and students. The success rate for EDC businesses is higher than 85 percent; more than 50 businesses have graduated from the incubator facility.

Based on its experience in high-tech business incubation, NJIT has placed a focus on increasing the depth and breadth of services that these incubators can offer to resident firms. In particular, the objective should be to promote business acceleration – growing companies more rapidly from business concept to fledgling business. On the technological front, underwriting the expense of access to university based personnel and equipment assets and facilitating the ability to compete for federal and foundation grant funding will more rapidly move companies to critical "proof of concept" and reduce the inherent risk to investors. In addition, adding new professional services liked shared support for marketing, information technology infrastructure, management team building and other critical growth items will increase the flow of successful businesses from existing incubators. NJIT has won several grants from the NJCS&T and has application spending with the National Science Foundation to further enhance its concepts for new business acceleration – and these are viewed as critical competitive advantages for the NJ-EDA led Innovation Zone program in Newark.

II.H.7. Businesses & Governmental Assistance Services

NJIT is dedicated to making practical connections between the resources of the university and the needs of New Jersey's business and industry. Academic research and contract development is one mode, but various forms of technology extension, workforce training and other assistance are essential elements necessary to reach companies of all sizes. The benefits are not limited to the private sector, as NJIT also assists state and local governments to achieve the benefits of technology insertion for business process improvement.

Advanced Manufacturing Talent Network

New Jersey's Department of Labor and Workforce Development awarded grants to six organizations to create "Talent Networks" in the priority industry clusters of the state strategic plan for economic development. The goal of the "Talent Networks" is to connect businesses in six key industries with educational institutions, workforce development agencies, government and community groups to identify the skills and training Garden State employers require in prospective employees to remain competitive in the global market. By being trained in those skills, students and job-seekers will be able to find long-term jobs in New Jersey and help to boost the state's economy. The NJIT-led Advanced Manufacturing Talent Network, (ManufactureNJ) is an industry demand-side driven strategy to respond to current and future employment and education needs within this rapidly changing industry. The network will be an important change agent to empower an ever growing number of NJ companies and their workforces to effectively integrate advanced manufacturing technologies into daily operations and to do so across a large number of NJ companies not normally thought of as "manufacturers" such as in biomedical devices, pharmaceuticals, engineering technologies, computer and electronics, chemical, transportation equipment, machinery, electrical equipment, and petroleum, to name a few. Activities & objectives include

- Put workforce needs of advanced manufacturing sector FIRST among existing entities;
- Link with all M-NJ-related partners: industry, education, non-profit organizations, workforce-related entities, job seekers and across existing Talent Networks; and
- Build capacity of M-NJ Talent Network and each of its non-exclusive members through information and assistance

Technology & Entrepreneurship Talent Network

The Technology & Entrepreneurship Talent Network was created by the N.J. Department of Labor and Workforce Development to focus on the specific needs of the industry by connecting employers, job seekers, career centers and educational institutions. The network assists those who want to start or grow a business in New Jersey, or who want to pursue a career in technology areas such as IT/software, communications, life sciences, electronics/advanced manufacturing, and energy/environment. The Technology & Entrepreneurship Talent Network is a strategic partnership of Information Technology (IT) industry employers, entrepreneurs, educational institutions, government agencies and professional and nonprofit community organizations.

TETN was established by the New Jersey Department of Labor and Workforce Development and hosted by New Jersey Institute of Technology (NJIT) to focus on the specific needs of key industries. The mission of TETN and other NJ LWD Talent Networks is to:

Support the efforts of the workforce development system and educational institutions to prepare workers for opportunities in key industry sectors,
Serve as the primary workforce contact for the industry sector, and
Encourage networking between jobseekers, employers and education and training providers.

Lean Manufacturing Assistance
More than 100 New Jersey manufacturing firms benefited this year from the technical assistance programs of the Center for Manufacturing Systems (CMS). The center, directed by Wayne Chaneski, offers services that range from identifying short-term productivity improvement opportunities to long-term engagements geared toward streamlining entire operations. CMS also assisted companies with product design and prototyping, process development, plant layout, machining of complex parts, and training in modern manufacturing concepts.
Training in lean manufacturing is one of the center's most popular services. Lean techniques -- inventory reduction, reduced lead time, continuous flow, increased flexibility -- are critical to the small and mid-sized manufacturing businesses that are the center's clients. One project for Purepac Pharmaceutical, an Elizabeth-based manufacturer of generic drugs, focused on reducing setup time -- the time a machine is out of service for changeover between the end of one run and the beginning of another. The CMS team videotaped an actual machine setup, then helped employees to review the process and identify solutions to problems. One department also got 5S training (Sort, Set-in-Order, Shine, Standardize, and Sustain) for improving efficiency by reorganizing workspace.

