

## New Brunswick Strategic Planning Proposal

**Proposal Title:** Enhancing Diversity, Inclusion and Excellence in STEM Graduate Programs: A Strategic Opportunity for Rutgers

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**Primary Strategic Priority/Foundational Element/Integrating Theme Addressed** (Select one)

- Envision Tomorrow's University
- Build Faculty Excellence
- Transform the Student Experience
- Enhance Our Public Prominence
- Strong Core of Sciences and Humanities
- Inclusive, Diverse, and Cohesive Culture
- Effective and Efficient Infrastructure and Staff
- Financial Resources Sufficient to Fund Our Aspirations
- Robust Shared Governance, Academic Freedom, and Effective Communication
- Cultures, Diversity, and Inequality—Local and Global
- Improving the Health and Wellness of Individuals and Populations
- Creating a Sustainable World through Innovation, Engineering, and Technology
- Educating Involved Citizens and Effective Leaders for a Dynamic World
- Creative Expression and the Human Experience
- Measuring Progress and Defining Success

**Proposal Abstract** (brief summary of the proposal – 250-word limit):

We propose a **new diversity fellowship program to award competitive first-year graduate funding to alumni of our summer undergraduate research programs in STEM**. These summer programs are a proven pipeline to our doctoral programs. The summer students, who attend other schools throughout the nation during the academic year, are primarily from underrepresented, disadvantaged, and/or first-generation college backgrounds, or they attend colleges, including Minority Serving Institutions, that do not offer significant research. The number of STEM undergraduates in such summer programs in New Brunswick has substantially increased to over 100 annually. Almost all are strongly and positively influenced by their experience and apply to Rutgers doctoral programs.

However, it has become increasingly difficult to complete the cycle from summer scholar to graduate matriculant at Rutgers because of a steadily declining number of first-year fellowships, including those to promote diversity. The proposed fellowships address this problem by **providing resources to recruit and retain the best summer scholars and enhance the diversity and excellence of the incoming graduate class**.

**The proposed program strongly aligns with the Inclusive, Diverse, and Cohesive Culture element of the Strategic Plan,** and also supports the priority to build faculty excellence; research thrusts intersect with several integrating themes including Creating a Sustainable World through Engineering and Technology, and Improving Health. **To seed this program and provide proof-of-concept for future external funding sources, we request fellowships for two students for each of two years.** We aim to leverage matching support from New Brunswick units, including Engineering, SAS, SEBS, and RBHS.

## Full Proposal Description (5-page limit)

### a) What is being proposed

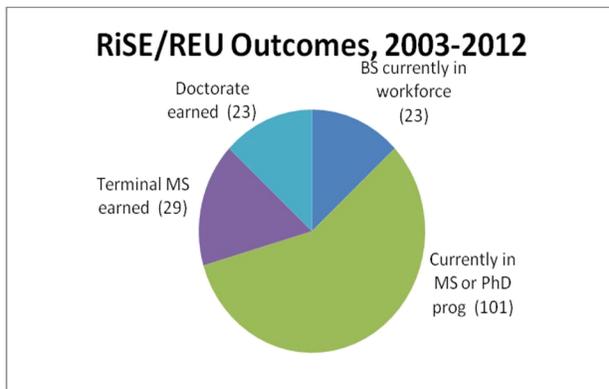
**We propose that the University establish a new diversity fellowship program to award competitive first-year graduate funding to alumni of our summer undergraduate research programs in STEM.** This proposal builds on the strength, growth, and investment in recent years in STEM undergraduate summer programs and leverages our success in garnering federal grants to support summer research for students from diverse backgrounds.

**a.1) Background:** Rutgers hosts a number of undergraduate summer research programs that are cross-cutting across New Brunswick, bridging multiple units, i.e. Engineering, SAS, SEBS, Pharmacy, and the Graduate School-NB, as well as the Robert Wood Johnson Medical School (RWJMS). The majority of these programs are federally funded, primarily NSF Research Experience for Undergraduates (REUs), run either directly as a formal REU site or indirectly as an element of a larger entity such as a Research Center or a Graduate Training program. In addition, the Office of Institutional Diversity and Inclusion (OIDI), in collaboration with the Graduate School-NB (GSNB) and RWJMS, run the RiSE (Research in Science and Engineering) program. RiSE hosts students across STEM disciplines and provides a recruitment mechanism and an enabling infrastructure for many of the REUs. Students are recruited from colleges across the U.S. and its territories, with a focus on populations that are historically under-represented in STEM and/or lack opportunities to pursue research at their home institutions.

