Florida A&M University

2022-2023 Legislative Budget Request

University of Distinction:
Improving 21st Century Health and Wellness

State University System
Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	
Request Title:	**Improving 21st Century Health and Wellness**
Date Request Approved by University Board of Trustees:	**Pending Board of Trustees Approval August 5, 2021**
Recurring Funds Requested:	**$6 million**
Non-Recurring Funds Requested:	
Total Funds Requested:	**$6 million**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	☒

I. Purpose – *1. Describe the overall purpose of the plan, specific goal(s) and metrics, specific activities that will help achieve the goal(s), and how these goals and initiatives align with strategic priorities and the 2021 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.*

SUMMARY

Florida A&M University is requesting **$6 million** in recurring funding via the Universities of Distinction program to support strategic investments in the areas of Public Health and Health Administration. The graduate programs are areas of strength for the University and are poised to achieve sustained excellence at the state and national levels with an infusion of Universities of Distinction funding. As outlined below, these investments will facilitate FAMU's focus on **Improving 21st Century Health and Wellness** and lead to increased: 1) program rankings; 2) production of high-quality graduates to meet Florida's critical workforce needs; 3) research productivity and scholarly output; and 4) community collaborations and partnerships to build healthy sustainable communities through disease awareness, prevention, and intervention. These program enhancements in turn will provide a significant

return on investment, by enhancing Florida's capacity to provide high quality healthcare and services to its diverse and aging citizenry.

Section I:
FAMU Universities of Distinction Project Framework and Rationale

The modern healthcare system has become one in which interdisciplinary teams represent complex entities who are increasingly asked to innovate, lead change, maximize work quality and efficiency to address challenges to public health, the healthcare service arena, and the health profession. To help address these challenges, Florida A&M University (FAMU) has identified a unique area of strength where it will focus on **Improving 21st Century Health and Wellness** by leveraging its high-level graduate programs in Public Health and Health Administration as a University of Distinction. Three specific academic programs have been identified that will work synergistically towards Improving 21st Century Health and Wellness in the State of Florida.

1. Doctor of Public Health (DrPH)
2. Master of Public Health (MPH)
3. Master of Health Administration (MHA)

FAMU's approach to Improving 21st Century Health and Wellness is guided by the goals and priorities outlined in FAMU's 2021 Accountability Plan and 2017-2022 Strategic Plan (*FAMU Rising*), which are aligned with the State University System's Strategic Plan. Outcomes from this initiative will result in the production of a more highly qualified workforce to meet the demands of today's public sector and healthcare industry. Specific to the State of Florida, foci of the initiative will be geared towards:

- Enhancing methods of disease prevention, health promotion, awareness, intervention, and community-participatory research (Public Health);
- Increasing efficiency and effectiveness in the management of health services (Health Administration); and
- Developing enhanced inter-professional collaboration and training initiatives with integrated practical and simulated experiences designed to improve overall health outcomes in the 21st century (Integration of Public Health and Health Administration).

Inter-professional collaborations allow public health professionals and healthcare managers to engage in protecting and improving the health of people and the communities in which they live; promoting healthy lifestyles, researching disease and injury prevention; and detecting, preventing and responding to critical health issues. Essential components to inter-professional collaboration include educational training that incorporates practical experiences for faculty and students, either through authentic on-site encounters in a face-to-face environment or through multi-disciplinary simulations that enhance skill proficiency and promote teamwork in the delivery of health care. Through this initiative, FAMU will increase

opportunities for students to be actively immersed and engaged as developing professionals groomed in a multifunctional and interdisciplinary environment that exemplifies the scholarship of teaching and learning, allowing faculty and students from both public health and health administration to engage in learning and evaluation simultaneously.

Table 1 – Alignment of Proposal with Key Goals of Universities of Distinction

Key Goals of Universities of Distinction	Alignment of FAMU's Proposal for Improving 21st Century Health and Wellness
Focuses on a core competency unique to the State University System and one that achieves excellence at the national or state level.	▪ Focuses on Health programs (core competency for SUS and FAMU). ▪ Targets goals to achieve excellence at state and national levels via rankings and recognitions for program quality, diversity, and affordability.
Meets state workforce needs now and into the future, including needs that may further diversify Florida's economy.	▪ Addresses critical workforce needs in the healthcare industry including: ➢ Servicing Florida's aging population; ➢ Servicing underserved populations; and ➢ Producing highly trained workforce.
Fosters an innovation economy that focuses on areas such as health, security and STEM.	▪ Contributes to diversification of Florida's Health economy via production of highly trained graduates equipped to address emerging need to offer healthcare services in both institutional and non-hospital homecare settings.

Section II:
Overview of FAMU's Public Health Programs

The field of Public Health focuses on improving and protecting community health and well-being, with an emphasis on prevention among large groups of people. Significant progress has been made in the past century in improving health and longevity through public health interventions and advances towards high-quality healthcare. However, fundamental challenges still exist as key factors that significantly influence overall health and well-being for many members of society; particularly outcomes related to racial and ethnic disparities. (Public Health 3.0: A Call to Action for Public Health to Meet the Challenges of the 21st Century, 2019).

