State University System
Education and General
2021-2022 Legislative Budget Request
Form I

University(s):	**Florida International University**
Request Title:	**Program of Distinction in Environmental Resilience**
Date Request Approved by University Board of Trustees:	**December 5, 2019**
Recurring Funds Requested:	**$15,150,000**
Non-Recurring Funds Requested:	
Total Funds Requested:	**$15,150,000**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	☒

I. Description – *1. Describe the service or program to be provided and how this issue aligns with the goals and objectives of the strategic priorities and the 2020 University Accountability Plan established by your institution (include whether this is a new or expanded service/program). If expanded, what has been accomplished with the current service/program?* 2. *Describe any projected impact on academic programs, student enrollments, and student services. University of Distinction proposals should also address the requirements outlined in the separate guidance document.*

A. Introduction

Florida International University seeks $15.15M in funding for our Program of Distinction in Environmental Resilience. This program is aligned with utilizing FIU's interdisciplinary core competence in addressing 21st Century environmental challenges. The program's mission is to: address environmental challenges by creating data-driven solutions, educating the work force of tomorrow in strategic areas of focus, and utilizing world class research strengths to address the economic and population wellbeing issues related to environmental resilience.

Environmental factors stand out as determinants of population health that are amenable to data-drive solutions and prevention strategies. As described by the NIH, environmental factors such as physical, biological and chemical environmental hazards negatively impact population health. Public and environmental health interventions, urban planning and public education

programs are recognized approaches that can be used to achieve health and environmental equity and potentially create healthier and safer environments for everyone. This program's focus on Environmental Resilience will address the health of Florida's environmental assets (e.g., coastal and waters) as well as the health of our population. It will help address a critical issue at all levels of government, while supporting FIU's continued research excellence ($1 Billion in Research expenditures in the past six years), and student success initiatives which both contribute to the expansion and diversification of Florida's economic portfolio.

1. Overarching Goals

- Recruit top research faculty and students
  - Be known as the top school for research on the environment and its impact
  - Increase national recognition and rankings for research and student excellence
- Increase research grants from federal government and private sources
- Be known as a national and global leader in Environmental Resilience
- Continue to be hyper-focused on student success outcomes
- Help Florida solve some of its most pressing environmental resilience challenges, including:
  - Implementing a coastal monitoring system
  - Educating workforce
  - Establishing a first of its kind Environmental Finance and Entrepreneurship program

2. Recent Accomplishments

The investments by the State of Florida and the support of the BOG, through programs such as the World Class Scholars, has assisted FIU in developing programs of distinction that, through interdisciplinary research and collaboration, have given FIU a Core Competence in Environmental Resilience. These programs of distinction have catapulted FIU to the top national tier of research universities; making FIU one of 5 Carnegie Research I Universities in the SUS. The progress driven by our programs of distinction include:

- In 2019 FIU met 8 of the 12 BOG Preeminent Research University criteria.
- A 61% increase in total research expenditures in the past five years.
- $1B in total research expenditures in the past five years.
- Ranked #83 in total research expenditures among Public Universities in the last National Science Foundation (NSF) Higher Education Research & Development report (HERD) (2018).

- Ranked #3 within the SUS in National Institutes of Health (NIH) research funding, #3 in U.S. Department of Energy funding and #4 in NSF funding.
- Ranked #9 in the nation and #2 in the SUS in Psychology research expenditures, and #4 in Environmental Sciences.
- A substantial increase in positions paid by external research grants in the past 5 years from 1,522 to 4,220 annually.
- A 150% increase in annual invention disclosures, from 37 to 91 annual disclosures in the past five years.
- A 30-fold increase in patents from 2 to 66 annual patents in the past five years, making FIU #15 among public universities, and #33 globally.
- A 38% increase in PhD production (from 156 to 215 annual) and 68% in BOG doctoral degrees (from 257 to 432) in the past five years.
- A 57% increase in the 4-year graduation rate from the 2010-14 cohort of students to the 2014-18 cohort.
- Freshman Retention rate of 90.2%.

The proposed LBR will support FIU's 2025 Strategic Plan of achieving exceptional student-centered learning and post-graduation success, producing meaningful research and creative activities, and leading transformative innovations locally and globally. Moreover, this program of distinction addresses two pillars of FIU's 2025 Strategic Plan's framework: 1) Accelerate Preeminence & Research and Innovation Impact, and 2) Amplify Learner Success & Institutional Affinity. This Environmental Resilience program involves collaboration across FIU research centers and programs that have gained distinction through the investments of the State through initiatives that have allowed FIU to recruit nationally recognized faculty. These centers and programs include the Institute of Environment, the Extreme Events Institute, the Institute for Resilient and Sustainable Coastal Infrastructure (InteRaCt), the Brain, Behavior and the Environment Program, and Center for Children and Families (CCF).

