

Catalyzing Research-Intensive Innovations: Pathway to R1
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Abstract

Florida Atlantic University (FAU), a Minority Serving Institution designated as a Carnegie Classification R2 is on the “Road to R1” as an institutional priority. FAU aims to create a transformational, tiered, research-intensive infrastructure to significantly enhance research quality of faculty, undergraduates, graduate students, and post-docs that will lead to increased scholarship and research productivity such as external funding awards, publications, innovations, patents, and partnerships. FAU will accomplish this by 1. Instituting the Vertically Integrated Projects (VIP) model and its associated research infrastructure in combination with FAU’s Office of Undergraduate Research and Inquiry (OURI) initiative to advance FAU’s research and scholarly productivity; 2. Strengthening the student pipeline by evidenced-based curricular, research and professional training leading to retention, graduation, doctoral enrollment, and preparation for research-intensive career pathways; and 3. Establishing VIP faculty professional development to enhance research productivity and mentoring skills. In turn, we believe that this focused plan will create the necessary threshold for FAU to achieve its R1 Carnegie status goal.

With FIPSE funding, FAU will adapt the successful Vertically Integrated Projects (VIP) model from Georgia Tech as a mechanism to our expected outcome of increasing the research productivity of faculty and post-docs, through large-scale, long-term, multidisciplinary research projects involving graduate and undergraduate students. Additional student outcomes will be increased retention, student success, and graduation within postsecondary education for underrepresented students including first generation and low-income students. This proposal addresses Absolute Priority 3 - funding for MSI institutions’ research and development infrastructure (34 CFR 75.105(c)(3)). Incorporating a set of evidence-based student-centered *overarching strategies* to achieve our goal, we will leverage institutional successes and published best-practices that have *already been documented* as successful in impacting underrepresented students who are completing their postsecondary degrees (undergraduate and doctoral). These evidenced-based strategies include **academic enrichments, long-term student engagement in research, faculty development, and tiered mentoring**. Academic enrichments include targeted research courses and training in grant writing, transferrable skills including data-science, communication, and critical thinking and other professional development opportunities made available through collaborations with other units. 16 VIP teams will be established and VIP students will complete, long-term research engagement, involving a tiered mentoring strategy to support fellows, including research-active faculty and post-doctoral students. Faculty mentors and postdocs will guide research progress and pathways to graduate education and professional research careers, while growing in their own capabilities and research productivity. FAU has established several successful initiatives that have increased research activity. These include our award-winning OURI that has supported thousands of undergraduate researchers within the past 5 years with research grants and summer fellowships as well as dissemination opportunities at symposia and research journals. Additionally, faculty across the university have received millions of dollars of external funding from key agencies (NSF, NIH, USDOT, NASA, etc.). Combined, the *overarching strategies* highlighted in our proposal provide a rich academic environment, and this FIPSE initiative will be the catalyst necessary for establishing both the necessary infrastructure and expertise to achieve and sustain the R1 research classification.

ABSTRACT: Research Infrastructure Investments to Elevate Morgan State University to Carnegie R1 Status

MSU is a historically black university in Baltimore with nearly 10,000 students, including 17% graduate students. MSU, while remaining true to its fundamental mission of offering excellent education and support for undergraduate and graduate students, particularly students of underserved backgrounds, plans to enhance its status as a research university to better serve its students, the communities that surround it, the entire nation, and the world. MSU developed two 10-year Strategic Plans, one in 2011 and one in 2020. The 2011 Strategic Plan included a goal of achieving the CCIHE R2 classification by 2020, a goal that was achieved by 2018. Following this success, MSU included achieving the CCIHE R1 status by 2030 in its 2020 Strategic Plan. The 2020 10-Year Strategic Plan has six (6) major goals, including the following two goals (Goals 3 and 4) that are directly related to the goals of this application:

- Goal 3: Elevate Morgan's Status to R1 Very High Doctoral Research University
- Goal 4: Expand and Improve a Campus-Wide Infrastructure to Support Operational Excellence and Increase Overall Institutional Capacity