Mechatronics Training
MechaForce, is a New Jersey implementation of Germany's Dual Education Model that NJII is leading. The goal of the program is to grow next generation technology workers through skill development and flexible degree pathways. With multiple access points and degree / skill training options for learners from high school through college and post-secondary training, the program delivers a system of options in design, fabrication and mechatronics to northern New Jersey employees and residents.
MechaForce will ensure that industry-vetted certifications and academic degrees are accessible from multiple entry points and that trainees will be able to seamlessly gain credits that connect high school to community college to university, depending on the educational needs and interest of the students and employers.

Healthcare Providers
NJIT competed for, and won federal designation as a regional extension center for health information technology. The $23M four-year award led to the creation of the New Jersey Healthcare Information Technology Extension Center, NJ-HITEC, with a commitment to bring 5000 primary care physicians to achieve federal certification for “Meaningful Use” of electronic medical record systems. NJ-HITEC met its goal and then went on to use residual funding from states that did not meet their objectives to assist another 2000 physicians attain Meaningful Use Attestation, making it the most effective center in the national program of 63 regional programs.

In a different but related program funded by NJ Medicaid/Medicare services, several thousand specialists were also assisted to make the transformation from paper-based to paperless operation.
In this same period, NJIT acquired operational responsibility for a regional health information exchange. Started under a federal block grant to the state, Health-e-cITi-NJ was to connect seven regional hospitals with technology that allowed live patient data exchange. After exhausting nearly all of its funds, the network was not operational. NJIT stepped in and has the network fully functional and is integrating physicians, clinical labs, and pharmacies to create a platform for vendor-neutral health information exchange.
NJIT has put into production for statewide use the New Jersey Immunization Information System (NJIIS) and the New Jersey Local Information Network and Communications System (NJLINCS) for the New Jersey Department of Health and Senior Services (NJDHSS).

NJIIS is an on-line immunization registry capable of enrolling all New Jersey children at birth and recording and evaluating their immunization histories for completeness under the Center for Disease Control and Prevention's current guidelines. Over 150,000 children are currently in the registry and more than 150 health departments, clinics and private physician's offices are currently participating via dial in modems or the Internet. NJIT installs client software at user sites, operates the servers and provides administrative and technical support for the NJIIS.

NJLINCS is an Internet based communications system that will link all local health departments with the NJDHSS in Trenton. NJLINCS provides rapid, two-way communication between state health officials and local health officers for dissemination and collection of health related information and data. NJIT operates the servers and provides administrative and technical support for the NJLINCS.

Other Assistance to Business

NJIT offers direct assistance to business through several services to small- and medium-sized businesses to encourage their growth and success. These services are delivered primarily through NJIT's six-business assistance centers:

- Technology Extension Program in Manufacturing Engineering (a component of the New Jersey Manufacturing Extension Partnership – NJMEP): a statewide manufacturing extension program to help small- and medium-sized manufacturing businesses to modernize and become more competitive
- Center for Manufacturing Systems: assists manufacturers with prototype product development, process improvement and modernization with high speed machining center, advanced CAD/CAM and rapid prototyping facilities.
- Enterprise Development Center: small business incubators that help new and developing enterprises survive the typically difficult start-up stages;
- New Jersey Technical Assistance Program (NJTAP): helps New Jersey small- and medium-sized businesses comply with state and federal pollution prevention regulations;
- Micro-fabrication Center: serves to assist businesses with design and fabrication services related to silicon processing technologies in the university's clean room for MEMS and CMOS processing;
- Polymer Processing Institute: provides assistance to small businesses in processing of polymers and plastics.

NJIT also provides assistance to business through workforce development activities, research activities, economic development activities, and public service activities.

II.H.8 New Jersey Immunization Information System and the New Jersey Local Information Network & Communications System

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- Technology Extension Program in Manufacturing Engineering (a component of the New Jersey Manufacturing Extension Partnership – NJMEP): a statewide manufacturing extension program to help small- and medium-sized manufacturing businesses to modernize and become more competitive
- Center for Information Age Technology (CIAT): integrates computer technology into the operations of New Jersey business, government, non-profit and educational organizations
- Center for Manufacturing Systems: assists manufacturers with prototype product development, process improvement and modernization with high speed machining center, advanced CAD/CAM and rapid prototyping facilities.
- Defense Procurement Technical Assistance Center: helps New Jersey small businesses obtain defense and other federal contracts
- Enterprise Development Center: small business incubators that help new and developing enterprises survive the typically difficult start-up stages;

- New Jersey Technical Assistance Program (NJTAP): helps New Jersey small- and medium-sized businesses comply with state and federal pollution prevention regulations;
- Micro-fabrication Center: serves to assist businesses with design and fabrication services related to silicon processing technologies in the university's clean room for MEMS and CMOS processing;
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II.H.9 Developing Digital Learning

One of the important goals in the NJIT 5-year strategic plan, Vision 2020, is to seize the opportunities technology offers for transforming university pedagogy. Using technology, NJIT will increasingly break down the divide between face-to-face and online courses creating a new category of converged learning as a new format for 21st century learning. By embracing digital technology as the transformative learning strategy for the delivery of instruction, NJIT will give students control over time, place, path and pace of their education.