FIU's leadership in environmental research and its interconnection to public health grew out of FIU's unique geographic location with a diverse population in a complex and vulnerable South Florida ecosystem. From FIU's inception, faculty with interest in environmental research have been attracted by the magnet of the Everglades, the Florida Keys, the coastal regions and our hurricane vulnerabilities. Similarly, the size, heterogeneity and complexity of South Florida's population have attracted world class faculty to FIU to study the region's public health challenges.

The proposed program of distinction on Environmental Resilience is designed to advance our current research programs and lead to innovative solutions to enhancing local, regional, and national resilience to environmental change, including preparing the workforce needed to address these challenges. It will also raise FIU's academic standing by leveraging existing programs of national preeminence to generate new knowledge and innovative solutions for the betterment of the environment, health, and society. This will solidify FIU's role as a top urban public research university and leader in environmental resilience and solutions. This Program of Distinction will enable us to attract and retain the best, most productive faculty and students, while cultivating leaders and nurturing all students, post-doctoral students, researchers, and staff to excel.

B. Creating Unique, Interdisciplinary Approaches to Florida's Environmental Resilience

The Environmental Resilience program will address important environmental challenges. These are: (1) Enhanced Water Quality Monitoring for Coastal Health and Resilience, (2) Environmental Forensics and Public Health, (3) Environmental Finance and Risk Management, (4) Family Preparation and Resilience to Disasters

1. Enhanced Water Quality Monitoring for Coastal Health and Resilience

Tourism is an important component of Florida's economy, much of which is focused on the more than 600 miles of coastline. These world-renowned economic assets are vulnerable to a myriad of environmental and human-driven challenges, e.g. harmful algal blooms (HAB) which provide both health risks as well as had significant negative impacts of up to $130 million due to physical and economic damages on tourism as reported by the Tampa Bay Regional Planning Council in 2018.

It is imperative we establish state-of-the-art water quality monitoring throughout our southern coastlines as well as in the interior freshwater bodies that transport pollutants to the coastline. Through FIU's Center of Excellence in Aquatic Chemistry and Environment (described below), we are developing those tools necessary to provide the real-time data necessary to make predictions regarding harmful algal blooms.
In this initiative, we propose to acquire and employ a real-time, distributed sensing platform to measure and predict the occurrence of HAB species and their likely severity and impacts on coastal ecosystems. In order to improve ecological models that predict the presence and locations of harmful algal blooms, FIU seeks to understand the factors driving bloom dynamics.

To model the timing and spatial distribution of HABs, FIU must be able to simultaneously measure climate (air temperature, light, windspeed and direction), aquatic environmental drivers (temperature, light, turbidity, dissolved oxygen, nitrogen, phosphorus, pH, pCO2, conductivity), biotic responses (algal cell densities and sizes, florescence, chlorophyll) and current/flow profiles (3-dimensional current velocity and direction, wave direction). This requires the design, development and deployment of a sophisticated water quality buoy platform that simultaneously measures the biological and physical variables associated with poor water quality and the development of HABs. We will also develop sensing techniques specific for brevotoxins, known to be harmful to humans.

To fully utilize the data, we will develop and maintain a near, real-time database for both Biscayne and Florida Bays, and the Florida Keys built on our 20-year record of data collected along a series of monitoring stations. In addition to a spatially explicit database, computer scientists in our CREST Center (described below) are developing computer algorithms to search other existing city, county and state datasets such as those at Florida Department of Environmental Protection (FDEP), South Florida Water Management District (SFWMD), Miami Dade County, etc. to harvest existing data and more fully populate the FIU database with ancillary information.

It is important to note that while it is imperative to be able to predict where and when nuisance algal blooms will occur to prevent human health issues, it is equally important to be able to predict where coastlines are free of such events and readily usable to the public and tourists.

2. Environmental Forensics and Public Health

Environmental Forensics requires a cross disciplinary approach that encompasses the understanding of the sources of environmental contaminants, their transport through key ecosystems and their subsequent incorporation into humans and other fauna. The role of contaminants such as magnesium, calcium, zinc or manganese in high concentrations are now known to be involved in the onset and progression of chronic diseases like Alzheimer's or Parkinson's.