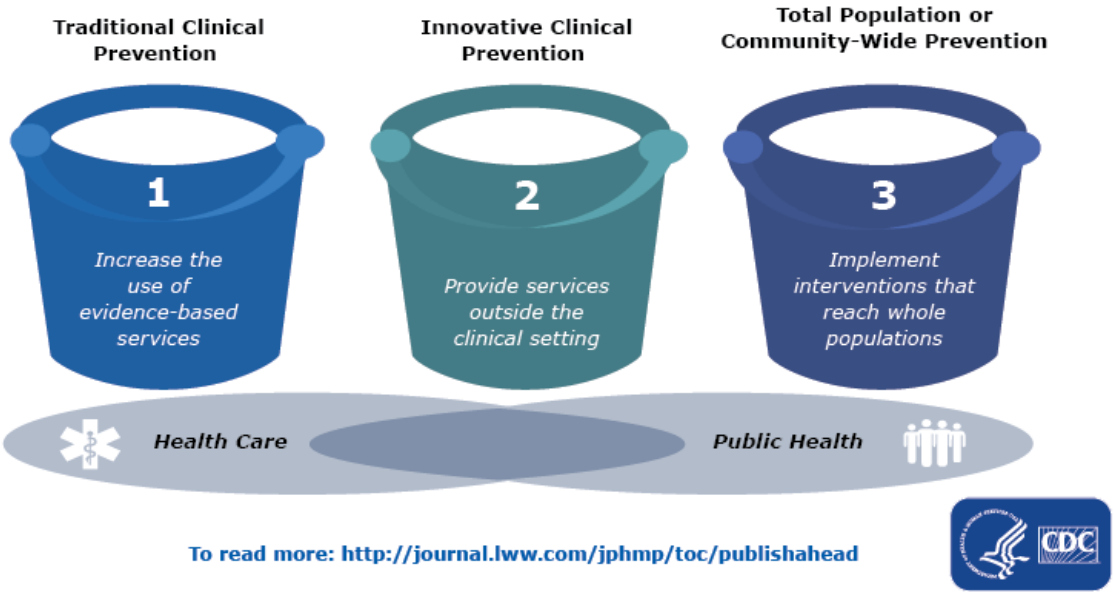
Fortunately, many programs, such as FAMU's DrPH and MPH are working to influence these determinants both by producing more graduates (especially minorities) trained to effect change and bring added value in disciplines that address workforce shortages. FAMU public health professionals are uniquely

qualified to conduct research and build collaborative partnerships with local communities that focus on effective methods for increasing awareness and implementation of primary prevention and disease intervention measures.

Leveraging the competencies of FAMU Public Health programs increases opportunities to more directly impact healthcare by integrating the three distinct areas of prevention as provided in the Center for Disease Control and Preventions' framework Public Health 3.0. The CDC developed this framework in response to a transforming system of healthcare that typically focused on episodic, non-integrated care towards one that integrates healthcare and public health to effect substantial change in lasting health for individuals, communities, and populations. The integration is conceptualized using three "buckets" of prevention–traditional clinical prevention interventions, innovative clinical interventions, and extended care outside the care setting, and total population or community-wide interventions. (*Healthy People 2020*, U.S. Department of Health and Human Services).

FAMU public health programs work in concert with this model as graduates are trained to develop non-clinical, community approaches using evidence-based research to help build sustainable, healthy communities outside of the clinical setting and that affect total populations.

Figure 1 – Center for Disease Control Public Health Framework



Source: https://nam.edu/public-health-3-0-call-action-public-health-meet-challenges-21st-century/

Evidence of FAMU's Public Health programs that have directly impacted the public health sector can be seen in recent events in response to the global COVID-19 pandemic. FAMU's Institute of Public Health faculty have been directly involved in state and local efforts to help combat the rapidly growing pandemic in the United States. On April 25, 2020, Florida A&M University opened its Bragg Stadium as a walk-up COVID-19 testing site to assist Tallahassee's Southside

community in the fight against the pandemic. FAMU in partnership with Bond Community Health Center organized the site, with logistical and other support from the Florida Department of Health and the Florida Department of Management Services. The Leon County Health Department is also a partner.

Since its opening, nearly 360,000 people have been tested for COVID-19. Our community partners have noted its success and have been very pleased with the outcomes, particularly the services provided to Tallahassee's Southside, where FAMU is physically located. "What we are doing is within the mission of FAMU and the Bond Community Health Center," said Dr. Cynthia Harris, who is director of the FAMU Institute of Public Health. "This is a huge team effort. I am elated to see the outpouring of support." The site was initially scheduled to operate for a few weeks. However, it remains open due to the demand to serve Leon County and its constituents. "It is vital that this site remains open," said Dr. Temple Robinson, CEO of Bond Community Health Center, a partner in operating the site. "There are so many people we have yet to reach in the Tallahassee area who need to be tested." The site will remain open for the foreseeable future in an effort to combat the COVID-19 pandemic with essential services provided by the FAMU Institute of Public Health, FAMU faculty, staff, and community partners.