The primary audiences for this grant are MSU graduate students, postdoctoral fellows, faculty, and staff. MSU's commitment to diversity and inclusion extends to the realm of research. MSU will prioritize efforts to increase diversity among faculty, students, and research topics, ensuring equitable access to research opportunities. Further, MSU will actively collaborate with industry, government agencies, and other research institutions to expand research opportunities, leverage resources, and address real-world challenges. The impact of MSU achieving R1 status will reach the communities of Baltimore, as well as the Maryland region, the US, and societies around the world.

The grant's primary activities are categorized as goals falling into two "thrust" areas: research and education. The research goals are to (1) Increase Morgan's Science & Engineering (S&E) and Non-S&E Research Expenditures; (2) Increase the Number of Full-time Postdoctoral Researchers-recruiting 10 postdocs per year; (3) Improve Research Administrative Services; and (4) Promote Research & Development (R&D) Capabilities & Capacity to Increase R&D Funding. The educational goals are to (1) Enhance Faculty Training and Professional Development (related to research and mentoring); (2) Provide Funding to Attract Doctoral Students to New Programs; (3) Enhance Graduate Students' Preparation for Research-support 10 RAs per year and Teaching Assistantships-support 10 TAs per year; and (4) Increase Doctoral Conferrals in STEM, Social Sciences, Humanities, and other fields.

This proposal establishes clear performance metrics and benchmarks to assess progress toward R1 status. Regular reporting and evaluation will ensure transparency and accountability in our journey. MSU is committed to a sustainable path beyond R1 status, and will develop strategies to secure long-term funding sources, maintain a culture of research excellence, and sustain the impact of our research endeavors.

In conclusion, Morgan State University is poised to embark on a transformative journey toward R1 "Very High Research" Doctoral University status. This proposal aligns with our institution's core values and mission, reaffirming our commitment to excellence in research, innovation, and education. We are confident that, should this application be funded, MSU will be able to achieve R1 status by 2030 or earlier. MSU is intent on doing so while preserving its core mission of being an excellent educational institution for students and an anchor institution for its surrounding communities. As the MSU President, Dr. David Wilson, wrote in a Baltimore Sun editorial: "As Morgan State reaches for the sky in research rankings, it holds tight to its roots."

Title: University of Puerto Rico Center for Resilience to Climate Change (UPR-CRCC): Transformation of Puerto Rico's Chemistry Education and Research Infrastructure for Climate Resilience and Wellness

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Abstract

The University of Puerto Rico Río Piedras Campus, the only Hispanic Serving Institution with R2 Carnegie classification in the island, is seeking funds to transform obsolete learning rooms and research laboratories with deteriorated infrastructure into resilient spaces that can integrate topics in chemistry related to climate change. Damage to infrastructure was and is a major issue before and after the island's devastating destruction caused by Hurricane María, thus, current efforts are imperative to mitigate the effects of future atmospheric disasters. The areas to be renewed are specifically targeting undergraduate and graduate teaching and laboratory spaces with a maximum impact to all students in the College of Natural Sciences since the service of the Department of Chemistry is a requirement to all students' majors with a bachelor's degree in science. **The proposal plans to renew six teaching rooms into learning commons and four research labs into resilient research working areas by the inclusion of solar panels, independent water reservoirs and satellite internet service, as well as new modules for four of the areas. The learning commons will include areas for peer-mentoring and group exchange, and rooms with virtual reality technology for teaching.** This project includes the creation of services and educational resources for the K-12 public education system to promote interest of the next generation in STEM topics. Topics will be aimed at looking at learning science as the necessary tool to solve current and future problems. In addition, the Department of Chemistry will establish a service center for students, faculty and the community of Río Piedras that will involve learning about mental health wellbeing and will provide tools to comply with clean water and clean air policies to seek through science and education the transformation of our population into becoming scientific citizens for a more sustainable future.