The objective of this new model is for NJIT to achieve convergence of the physical and virtual campus, with no functional distinction between face-to-face and online courses. Both modalities will operate synergistically in an anywhere classroom. A student will have the opportunity to transparently engage in a course either remotely or in a classroom environment, with both modalities occurring in the same course section. Because of individual circumstances, one mode may have advantages for a given student at a given time, but the tools and venues open to all students are expected to provide equivalent outcomes. Academic standards will be consistent because course content and learning outcomes will stand independent of delivery mode. Imagine a class where all students register in the same way whether they want to attend by coming to the classroom, logging into the class from their dorms or nearby apartments, or joining the class from another state or country. Admission, registration procedures, and costs are the same regardless of the location from which they attend the class. Those in the classroom experience the delivery of the course content as they would in a traditional class—except they are joined via synchronous streaming by other students who are taking the course from a distance, anywhere in the world. These remote students are held to the same standards for academic excellence as their classmates on campus: they engage in the same discussions, do the same homework, and take the same exams. The classroom is brought to the remote learner in real time, and he or she participates in the class in the same way as those physically present. Rather than continuing the distinction between face-to-face and online courses within academic programs, NJIT is breaking down the divide and bringing them together using new technology and transforming pedagogy. This new pedagogy is already being used in classes for more than 200 students.

The third mode of digital learning described above in particular supports the learning experience of fully online and remote NJIT students. Much of this expansion is taking place entirely under the direction of NJIT. Some continues to be supported by NJIT's relationship with Pearson in four different online master's degree programs (Civil Engineering, Electrical Engineering, Computer Science, MBA and associated online Graduate Certificates). The services that Pearson provides include marketing, recruitment, retention and online course conversion. Recruited students are predominantly adult learners who study part-time, 100% online and take on average 1.5 classes each semester.

II.I. Major Capital Projects Underway in Fiscal Year 2016

NJIT is in the third phase of a multi-phase, multi-year project to rehabilitate the former Newark Central High School. The original structure was built in 1919 with an addition to accommodate a gymnasium and swimming pool in 1970. The building is approximately 220,000 gross square feet and occupies a prominent position on Martin Luther King Jr. Blvd. With the award of $86.3 million from the state of NJ, the project is now advancing rapidly and we anticipate completion by 2017.

The current phase is focused on preparing the Central King Building's 4 lowest floor levels (Second level, First / Summit St level, New St level and MLK level) for various new academic and student uses. At the Summit and New St levels, 285 classroom seats will be added alongside numerous study, lounge, meeting and exhibition spaces. The New St level will also house new student use facilities including various tutoring centers and a 94 seat computer emporium space, as well as the newly established teaching excellence center, a faculty focused technology training initiative. The MLK level will be the new home to the working studios for the New Jersey Innovation Institute, a collaboration between NJIT and outside industry partners. The partially renovated 2nd floor will remain as general use classroom space, and receive building system and interior finish upgrades. New landscape and entry / egress features are planned for all sides of the building. Portions of the Summit St building entrance were completed for the start of the Fall 2015 semester. Renovations to the building's 1912 exterior facades are planned for completion in this phase. New fenestration and exterior cladding is proposed for the 1969 building facades. Construction completion and occupancy is planned for early 2017. Future project phases will include interior renovation to the Summit level 500 seat auditorium and the 1969 pool spaces at the New St and MLK levels.

In June 2015, NJIT broke ground on a new parking garage in the University Heights Science and Technology Park. The new 980 space facility will provide over 770 new parking spaces for NJIT students, faculty, and staff. The facility is being constructed to Green Garage Certification requirements and will consolidate safe and convenient parking for the NJIT community.

A second grant from the New Jersey Higher Education Capital Grant Programs of $13.5 million has been awarded to build a 'Life Science and Engineering Laboratory' as an extension to the existing York Center for Environmental Engineering and Science. This project will substantially expand laboratory space on campus and provide space for interaction between student groups and research faculty. Construction will begin in October 2015 with completion expected in 2016.

Finally, NJIT is nearing design completion for the new $102M Wellness and Events Center. The new facility will replace the existing Fleisher Athletic Center constructed in the 1960s when NJIT had a student population of approximately 4,000 students. With our enrollment eclipsing 11,000 students, the new facility will provide the community with a multi-purpose facility for large scale events, recreation, fitness and wellness, and intercollegiate athletic support. Construction is slated to begin in November 2015 with the new facility being completed in the summer of 2017 and the athletic field complex being complete in spring of 2018.