<b>RiSE/REU Demographics 2003-2013</b>	
330 participants	
Underrepresented minority participants	78%
First generation college participants	44%
Participants attending Predominantly Undergraduate Institutions (limited academic year research opportunities)	42%
<b>RiSE/REU Sending Schools 2003-2013</b>	
Total number	120 schools
Minority Serving Institutions	31 schools (25%)
Geographic diversity	30 states, Puerto Rico, Virgin Islands, and Guam

The heart of the programs is an immersive 10-week research experience under the guidance of carefully matched faculty mentors; in addition, we enrich the curricula with activities designed to spark a lifelong interest in STEM and to foster individual career development.

The New Brunswick/Piscataway campus has been particularly successful in developing and securing funding for such programs. In the 10 year period 2003-12, the number of REU sites on our campus has grown from one to five, putting us in the top 10% of all research universities. With two renewals and two new awards added in 2013, we hosted seven sites last summer, positioning us among the national leaders. Other collaborating programs include the REU component of an NSF Engineering Research Center and an NIH-funded program at the School of Pharmacy. Partnerships with RiSE have been cited as a key strength in the success of the NSF and NIH proposals. In aggregate, our collaborating programs have allowed us to grow to a summer community of over 100 scholars.



These summer programs have been tremendously successful in fulfilling their training mission. Of summer alumni who have already earned their BS, over 85% have gone on to graduate or professional school; the rest are almost entirely in the science workforce with many expecting to attend graduate school. Moreover, a significant percentage of our summer scholars are strongly and positively influenced by their experience at Rutgers and apply to doctoral programs at the University.

**a.2) Strategic opportunity:** As our REU presence has grown, the number of summer alumni applying to our graduate programs has steadily increased, with a record number of students from the 2011 and 2012 summer classes having applied for 2013 graduate admission. This presents a strategic opportunity for Rutgers to grow a diverse and inclusive graduate student body, and to overcome the current constriction of the STEM pipeline at the undergraduate to graduate transition. However, it has become increasingly difficult to complete the cycle from summer scholar to graduate matriculant at Rutgers because of the steadily decreasing number of first-year fellowships, including those targeted at promoting diversity. **The proposed first-year graduate fellowships would address this problem by providing resources to recruit the best summer scholars and enhance the ethnic, cultural and geographic diversity of the incoming graduate class.**

**a.3) Proposed initiative:** We propose that the University provide fellowships for two first year graduate students for each of two years. Eligibility for these awards would be restricted to alumni of summer research programs.

**a.3.1) Recruitment:** The fellowships would initially be publicized as part of the summer program application process. Given the knowledge that a summer at Rutgers would provide an edge in winning a fellowship, top sophomores and juniors might favor Rutgers for their summer experiences. During the fall of their senior year, alumni would receive reminders about the fellowship opportunity, incentivizing them to apply to Rutgers for graduate study.

**a.3.2) Mechanism:** Fellowships would be administered by the Center for Graduate Recruitment, Retention, and Diversity (GR<sup>2</sup>aD), a unit of OIDI. Graduate Program Directors would nominate qualified summer program alumni who have applied to their programs. A review committee, consisting of a faculty member from each participating unit (currently Engineering, SAS, SEBS, Pharmacy, and RWJMS) would select two winners from among the nominees and would rank wait-listed candidates. A rubric would be prepared to aid the selection process, with the student's potential to contribute to a diverse and inclusive culture on campus receiving heavy weight.

**a.3.3) Sustainability:** The University-funded fellowships will seed the program and provide proof-of-concept for future external funding, as described below. In addition, the program will leverage matching support from the participating New Brunswick units, and deans have expressed support for this initiative.