Objectives: 1- To create an emergency working plan on how to mitigate the different effects of environmental disasters and climate change high impact events. 2-Creation of resilient laboratories and transforming classrooms into learning commons. 2- Implement a holistic view to improve research and teaching infrastructure and strengthen mental health and wellness through a partnership with the Department of Counseling for Student Development. 4.-Provide services to students, faculty the community on climate change approaches, mentoring, mental health and life coaching skills.

Undergraduate students at the University of Puerto Rico- Río Piedras are participative in its majority to Pell grants program; 64% received Pell grants in the academic year 2021-2022. The UPR student body fall under Priority Group III.

ABSTRACT

The proposed project, Support for Ph.D. in Engineering Degree Program Development (SPED), falls in the **Absolute Priority 3** of the Department of Education's funding opportunity. The specific objectives of the proposed project are to (a) support the institution's aspiration to attain a Carnegie Classifications R1 status, (b) support the development of a Ph.D. program in engineering, (c) increase the underrepresented minorities pursuing Ph.D. degrees in engineering, (d) encourage innovations serving coastal communities, in three strategic areas of coastal resilience, marine energy and blue economy, and biomedical devices.

The overall vision is that the proposed project will lead to the development of an internationally recognized Ph.D. program known for its cutting-edge research, distinguished scholarship, diverse student body, and innovation. To achieve this vision, we will integrate education, research, and community engagement into the development of a new Ph.D. program. We will adopt a student-centered approach to recruit and mentor students including students from underrepresented minority (URM) groups, to support individual student's aspirations and career goals. The proposed project will encourage and inspire innovations to serve communities at large.

The proposed project falls in Absolute Priority 3 of the Department of Education's funding opportunity, which supports institutions to attain higher research activity status, for example, to move from Carnegie Classifications R2 to R1 status. To attain an R1 status, we should consider increasing the STEM expenditures, STEM doctorates, number of research staff, and research faculty, i.e., the metrics on which Carnegie Classifications are based. The proposed project will support the development of a Ph.D. program in engineering that will increase our numbers in those metrics and support the institution's aspiration to become an R1 university. The proposed project will leverage the significant federal funding that we have in engineering, for example, about \$2.8 M of direct research expenditure last year and over \$5 M in state-of-the-art instrumentation and laboratories of engineering research, particularly in the areas of nanotechnology and nanoscience, optical diagnostics, material characterization, and coastal water resources, and unmanned aircraft systems.

The proposed budget is \$4,730,107 and will provide support for (a) graduate research assistants/graduate fellows, (b) research assistantships for undergraduate students, (c) graduate program faculty, (d) laboratory operations, (e) field experiments, (f) mentoring and administrative support, (g) support for travel for SPED faculty and students for field experiments and attending conferences, (h) publication charge, and (i) external evaluator(s). Over the project period, the proposed project will support (a) six graduate faculty members with a total of 38 person-months, (b) 60 person-year of graduate fellows, (c) 72 undergraduate research assistants for research experience (each with 10 hours per week and 50 weeks-equivalent per year), (d) one program coordinator assisting with mentoring and graduate student recruitment, (e) one post-doctoral fellow assisting with laboratory development. The proposed project will have in-kind matching support for faculty research time, program administration, graduate students, and readily available scientific equipment and instrumentation for faculty and student thesis research.

The proposed project will conduct research in three thrust areas and encourage scholarship in cutting-edge research and innovation. Thesis research topics will include digital twins, autonomous systems engineering, coastal engineered structures, and applying AI to improve the resilience capacity, offshore wind turbine, green hydrogen, green electro-fuels, extracting minerals from seawater, salinity gradient for power generation, translational research including functional nano metamaterials, micro-/nano-drug delivery systems, organ-on-a-chip for disease mechanism exploration.