This initiative will: (a) improve basic scientific understanding of global change and anthropogenic effects caused by multiple environmental drivers, the physical and biological responses measured in water quality, soil and sediment contamination, emerging diseases, invasive species and other global stressors that are a risk to ecosystems and community health—filling the knowledge gap; (b) train students in the practices and

uses of technologies needed to better understand risk assessment and mitigation with innovative solutions; and (c) provide state of the art facilities that can support faculty and student researchers at FIU and around the nation--to fill research gaps that now exist because the capabilities and instrumentation are not available.

The team composition reflects the complex nature of the problem; toxic metals, for example, are affecting ecosystems like the Florida Everglades and its resources, inducing adverse outcomes pathways in marine organisms, influencing mental health of populations and creating environmental inequalities in minority populations. Another area of concentration is the characterization of environmental materials for provenance discrimination and or geographic origin identification.

3. Environmental Finance and Risk Management

Sustainable environmental policies and practices depend upon creating trans-disciplinary programs that integrate between finance and natural systems. This integration can be achieved by linking financial theory and innovations to environmental sciences. While society currently tries to manage perceived risks or deficiencies by encouraging specific applications of finance – e.g. hazard insurance finance, home mortgage finance, energy finance, climate finance, forest finance, fisheries finance, ecosystems restoration finance, etc. – resilience requires a holistic understanding of how these and other applications, policies, and institutions interact as part of a coupled complex human and natural systems. FIU's approach advances a holistic viewpoint that identifies key interrelationships between finance and the human dimensions of environmental change.

The Environmental Finance and Risk Management program will be based on the rational that an expenditure of funds is required for large-scale anthropogenic environmental change (e.g. land development, resource extraction and harvesting, manufacturing, distribution, disposal, cleanup, restoration). Human action as financial transactions is essential, since "conservation without finance is just conversation". Conversely, too much money that is wrongly directed money can induce harmful environmental action.

Modern mathematical finance sprang from the theory of heat diffusion in a fluid and was then used to forecast securities prices. Important practical applications have since extended these theoretical links. The payoff of catastrophe bonds and weather derivatives is explicitly tied to environmental parameters, thus requiring knowledge of both science and finance.

Our environmental finance program will use a convergent research approach, compared to past academic models that separated financial engineering from environmental sustainability. The National Academies defines "Convergence" as "research driven by a specific and compelling problem" requiring "deep integration across disciplines". In addition, NSF considers Convergence research one of its "10 Big Ideas for Future Investment." Environmental finance and risk management will be a first-of-its-kind transformative example of Convergence.

This program will support emerging research involving risk management, resilience, sustainability and coupled systems. It will also emphasize environment-linked finance's relevance to a growing number of exciting commercial and policy applications. Graduate students will be supported to conduct research in this new, convergent research area and to pursue future careers in environmental resilience.

4. Family Preparation and Resilience to Disasters

Given the increased frequency with which severe weather events have been impacting Florida, the preparation of our most vulnerable populations are critical, both pre- and post-hurricane events. FIU's Center for Children and Families (CCF) and Extreme Events Institute (EEI) are well positioned to address this critical issue. These teams will coordinate to develop workshops focused on promoting storm-related media literacy for Floridians by helping families (a) make sense of meteorology reports and storm updates, (b) learn to distinguish actionable updates from less emotional "spectacle-focused" coverage, and (c) learn the negative impacts that extensive pre-storm media exposure can have on child and family functioning. Parents will receive coaching in how to talk to children across different developmental levels about impending storms and about storm-related destruction and loss, and will be trained in how to identify signs of significant post-storm adjustment difficulties in their children and themselves.

In the context of severe weather events, addressing storm-related emotions and preparation is critical from a public mental health perspective, but is also critical from the perspective of public safety. Increasingly, research documents how stress and panic in the population constrain responsible decision-making and place Floridians at risk. During storm watches, masses of individuals not dwelling in evacuation zones make emotion-based decisions that contribute to pervasive traffic congestion/gridlock and widespread gas shortages that disrupt and prevent timely evacuation for those in mandatory evacuation zones and in immediate danger. Poor pre-season household preparation (e.g., stocking

water, non-perishables, batteries, and other supplies) leads to abrupt supermarket shortages during individual storm watches that lead to additional unwarranted evacuations that burden the smooth and timely flow of evacuees from high-risk/mandatory evacuation regions. In fact, one of the leading reasons individuals in high-risk zones give for not choosing to evacuate is their concern that evacuation routes (and subsequent return routes) will be overcrowded and they will not have access to additional needed fuel along the way.