***b) How does the initiative align with the University Strategic Plan?***

The proposed initiative strongly aligns with the University Strategic Plan across several foundational elements and strategic priorities. In addition, the STEM research thrusts of the participating programs mesh with several integrating themes:

- *Inclusive, Diverse, and Cohesive Culture*- The summer programs (listed in section (d) below), successfully recruit and integrate an exceptionally diverse pool of students for 10 weeks. These students bring their diverse perspectives to their research labs, departments, and units and enrich the culture of the New Brunswick/Piscataway campuses. By tapping this talent pipeline for Rutgers graduate programs, Rutgers has the opportunity to gain similar benefits for 4-6 years for each student.
- *Build Faculty Excellence*: As the Strategic Plan points out, the quality of graduate programs is critical to recruiting outstanding faculty. In STEM, diversity is widely acknowledged to spark innovation and enhance the research enterprise. Hence, a graduate community that embraces diversity and inclusion should promote quality and creativity in the science. In turn, this should incentive top faculty candidates to consider Rutgers. Moreover, by demonstrating our commitment to diversity in STEM, Rutgers should attract faculty who are themselves from underrepresented backgrounds. Lastly, the graduate students of today are the future faculty of tomorrow; by attracting top diversity graduate students to Rutgers, we are home-growing a pool of potential faculty candidates.
- *Enhancing our Public Prominence*; By bringing students from across the country to the New Brunswick/Piscataway campuses, the summer programs spread the Rutgers brand nationwide. Advertising that there are specific graduate fellowships for REU participants will enhance the number, quality and diversity of REU applicants and, in turn, the graduate applicant pool.
- *Educating Involved Citizens and Effective leaders for a Dynamic World*; Professional development is a major component of these programs, with strong emphasis on persuasive writing and public speaking, interdisciplinary connections, responsible conduct of research/ethics, exploration of career options, and dialogues with leaders in scientific community and public policy.
- *Improving the Health and Wellness of Individuals and Populations*; REU sites in Cellular Bioengineering, Pharmaceutical Engineering, and Toxicology & Pharmacology, along with the RiSE program, which hosts a significant fraction of participants at RBHS, are aimed at training the next generation of engineers and scientists to improve human health and welfare
- *Creating a Sustainable World through Innovation, Engineering, and Technology*; REU sites in Green Energy Technology, Cellular Bioengineering, and Pharmaceutical Engineering aim at integrating innovation with research to derive cutting edge solutions to high impact problems. The Green Energy Technology program is specifically targeted at sustainability. A separate REU in Biotransformation aims to understand climate-related differences in the environmental impact of organic compounds and includes thrusts in environmental engineering. z

**c) Additional themes, priorities, and elements that are addressed**

The proposed fellowships will serve to:

- Strengthen our participation at the graduate level in the CIC, which provides incentives for students in Summer Research Opportunity Programs (SROPs, which are diversity-focused) to apply for doctoral study at CIC institutions. The fellowships will make Rutgers an attractive choice for SROP alumni, hence giving us a competitive edge among our peers and promoting national visibility.
- Strengthen our relationships with Minority Serving and Predominantly Undergraduate feeder schools, which will promote Rutgers to their top undergraduates. This should lead to collaborative research with these schools and enhance our ability as Research Partners in federal grants aimed at building their research capacity.

**d) Who will be involved?**

**This initiative is led by Dr. Evelyn Erenrich, Assistant Dean, Graduate School-NB (GSNB); Director, Center for Graduate Recruitment, Retention, and Diversity (GR<sup>2</sup>aD), a unit of OIDI, and Director, RiSE at Rutgers. The PIs and Program Directors of collaborating REUs and other partner programs will also participate in this initiative.**

Currently, Rutgers hosts the following REUs and affiliated programs.

Program Name	Funding Agency	Principal Investigator/Program Director	Unit/Department or Center	# of participants per summer
Cellular Bioengineering	NSF	David Shreiber	School of Engineering (SoE)/Biomedical Engineering	10
Green Energy Technology	NSF	Kimberly Cook-Chennault	SoE/ Mechanical & Aerospace Engineering	10
Structured Organic Particulate Systems	NSF	Fernando Muzzio/Henrik Pedersen	SoE/NSF-Engineering Research Center in Pharmaceutical Engineering	6
Physics & Astronomy	NSF	Andrew Baker	SAS/Physics & Astronomy	8
Toxicology & Pharmacology	NIH, Amer Society for Pharmacology, Society of Toxicology	Debra Laskin/Lauren Aleksunes	RBHS – Ernest Mario School of Pharmacy	16
Biotransformation	NSF	Lily Young	SEBS/Environmental Sciences	8
Ocean Sciences	NSF	Gary Taghon	SEBS/Institute for Marine and Coastal Sciences	8
Perceptual Sciences	NSF	Matthew Stone	SAS/Psychology and Computer Science	8
DIMACS (Discrete Math and Theoretical Computer Science)	NSF	Rebecca Wright/Eugene Fiorini	SAS/Mathematics and Computer Science	24
RiSE	NSF, NIH, NASA, McNair, corporate and philanthropic	Evelyn Erenrich	GSNB, OIDI, RWJMS	18