Abstract

North Carolina Agricultural and Technical State University (NCA&T) is an R2 doctoral research university, and the nation's largest Historically Black University (HBCU). NCA&T will use funding from the Research and Development Infrastructure (RDI) program to address infrastructure constraints on its biomedical research programs – specifically, renovating and fitting out the university's vivarium and expanding funding resources for graduate students within biomedical research programs. Although NCA&T received support from the National Institutes of Health (NIH) to renovate the vivarium and equip it with needed fixed equipment, the rising cost of construction materials has prevented the completion of the proposed renovation.

Aligning with NCA&T's goal to attain R1 status by 2030, the project goals are as follows **(1) enhance support for graduate students engaged in biomedical research, thereby reducing the barrier of cost in graduate studies; (2) increase access to modern, state-of-the-art research equipment, thereby supporting and enhancing the university's research portfolio and fostering a community of research collaboration and innovation; and (3) complete the renovation of the university's vivarium, partially supported by the NIH, thereby enhancing NCA&T's competitiveness for increased funding of research utilizing animal models.** The long-term impact of the proposed funding will enable the expansion of biomedical, life science, and agricultural research at NCA&T and in the Piedmont Triad region while growing undergraduate, doctoral, and post-doctoral research training to increase regional, statewide, and national diversity within biomedical sciences and careers. **Per the 34 CFR 75.105(c) (3) criteria, NCA&T declares its priority as *Priority 1—Funding for Historically Black Colleges and Universities' Research and Development Infrastructure*. NCA&T also declares for the *Competitive Preference Priority- Over 52% of students enrolled are Pell Grant recipients based on the most recent data from the National Center for Education Statistics.***

Title: Advancing Healthcare Research Capacity: An Innovative master's Program in Applied Biomedical Sciences

In 2022, Sam Houston State University (SHSU) earned recognition as a Hispanic-Serving Institution (HSI) and achieved Carnegie's R2 Doctoral University status, signifying its commitment to high research activity. However, with Texas's population, particularly the Hispanic community, on the rise, addressing evolving healthcare needs has become imperative. SHSU's recent strides in research investment illustrate the university's dedication to building research capacity. To sustain and expand this momentum, the establishment of a graduate program like Applied Biomedical Sciences is paramount. This innovative program will produce graduates trained with practical skills and interdisciplinary expertise, capable of collaborating with industry experts. Their presence will significantly enhance research productivity and faculty expertise. These graduates will not only be well-prepared to contribute immediately to biomedical industries but will also possess strong problem-solving and communication skills. Situated in East Texas, SHSU's program holds immense potential for community impact. Furthermore, it will play a pivotal role in addressing healthcare disparities in underserved communities and empowering underrepresented populations. By aligning with regional workforce demands, the program will contribute substantially to the overall growth of the healthcare ecosystem.

In conclusion, the proposed graduate program at SHSU is poised to be transformative. It will boost research capacity, foster human capital development, and establish crucial industrial partnerships. Ultimately, it positions SHSU as a trailblazer in healthcare research, driving growth and innovation in the field.

EXECUTIVE SUMMARY

Having access to the funding, materials, tools, and processes that facilitate high-level research activity is essential for creating a thriving research institution that makes substantial contributions to scholarly knowledge, teaching, and innovations that can improve lives and change the world. Given the importance of research in helping to ignite the learning and discovery at the heart of its mission, Florida A&M University (FAMU) is on a quest to become one of the first Historically Black Colleges and Universities (HBCU) to receive an R1 (“very high research activity”) Carnegie Classification. Toward this goal, FAMU requests \$5,000,000 from the U.S. Department of Education’s Research and Development Infrastructure (RDI) grant to support the Academic Success for Ph.D. and Post-doctoral Institutional Research Experiences (ASPIRE). The goal of ASPIRE is to accelerate FAMU’s progress towards becoming an R1 Carnegie Classified research institution through strategic investments in evidence-informed professional development initiatives for graduate students, post-doctoral associates, and faculty; equipment, materials, and tools needed to build sustainable research and development activities. FAMU proposes to achieve this goal through six strategic objectives: 1) Create a doctoral student success program; 2) implement a post-doctoral associate success program; 3) Establish ongoing faculty professional development and peer support program; 4) Expand and make improvements to FAMU’s online research content and other research-related administrative services; 5) Invest in critical research software, state-of-the-art lab equipment, and lab facility improvements; 6) Publicize outcomes and research related to ASPIRE; and, 7) Conduct an evaluation to assess the implementation and effectiveness of ASPIRE. This proposal responds to RDI grant program Absolute Priority 1 and the Competitive Preference Priority demonstrating that Pell Grant recipients comprise greater than 50% of undergraduate student enrollment.