Once the storm-related prevention workshops are developed, the CCF is well-poised to disseminate them to the rest of the State of Florida through multiple mechanisms. The CCF's annual Miami International Conference on Evidence-based Treatments for Childhood and Adolescent Mental Health (MICAMH) can also be used as a dissemination site as it is attended by mental health professionals from throughout the state. Further, the CCF has extensive experience disseminating information to mental health and health professionals throughout Florida and the U.S. through its decade-old website on Evidence-based Practices in Child Mental Health. Further, Dr. Jonathan Comer, a member of the CCF with expertise on the impact of disasters on child mental health has developed procedures for modifying parenting programs to be delivered over the internet, and has shown that the impact is comparable to face-to-face trainings/sessions. Thus, the team will develop both face—to-face and web versions of the storm-related prevention materials. The dissemination effort will also be facilitated through the extensive networks of the Extreme Events Institute (EEI) at FIU.

C. Workforce of the Future

Attracting and retaining top research faculty will continue to provide our undergraduate and graduate students with exceptional preparation for innovatively solving the most critical environmental resilience challenges. In addition to traditional in-class and lab training, this proposal includes extensive field opportunities and workforce training components. The U.S. Bureau of Labor Statistics, Employment Projections program highlights jobs requiring degrees, credentials, and skills offered by this trans-disciplinary program, e.g. Environmental Risk Management, Engineering, Public Health and Disaster Management.

Future workforce will need new skills to be able to communicate across disciplines, implement convergent research approaches, as well as navigate the technological innovations of the coming decades. Alongside the research programs mentioned above, we will develop the workforce needed to address environmental resilience challenges locally and

nationally. A few specific programs to be added to our current offerings are outlined below:

Environmental Fellows pipeline and top student recruitment.
The Environmental Fellows pipeline will be focused on the development and recruitment of top-qualified and diverse talent from South Florida schools. This will include high school teacher trainings, intense summer research experiences, guaranteed undergraduate research placements and paid internships in the fields related to Environmental Resilience.

Graduate student retention, doctoral student and postdoctoral fellow support.
Graduate students and postdoctoral fellows constitute a fundamental scientific workforce for research centers and research programs. FIU will provide financial support for recruitment and retention of graduate students and postdoctoral fellows who will work with the faculty directly involved with these programs.

Industry partnerships, trainings and certifications.
This funding will support partnerships with industry in developing technological solutions to address environmental challenges and partnerships in workforce training. Artificial intelligence, robotics and financial management in industry competency for environmental resilience associated with the proposed Environmental Resilience program of distinction.

Artificial Intelligence & Robotics.
Automation and machine intelligence promise to fuel economic growth and produce new occupations, with likely impact on almost all industries and occupations. The broad-based application of Artificial Intelligence (AI) to software and hardware systems is launching a significant leap forward, creating intelligent software applications and robotic machines that learn from experience to make decisions and process vast amounts of data to reach independent conclusions. Therefore, we propose training in automation and robotic processes, in partnership with our Robotics Academy.

Environmental Finance.
Like environmentally linked health issues, very few students or faculty have training in bringing together finance and environmental issues. This initiative will link our Extreme Events Institute with our nationally ranked College of Business to establish a certificate program in Environmental Finance, not only for our students but for professionals from around the country, and the world who are working to solve the challenges of Environmental Resiliency. The overarching goal of the Certificate

Program is to spur an understanding of how the modern global financial system interacts with multiple natural systems. Specific goals are to train future scientific, financial, and policy professionals in:

- The advanced quantitative skills required to understand, evaluate, and price modern financial instruments that are linked to environmental parameters. Such skills include scientifically-based risk assessment, analytic techniques of mathematical finance, and computer-based simulation techniques.
- Key statistical methods, and techniques for applying these methods to scientific and financial data.
- Key concepts of the role of finance as part of the dynamical coupled Earth Systems.

To further disseminate the findings from this LBR, FIU will develop a series of workshops that can be provided to stakeholders, policy makers and business and government entities to explore new ways to link finance with environmental resilience.