II.I.I Updating Facilities

NJIT continues its program of major maintenance projects including roof repairs/replacements, HVAC system and control upgrades, building refurbishments and sustainability improvements. We have incrementally increased the overall spending on existing space and will continue to do so in conjunction with our 2020 Vision strategic plan.

As part of the overall planning efforts, NJIT will complete a space utilization study, facilities condition assessment, and facilities master plan update during fiscal year 2016. These will become the key planning documents in an effort to maximize existing space utilization and reinvest in our existing facilities.

III. Other Institutional Information

III.A. Degrees

III.A.1. Bachelor's Degrees Awarded in Fiscal Year 2014

CIP Code	Institutional Program Title	Total
400801	Applied Physics	4
40201	Architecture	109
260202	Biochemistry	5
260101	Biology	52
260203	Biophysics	2
110401	Business & Information Systems	16
140501	Biomedical Engineering	60
520201	Business	70
110701	Computing & Business	2
140801	Civil Engineering	133
150000	Construction Engineering Tech	30
140701	Chemical Engineering	48
400501	Chemistry	14
150000	Concrete Industry Management	5
150000	Computer Technology	23
150000	Construction Management Tech	11
140901	Computer Engineering	26
231303	Communication	9
110101	Computer Science	49
100304	Digital Design	11
150000	Electrical & Computer Eng Tech	38
141001	Electrical Engineering	70
150000	Electrical & Computer Eng Tech	4
141301	Engineering Science	2
30104	Environmental Science	6
110401	Human Computer Interaction	4
540101	History	4
521101	International Business	5
49999	Industrial Design	16
143501	Industrial Engineering	26

500408	Interior Design	17
110401	Information Systems	6
110103	Information Technology	81
229999	Law, Technology and Culture	4
270101	Mathematical Sciences	21
141901	Mechanical Engineering	106
150000	Mechanical Engineering Tech	26
150000	Medical Informatics Tech	3
150000	Surveying Engineering Tech	14
301501	Science, Technology & Society	6
500502	Theater Arts and Technology	2
150000	Telecommunications Mgmt Tech	4
110401	Web & Information Systems	3
Total		**1147**

III.A.2. Master's Degrees Awarded in Fiscal Year 2014

CIP Code	Institutional Program Title	Total
270301	Applied Mathematics	4
400801	Applied Physics	3
270501	Applied Statistics	13
40201	Architecture	28
260101	Biology	3
144301	Biopharmaceutical Engineering	1
110401	Business & Information Systems	30
140501	Biomedical Engineering	1
140501	Biomedical Engineering	62
261103	Bioinformatics	11
261102	Biostatistics	3
110701	Computing & Business	4
140801	Civil Engineering	76
140701	Chemical Engineering	29
400501	Chemistry	12
142701	Critical Infrastructure	1
140901	Computer Engineering	11
110101	Computer Science	90
111003	Cyber Security & Privacy	6

141001	Electrical Engineering	95
151501	Engineering Management	122
110199	Emergency Management Bus Cont	3
141401	Environmental Engineering	12
440501	Environmental Policy Studies	2
30104	Environmental Science	5
520201	Healthcare Systems Management	9
521101	International Business	3
143501	Industrial Engineering	17
309999	Interdisciplinary Study	1
40301	Infrastructure Planning	5
110401	Information Systems	59
110103	IT Administration & Security	19
520299	Business Administration	56
141901	Mechanical Engineering	42
143601	Manufacturing Systems Engr	4
520201	Management	42
520299	MBA Management of Technology	1
270301	Mathematical & Comp Finance	8
141801	Materials Science &Engr.	11
142701	Occup. Safety & Health Engr.	4
141001	Power and Energy Systems	13
512004	Pharmaceutical Chemistry	14
140701	Pharmaceutical Engineering	17
142701	Pharmaceutical Sys Management	13
231303	Professional & Tech Comm	10
140903	Software Engineering	7
141001	Telecommunications	7
140804	Transportation	14
Total		**1003**

III.A.3. Doctoral Degrees Awarded in Fiscal Year 2014

CIP Code	Institutional Program Title	Total
400801	Applied Physics	2
140501	Biomedical Engineering	1
140501	Biomedical Engineering	4
140801	Civil Engineering	1
140701	Chemical Engineering	7
400501	Chemistry	2
140901	Computer Engineering	1
110101	Computer Science	7
141001	Electrical Engineering	3
141401	Environmental Engineering	4
30104	Environmental Science	1
143501	Industrial Engineering	2
110401	Information Systems	3
270101	Mathematical Sciences	9
141901	Mechanical Engineering	2
141801	Materials Science &Engr.	2
459999	Urban Systems	3
Total		**54**