Research and Development Infrastructure Project to Transition Clark Atlanta University to R1 (REDI CAU to R1)

Clark Atlanta University (CAU) is the largest United Negro College Fund (UNCF) member institution and the only R2 HBCU in Georgia. Our graduate students that this project will serve are predominantly African American. The overall goal of this research and development infrastructure project is to support CAU's transition to a Carnegie Doctoral University, Very High Research Activity (R1) classification within the next seven (7) years by 2030.

This project will support the further growth of CAU's graduate programs, using a multi-prong strategy that will focus on 1) a paradigm shift among our non-STEM departments regarding their doctoral funding model, 2) reducing time to graduation, 3) developing programs to support an increase in doctoral degree completion and 4) improving grantsmanship amongst our faculty, including increased participation in multidisciplinary multi-institutional research and development centers, to increase CAU research and support for our doctoral students.

REDI CAU to R1 will be built on five pillars: 1) University policies that promote high-quality research and process improvement, 2) Strategic faculty hires, 3) Faculty development and faculty mentoring, 4) Updated funding model for graduate students, and 5) Enhancement of collaborative research and development of research centers. We will utilize this information and lessons learned by other institutions of higher education (IHEs) to establish innovative and impactful faculty development and mentoring programs to increase our research and development.

Project R2SQ (Reaching together for R2 Status or R2 Squared)

In order to establish our university as an R2 providing significant thought leadership, National Louis University will enact a collaborative model wherein our faculty operate as a community of research practitioners, sharing and building our collective expertise. Applying a research-based community of practice to the scholarship process, R2SQ will reach the goals and objectives shown in Table 1. The project will serve the highly diverse student body of NLU.

Table 1. R2SQ Goals and Objectives

Goal 1. Establish National Louis University as an R2-Level MSI providing significant, innovative and usable research that flows from our mission of strengthening education and supporting communities.

Goal 2. Achieve annual levels of \$4 Million in external, research-specific funding by implementing an accessible, sustained system of opportunities and supports for faculty participation in obtaining and enacting funded research.

Goal 3. Increase students' opportunities for advanced research and award 25 Ph.Ds. and 100 practice-based doctorates annually.

These goals will be reached by enacting four objectives.

Objective 1: Implement Cohesive Research Support Infrastructure

Objective 2: Build Multi-year Sustainable Research Collaborations

Objective 3: Establish university-level community of practice to support research productivity

Objective 4: Increase Opportunities and Supports for BIPOC Student participation in Advanced Scholarship

Project Title: Run to R1

Howard University's *Run to R1* proposal I designed to address the critical resources required to regain Carnegie Research One Status. The proposed set of activities will support our efforts to increase the research activities for faculty and student development. The funds from this grant proposal to accomplish the following: a) **improve the infrastructure** of the school to support faculty in applying and managing grant activity; b) increase the **number of students enrolling and conferring** with graduate degrees from the school; c) broaden partnerships that allow for the school of education to **sustain the increased research activities** while disseminating lessons learned. The proposal will center around increasing grant support personnel, hiring and retaining faculty and students, support for research internships and fellowships for students, creating and supporting inter-and intra-institutional research opportunities, and providing faculty development opportunities across the school. Through a partnership with the Center for HBCU Research, Leadership and Policy, the grant will also employ a training and dissemination strategy designed to provide collaboration experience for faculty while also sharing the lessons learned from this project.