D. Research Centers and Programs Participating in the Environmental Resilience Core Competence Program

The Institute of Water and the Environment

The Institute of Water and the Environment has over 130 faculty and staff and includes the Southeast Environmental Research Center (SERC), the Center for Coastal Oceans Research and the Medina Aquarius Program, the Florida Coastal Everglades Long Term Ecological Research Program, plus an NSF-funded Center of Excellence on aquatic chemistry and ecotoxicology. It also includes the Sea Level Solutions Center, bringing together faculty from nearly every college and school at FIU to address challenges posed by rising seas and other environmental challenges. In addition, the Institute features organized research units on the Sustainable Built Environment and Informatics, International Programs, and a UNESCO Chair on Water Security and Social Equity. From the wetlands of the Everglades to the coral reefs in the oceans, institute researchers are helping to preserve freshwater and marine resources for future generations. The Institute of Environment is the largest research center/institute at FIU, with a portfolio of over $40M in research awards, which includes both research grants and training grants for undergraduate and graduate students.

The Director of the Institute, Dr. Todd Crowl has more than 30 years of experience working on interdisciplinary projects related to ecosystems science and aquatic ecology, including urban stream ecology. Dr. Crowl

has received and managed more than $40M of grants, including two of the NSF's largest Center of Excellence awards.

The Institute of Water and the Environment houses several flagship programs that have State of Florida, national and international recognition. These flagship programs include:

- The Center for Aquatic Chemistry and the Environment (CAChE); which is a National Science Foundation (NSF) Center of Research Excellence in Science and Technology (CREST) that tackles one of the most complex challenges: environmental contamination. CREST has funded over 30 PhD students and over 50 undergraduate and masters students.

- The Florida Coastal Everglades (FCE) LTER Program; which is part of the Long Term Ecological Research (LTER) Network established by the National Science Foundation in 1980. The FCE LTER Program was established in May of 2000 in south Florida, where a rapidly growing population of over 6 million people live in close proximity to - and in dependence upon - the Florida Everglades. The program includes 86 senior scientists and 77 students from 29 institutions. FCE researchers study how hydrology, climate, and human activities affect ecosystem and population dynamics in the ecotone and more broadly, the Florida Coastal Everglades. FIU researchers working in the Everglades provided the data and water quality analyses that were used to set Florida's water quality criteria. The criteria for allowable Phosphorus concentrations in freshwater are still in force.

- The Southeast Environmental Research Center (SERC) Water Quality Monitoring Network. Operated by SERC, the function of the Network is to address regional water quality concerns that exist outside the boundaries of individual political entities. Funding for the Network has come from many different sources with individual programs being added as funding became available. Field sampling occurs over different time periods due to the nature of the funding. The Florida Keys National Marine Sanctuary and the Southwest Florida Shelf are sampled quarterly. The data summary maps are produced on a quarterly basis by integrating the individual projects into one data file for that month sampled. Previous surveys of Biscayne Bay, Florida Bay & Whitewater Bay, Ten Thousand Islands, and Marco-Pine Island Sound were sampled monthly.

- The Center for Coastal Oceans Research. The Center consists of the Medina Aquarius Program, the world's only permanent undersea

research laboratory, and partners with the Florida Keys National Marine Sanctuary, and the Rookery Bay Research Reserve.

The Extreme Events Institute (EEI)

The EEI comprises the International Hurricane Research Center and the Disaster Resilience and Climate in the Americas program. The EEI is a globally involved center for research, education, and training in natural hazards and disaster risk management. The Institute conducts multi-disciplinary research on hazards and vulnerabilities of all types, with emphasis on the role of pre-impact "risk drivers." The Institute includes faculty and researchers from the social and behavioral sciences, engineering, computer science, earth and atmospheric sciences, public health, public administration, business, and architecture. The EEI manages the Wall of Wind Laboratory, which was established through a State of Florida Center of Excellence, and is funded through the NSF Natural Hazards Engineering Research Infrastructure (NHERI) program. The EEI developed and manages the Florida Public Hurricane Loss Model. The EEI has a portfolio of $15.6M in research awards from of a variety of agencies, including the NSF, NOAA and USAID.

The Director of EEI is Dr. Richard Olson, an international expert on disaster management. Professor Olson was part of a research team to the 1972 Managua, Nicaragua earthquake and was subsequently involved in disaster response, research, and evaluation in more than 20 events, including Guatemala 1976 (earthquake); Chile 1985 (earthquake); Mexico City 1985 (earthquakes); Colombia 1985 (volcanic eruption and lahar) and 1994 (earthquake and landslide); Peru and Bolivia 1996-1998 (El Niño-Southern Oscillation); the Dominican Republic 1998 (Hurricane Georges); Honduras and Nicaragua 1998 (Hurricane Mitch); Belize 2000 (Hurricane Keith); and El Salvador 1986 and 2001 (earthquakes). He subsequently organized field research teams to the Chile and Haiti earthquakes of 2010.