### ***e) Desired outcomes***

In and of themselves, the summer programs have substantial value. Furthermore, they are effective vehicles to grow the diversity and excellence of our graduate programs and the research enterprise at Rutgers. Our undergraduate summer programs provide a talent pipeline with existing connections to and proven success at Rutgers:

(1) Both Scholars and faculty have had the opportunity for in-depth mutual assessment prior to the graduate application and admissions processes.

(2) Alumni serve as ambassadors at their home institutions, generating additional graduate applications and a self-sustaining pipeline.

In addition to their power for graduate recruitment, these programs help the University fulfill its educational mission; enhance the diversity, vibrancy, and cultural perspectives of the campus; provide mentoring opportunities for graduate students and postdocs; extend the Rutgers brand across the nation; and raise Rutgers' profile among top students. These outcomes can be further leveraged for recruitment of future faculty and to increase diversity among the faculty.

Furthermore, by serving as mentors, faculty broaden the impact of their research and training, in turn favorably positioning them for training grant awards (such as 14 competitive NSF, NIH, Department of Education, and NASA grants awarded in the last 10 years that have leveraged our summer program and

diversity recruitment success). As an ancillary benefit, the programs promote strategic relationships and research collaborations with faculty at the sending schools, many of which are minority-serving. In turn, this positions us for success in future grant competitions that require partnerships between research universities and minority-serving or predominantly undergraduate institutions.

With regard to this specific proposal, we expect the following outcomes:

- (1) The fellowships will **increase ethnic, cultural, and geographic diversity across campus**.
- (2) Armed with the knowledge that fellowships are designated specifically for summer scholars, **the nation's best undergraduates will apply here** for the summer. In addition, Rutgers will gain a competitive edge in the CIC Summer Research Opportunity Program (SROP) common application for summer programs focusing on diversity.
- (3) By demonstrating the University's buy-in to both diversity and excellence in graduate education and the research enterprise, the fellowships will spark **recruitment of future faculty from diverse backgrounds**.
- (4) The **University's commitment will incentivize more investigators and departments to apply for REU funding and will make their applications more compelling**. This success will in turn further increase the pool of students, will broaden the impact of research and training at Rutgers, and will leverage these outcomes to make us even more competitive for prestigious and well-funded NSF, NIH and Department of Education graduate training grants.
- (5) **The fellowships will help grow ties with NJ industry** by providing a diverse nationwide pool for the scientific workforce. In turn, the program should catalyze new industry-Rutgers research collaborations and bring in corporate funding.

***f) Anticipated resources to support this initiative.***

We have a long-term goal of one fellowship for every 15-20 REU summer students. To seed this initiative, **we request two fellowship packages (a full stipend, tuition, and health benefits) for two years from the University**. We expect to leverage these with matching funds from the participating units to fund additional fellowships. Long term, we expect **the program to become sustainable via industry matches and support from units and federal training programs**.

**Proposed Measures to Mark Progress or Determine Success**

*[Please explain, in one or two paragraphs, how progress toward achievement of the initiative will be measured and how overall success will be determined.]*

The success of this program can be measured on several fronts. First, we will assess the number of REU alumni that attend Rutgers for graduate school via this initiative and track their productivity. Second, we will evaluate the number and quality of applicants to the REU programs, and specifically query their influence of the potential fellowships on their level of interest in Rutgers. Third, we will chart the number of new/renewal REU proposals emanating from Rutgers and compare the number after advertising the potential for first year fellowships to current numbers. Finally, we will track the number of training grants, inter-institutional collaborations, and similar opportunities that partner with the initiative.