

# Integrative Life Science and Engineering Laboratory

*A recent MIT study proclaims the convergence of the Life Sciences, Physical Sciences, and Engineering as “The Third Revolution” in biomedical research, one with the potential to eclipse the impact of molecular biology and genomics revolutions. The product of this convergence will be critical advances in a broad array of sectors, from health care to energy, food, climate, and water. In the words of the study, “Convergence goes beyond simple multi-disciplinary teaming. It represents a fundamentally different viewpoint on the conduct of medical research.”*

*NJIT recognized and embraced this future. For more than a decade, it has invested in connecting the traditional disciplines to the needs of the life-science community. It created the Biomedical Engineering Department in 2001 from faculty members engaged in life-science-related research. In 2007, NJIT nucleated its Department of Biological Sciences from a well-regarded program in mathematical and computational biology. As a result of their recent explosive growth, both departments have outgrown their available physical space and adequate laboratory facilities.*

## ■ Faculty Expansion

NJIT views these core departments as anchors to its life-science research. But embracing the principle of convergence means virtually every academic unit has a role to play in advancing the biosciences. The ramifications are reflected in the 5-year strategic plan adopted in 2010 influencing new faculty recruitment, student recruitment, new facilities investment, new academic program creation and our development efforts with government and industry. In the last year, NJIT added over a dozen new faculty members whose research intersects with the life sciences and more will be hired in the coming years. In addition to

enriching content of traditional degree programs, we have created almost 20 new degree programs — many at the master’s degree level that address the emerging, specialized needs of the bioscience industry of New Jersey. Having done so, the lack of facilities dedicated to the unusual requirements for bio-wet lab research have become a gating factor to remaining competitive in these areas.

## ■ The York Project

The proposed project updates the York building, a twenty-three year old, three-story research facility with roughly 12,000 ft<sup>2</sup> of wet laboratory space and 7,000 ft<sup>2</sup> of office space by adding 10,000 ft<sup>2</sup> of bio-wet laboratory space in Phase 1, supporting 50 additional researchers (faculty and graduate students).

A second modular expansion is included in the design concept and would be constructed as soon as funding permits. The design is an open laboratory configuration designed to promote collaboration and cross-talk among the investigative teams while maximizing use of shared, core infrastructure. It is cost-effective use of space and instrumentation and the optimal strategy for building the multi-functional teams that are necessary to unravel the complexities of biological systems and translate that understanding into new products and services. The York building was originally designed contemplating an expansion of this type and it is part of the university’s Campus Master Plan of 2008. The preliminary design work was prepared as part of an anticipated 2009 ARRA proposal to the National Institutes of Health; therefore, there is a detailed plan and solid cost estimates that qualify as construction ready.

## ■ Research Growth

An investment by the State of \$13M will pay back in a number of direct and indirect ways. The functionalized space will sustain growth in federally funded research of at least \$5-10M/year and would dramatically increase

## At a Glance

New Jersey Institute of Technology (NJIT) requests a total grant of \$13,500,000 to modernize and expand bio-wet laboratory facilities in NJIT’s York Center from the following programs:

- **Building our Future Bond Act** (“GO Bond”) \$9,000,000
- **Higher Education Technology Infrastructure Fund** (“HETI”) \$500,000
- **Higher Education Equipment Leasing Fund** (“ELF”) \$4,000,000.

In addition, to the State bonds, NJIT is positioned to provide:

- **Cash match** \$3,500,000
- **Already invested** \$2,590,000

opportunities for collaboration with traditional life science and medical researchers — especially those in Newark’s University Heights Science Park, New Jersey’s hospitals and companies. These research activities will spawn scores of master’s and doctoral graduates that can satisfy the workforce needs of New Jersey industry. The heightened activity and specialized facilities will be an attractive location for companies to outsource their own R&D needs and for start-ups such as the 90 companies in our own Enterprise Development Center to find resources to help them grow to independent and profitable businesses that will continue to operate in the State.

This is a high-leverage investment. It binds together researchers from across the university, across New Jersey universities and across the boundaries of academe and industry. It is fundamental to keeping pace with leading polytechnics across the country. It will create the outflow of knowledge and knowledge workers that will keep New Jersey the “medicine chest” of the world and a seat of innovation for the emergence of forward-looking industries rooted in the application of bio-sciences and technology.

## Importance to New Jersey's Strategic Priorities

*The bioscience and technology industrial cluster is one by which our state is known throughout the world. It is a vibrant and growing sector with a demand for workplace competencies at all skill levels, but especially at the advanced technical degree level required to master leading-edge scientific discovery driving innovation in the life sciences.*

- The bio-science industrial cluster includes pharmaceutical sector, biotechnology and medical device manufacturing. It accounted for \$23 billion of New Jersey's Gross Domestic Product in 2009, with direct employment of 125,965 of the State's private-sector workforce.
- Over the past five years, this cluster's establishments have expanded by 15.9% in New Jersey, outpacing the nation by 6.0 percent.
- The number of employees working directly at those New Jersey biotechnology companies also increased, rising 9.3 percent in the last two years, from approximately 15,000 employees in July 2010 to an estimated 16,400 in 2012. This is a highly educated workforce with 33% bachelor's, 23% master's/professional, and 8.2% doctoral degree holders.



*Typical research lab*

It is clear why this sector has been identified as a Target Industrial Cluster in the State Master Plan and the target for so many other states' economic development initiatives.

Each subsector of the bioscience cluster faces dynamic changes to the core competencies by which companies will grow into the next century.

- **Biotechnology** is maturing from lab discovery through clinical trials, and with that a growing need for production technology as it also demands new scientific-based competencies.
- **Big-pharma** has found the drug-discovery pipeline shrinking and needs to find new efficiencies in the production of exiting drugs and formulations while

coming to grips with new bioscience principles of disease and treatment.

- **Medical device** companies need to embrace micro- and nano-technologies that introduce sensing, computing and communications in a whole new way.

This growth demands a new generation of workers with the skill levels that only advanced degree training can provide — and that education needs to be steeped in the principle of convergence. We believe this to be essential to achieving those goals and include letters from the major trade groups for these industries: BioNJ, HealthCare Institute of New Jersey, Research and Development Council of New Jersey and NJ Association for Biomedical Research to support that claim.



*York Center*