The Institute for Resilient and Sustainable Coastal Infrastructure (InteRaCt)

InteRaCT identifies engineering solutions for challenges faced by aging infrastructure and develops innovative and economical technologies for the creation of resilient and sustainable communities. The economic prosperity of the United States is closely related to the health of the nation's infrastructure, which includes Aviation, Bridges, Dams, Drinking water, waterways, ports, rail, transportation, roadways, ridges, communication, energy, waste water systems, water management systems, and power systems, to name a few. InteRaCt is an umbrella organization that incorporates bridge engineering, the U.S. Department of Transportation-funded University Transportation Center (ABC-UTC), and the Lehman Center for Transportation Research.

InteRaCT has a portfolio of research awards of $5.1M. The Director of the Institute, Dr. Atorod Azizinamini was recruited as a Cluster hire to be the chair of Civil and Environmental Engineering in 2011.

The Brain, Behavior and the Environment Program

The Brain, Behavior and the Environment Program is a trans-disciplinary initiative at FIU that unites the dynamic and diverse neuroscience community at FIU toward three goals: to create and empower research programs focused on environmental causes of neurological disease, to devise strategies and develop treatments for neurological disorders using novel neuroscience and engineering tools as well as pharmacological approaches, and to establish a rich educational resource in South Florida to educate students, faculty, clinicians, the public, and health officials on the role that environmental factors play on neurological disease. This program currently has $10M in research awards, with the majority being from the NIH.

The Brain, Behavior and the Environment Program includes a multidisciplinary group of faculty. Its Director is Dr. Tomas Guilarte, Dean of the Robert Stempel College of Public Health & Social Work. Dr. Guilarte was recruited through a World Class Scholars initiative. Dean Guilarte is renowned for revealing the effects that low-level lead exposure has on the central nervous system during brain development, a discovery that led to strategies for mitigating learning deficits. He joined FIU after serving as the inaugural Leon Hess Professor and Chairman of the Department of Environmental Health Sciences at Columbia University-Mailman School of Public Health in the City of New York. Prior to Columbia University, Dr. Guilarte spent three decades as a professor and researcher in the Department of Environmental Health Sciences at the Johns Hopkins University Bloomberg School of Public Health.

The Center for Children and Families (CCF)

The CCF is a nationally recognized, interdisciplinary clinical research center committed to improving the lives of children and families struggling with mental health concerns. The mission of the CCF is to (1) study the causes and nature of children's mental health problems, (2) to develop and test intervention and prevention models for evidence-based, cost-effective services that can be used to improve mental health in children and families at a population level (3) to provide services for children and families in clinic and community settings, and (4) to educate students, families, and professionals in the U.S. and abroad regarding the causes and treatment of childhood mental health and effective intervention and prevention. The CCF has over $60M in research awards (50 grants), with the majority being from the NIH. The CCF was recruited to FIU from SUNY Buffalo as a part of a Cluster Hire, and its Director, Dr.

William Pelham, is internationally recognized as a leader in child mental health and has received numerous national awards recognizing his contributions. Dr. Pelham has hired 25 faculty members in the CCF, all of whom have all obtained federal funding for their research and the majority of whom have won early and midcareer awards for their research. Dr. Jon Comer, for example, has received national exposure for his research on children's response to disasters, including hurricanes. Dr. Pelham has held more than 80 research grants (16 current) from federal agencies (NIMH, NIAAA, NIDA, NINDS, NICHD, IES), foundations, and pharmaceutical companies, and has over 400 scientific publications. CCF faculty together publish more than 160 scientific papers annually. Dr. Pelham and other CCF faculty have served as consultants/advisors to numerous federal agencies (e.g., NIMH, NIAAA, NIDA, NICHD, IES, ACF, SAMHSA, IOM, OMAR, the CDC, and AHRQ,) and national organizations (AAP, AACAP, APA, CHADD, NICHQ, SDBP). The CCF conducts annually a nationally prominent, annual conference, the Miami International Conference on Evidence-based Treatments for Childhood and Adolescent Mental Health (MICAMH), that is attended by more than 500 MH professionals throughout Florida.

E. Funding Categories

Faculty Recruitment/Teaching and Research ($7,000,000)

Faculty are the main drivers of research and student success at a University. To expand the interdisciplinary research collaboration of the Environmental Resilience program of distinction, faculty recruitment will be essential. Following the successful approach that has brought FIU to the status of a Research I University, the faculty recruited into this core program of distinction will consist of clusters that will both complement and add to the existing faculty; and will be world class in their achievements and potential. We will focus on expertise in the intersect of environmental factors and public health, and resilient infrastructures. We will recruit 3 members of the National Academies of Sciences, 21 senior level faculty and 16 mid-level faculty.

The full impact of a program of distinction encompasses both research and teaching. Our goal is for the program to be a critical contributor to student success in all the areas (environment, infrastructure and public health) that are the interdisciplinary components of the program. Therefore, we will accelerate the recruitment of new faculty, with the recruitment focusing on curricular areas with highest demand within the integrated program. These new faculty members will focus on offering undergraduate level courses in various modalities to meet student

demand and supply additional class sections required to ensure timely degree completion.

Environmental Fellows Career Pipeline ($1,000,000)

The Environmental Fellows pipeline will be focused on the development and recruitment of top-qualified and diverse talent from South Florida schools. This will include high school teacher trainings, intense summer research experiences, guaranteed undergraduate research placements and paid internships in the fields related to Environmental Resilience.

Early engagement in research experiences leads to undergraduate student success, both in terms of early graduation and job placement success or continuation to post-graduate education. The Environmental programs at FIU already have recruitment and training connections with high schools and State Colleges. This includes Research Assistantships for High School Students (RAHSS), as well as the Research Experience for Teachers (RET) and the Wind Engineering for Science Teachers (WEST) Workshop, which involves seasoned Miami-Dade County Public School (M-DCPS) teachers participating in a 6-week wind engineering research program. We will design an Environmental Academy pipeline by accelerating dual enrollment, providing High School students with summer research basics/fundamentals; and professional development for High School science teachers to strengthen the pipeline.

This component of the program will also focus on establishing an early pipeline of State College students with interest in the fields of study associated with the program. FIU is already co-located with MDCPS's Marine Academy of Science and Technology (MAST) at its Biscayne Bay Campus.

Doctoral Student Support ($800,000)

FIU's doctoral degree production has increased by 15% (373 to 430) in the past three years, with increases in research doctorates of 28% (151 to 194). Research doctoral education is an integral part of research preeminence, and a necessary component of recruitment of world class faculty. We will dedicate some of the financial support of doctoral students that will be part of the academic programs connected to the proposed program of distinction. This will support the continued success of these programs by being able to recruit the best and brightest doctoral student candidates. Since the research programs and institutes that are part of the proposed program of distinction receive significant external research grants and drive FIU's innovation, this investment will in turn increase external funding for doctoral students and amplify FIU's innovation impact.

Program of Distinction Postdoctoral Fellows ($750,000)

Postdoctoral scholars constitute a fundamental scientific workforce for research centers and research programs. World Class faculty, when recruited, require postdoctoral support to support their research, and successful postdoctoral scholars conduct research, add to the research funding and assist in the training of undergraduate and graduate students.

Faculty Research Grant Support ($600,000)

The growth of the program of distinction in terms of obtaining external research funding and quickly moving the research finding into technical applications and programmatic applications will depend on the recruitment of staff that will provide administrative support, and perhaps more importantly support in the pursuit of funding for the basic and translational research that will be conducted.

Recruitment Scholarships and Retention/Completion Grants ($1,500,000)

This funding will expand the merit scholarship budget towards the goal of improving the incoming student profile in the disciplines associated with the Environmental Resilience program of distinction, as well as retaining and accelerating the graduation rates of students. These funds also support students who face unexpected emergencies and financial circumstances that impact their ability to remain enrolled.

Industry Partnerships for Economic Growth/Workforce Development in Environmental Resilience ($1,000,000)

An important component of FIU's 2025 Next Horizon Strategic Plan is learner success through alignment with industry workforce needs. This funding will support partnerships with industry in developing technological solutions to address environmental challenges and partnerships in workforce training. Artificial Intelligence, Robotics and Financial management in industry competency for Environmental Resilience associated with the proposed Environmental Resilience program of distinction.

This will include:

- Identification and badging "essential" skills
- Identification and badging industry-recognized credentials throughout degree programs
- Alignment of essential skills to University Core Curriculum
- Development and/or alignment of continuing education for workforce development

Ongoing Support for Field Deployed Monitoring Equipment and Data Processing Technologies ($2,500,000)

The funds will be used to establish and maintain world-class coastal monitoring systems and centralized data-processing to inform policy and decision-making. This dataset will be available to all researchers focused on enhancing the resilience of Florida's coastal environment and the large populations living in near proximity. This program will require continuous upgrades and maintenance support to ensure it is well-positioned to help answer the critical questions facing the State of Florida.

II. Return on Investment - *Describe the outcome(s) anticipated, dashboard indicator(s) to be improved, or return on investment. Be specific. For example, if this issue focuses on improving retention rates, indicate the current retention rate and the expected increase in the retention rate. Similarly, if the issue focuses on expanding access to academic programs or student services, indicate the current and expected outcomes. University of Distinction proposals should also address the requirements outlined in the separate guidance document.*

Return on Investment will be measured through metrics that are directly related to the impact of the Environmental Resilience program on specific areas of program focus, as well as on the overall impact on FIU's progression in student success and research excellence. Through the program's accomplishments, FIU will also contribute to the SUS goal of Florida continuing to lead in higher education across the nation. Competition for economic drivers such as corporations, business infrastructure and R&D is estimated to only increase across the State, and we believe FIU's relative contributions to these SUS goals will help to retain existing and drive new business and industry to Florida.

The LBR request focuses on Accelerating Program of Distinction Research, Student Success and Innovation Impact. We will have metrics directly associated with the Program of Distinction, as well as Overall Return on Investment (ROI).

The metrics measuring Program success will be as follows:

- Buoy Design and Construction for water monitoring by the end of the first year, and deployment on the second year.
- Initial mapping of coastal water monitoring needs.
- Development of storm-related prevention workshops during the first 6 months of the year.
- During second year, sessions of the Miami International Conference on Evidence-based Treatments for Childhood and Adolescent Mental Health (MICAMH) dedicated to storm-related prevention workshops for mental health professionals and parents.
- Within the first year of the LBR funding, the Environmental Resilience program will submit at least one student training grant to the NIH or

NSF to financially support students being trained in the program.

- Within the first year of the LBR funding, the Environmental Resilience program will submit a NIH Core Center of Excellence (P30) grant application to National Institute of Environmental Health Sciences (NIEHS) focusing on addressing the impact of environmental factors on brain health.
- Over the first five years, the rankings, based on research expenditure growth, of the academic fields associated with the Program of distinction will improve in the NSF HERD's STEM field categories as follows:
    - Environmental Sciences – From current #65 of 431 programs among public universities to top 50.
    - Computer Science – From current #54 of 430 programs among public universities to top 40.
    - Health Sciences – From current #90 of 448 programs among public universities to top 75.
    - Psychology – From current #9 of 438 programs among public universities to top 5.

The Overall Return on Investment (ROI) will be as follows:

- The FIU FTIC 4-Year Graduation Rate to improve by 54% (from 38.9% in 2018 to 60% in 2025.
- The FIU FTIC 6-Year Graduation Rate to improve by 23% (from 57% in 2018 to 70% in 2025).
- The FIU FTIC 2-Year Retention Rate to improve by 2.3% (from 88% in 2018 to 90% in 2025).
- Total doctoral degrees to increase by 49% (from 404 in 2018 to 600 in 2025).
- Total research PhD degrees to increase by 58% (from 200 in 2018 to 315 in 2025).
- Total Research Expenditures to increase by 53% (from $196M in 2018 to $300M in 2025).
- Science & Engineering Research Expenditures to increase by 52% (from $166M in 2018 to $252M in 2025).
- Non-Medical Science & Engineering Research Expenditures to increase by 53% (from $153M in 2018 to $234M in 2025).
- Industry-related research and design to increase by 115% (from $9.3M to $20M).

III. Facilities (*If this issue requires an expansion or construction of a facility, please complete the following table.):*

	Facility Project Title	Fiscal Year	Amount Requested	Priority Number
1.				
2.				

2021-2022 Legislative Budget Request
Education and General
Position and Fiscal Summary
Operating Budget Form II
(to be completed for each issue)

University: **Florida International University**
Issue Title: **Program of Distinction in Environmental Resilience**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	51.00	0.00	51.00
Other (A&P/USPS)	10.00	0.00	10.00
Total	61.00	0.00	61.00
Salaries and Benefits	$8,808,251	$0	$8,808,251
Other Personal Services	$1,166,774	$0	$1,166,774
Expenses	$2,965,750	$0	$2,965,750
Operating Capital Outlay	$2,209,225	$0	$2,209,225
Electronic Data Processing	$0	$0	$0
Financial Aid	$0	$0	$0
Special Category (Specific)	$0	$0	$0
	$0	$0	$0
	$0	$0	$0
	$0	$0	$0
Total All Categories	$15,150,000	$0	$15,150,000