In addition to the COVID testing site, the FAMU Institute of Public Health was instrumental in the recent development and implementation of the FAMU Vaccine Administration Center (located in the Al Lawson Multipurpose Center) and offers all vaccines (Moderna, Pfizer and Johnson and Johnson). To date, nearly 13,000 people have been vaccinated at the Center. Twenty-three public health faculty and 13 students were also deployed by the Florida Department of Health to provide epidemiological support with contact tracing and modeling as well as health education assistance. Additionally, in April 2021, the FAMU Institute of Public Health was asked to lead an effort to reduce state-wide vaccine hesitancy in black and brown communities. This effort is interdisciplinary and involves the efforts of faculty and students in public health, allied health sciences, pharmacy, and nursing.

The FAMU Institute of Public Health also has expertise in mental health education and peer support for first responders. Recently, FAMU (through the FAMU Institute of Public Health) provided peer support and mental health services for firefighters called to action in the wake of the condo tragedy in Surfside, Florida. Through a grant awarded to a FAMU public health faculty member (2nd Alarm Project-$1 million), invaluable mental health and peer support services were rendered to these first responders.

A. Public Health (DrPH, MPH) Program Profile

The FAMU Institute of Public Health (IPH) was founded in 1995 and is housed within the College of Pharmacy and Pharmaceutical Sciences & Institute of Public Health. IPH was established to address disproportionately affected populations, experiencing adverse health outcomes such as heart disease, stroke, cancer, diabetes, infant mortality, HIV/AIDS and environmentally related conditions. Its

mission is to develop and produce culturally competent public health practitioners and leaders through graduate training, research and service. Focus areas of the program are: (1) Disease Intervention, Prevention and Awareness; and (2) Community-Based Participatory Research (CBPR).

The FAMU Public Health programs, through the expertise of its faculty, have collectively over 250 years of experience in teaching, research, and service and are continuously contributing substantially to the state of health in Florida through local and state-wide community partnerships. The program is the first DrPH degree program to be offered by a Florida institution of higher learning. Since its founding, the program has grown and distinguished itself as one of FAMU's signature and most impactful health programs. Since the graduation of the first DrPH student in 2008, 52 students have been conferred with the DrPH. The MPH program has graduated 450 students since 2004. Since its inception, the FAMU IPH has garnered over $17 million in total extramural funds (includes committed funds for outlying years) through the success of the faculty in obtaining federal and state contracts and grants.

B. Strengths of FAMU's Master of Science in Public Health (MPH) and Doctor of Public Health (DrPH) Programs

FAMU's academic programs in the Institute of Public Health (IPH) are highly productive and successful and are major strengths for the University. As noted below, these programs play a critical role in helping the University fulfill its mission, which includes a dedication to the "empowerment of citizens and communities."

- IPH supports FAMU's long-standing focus and commitment to conducting research and producing graduates to address health disparities and issues that disproportionally impact minority populations.
- IPH currently plays a critical role in the nation's effort to reduce the spread of COVID-19. FAMU faculty are actively engaged in daily testing through the Florida A&M University-Bond Community Health Center COVID-19 Testing Site since its opening April 25, 2020. The site has tested nearly 360,000 individuals.
- IPH aligns with the Strategic Priorities of the State University System to increase the production of highly qualified graduates in STEM and health disciplines to meet Florida's workforce needs. More than 90 percent of IPH graduates are African American, which demonstrates the ability of the programs to address diversity needs in the workforce and produce graduates who are committed to providing health services to underserved populations.
- The FAMU Public Health Program is fully accredited by the Council on Education for Public Health (since 2000). The program underwent its most recent re-accreditation (September 20-21,2020) with maximum re-accreditation (seven years) and **no non-compliant** findings as rendered by the Council at its meeting on March 7, 2021.

C. Program-Specific Rankings

FAMU master's level program in Public Health is currently ranked within Florida and nationally, and program faculty are striving to reach a designation of excellence in this program by increasing its existing rankings.

- Master of Public Health ranked No. 35 by MPH Online as one of the best MPH Programs in Florida (Source: https://www.mphonline.org/top-online-masters-in-public-health-programs/)
- MPH ranked in the top 20 nationally for most affordable online MPH programs in 2020 (Source: https://www.bestvalueschools.com/cheap/online/mph-degree-programs/)
- IPH ranked 123rd nationally in the 2021 U.S. News Rankings of "Best Public Health Schools." This ranking placed IPH above two other SUS institutions (UNF and UWF), and below four others (USF, UF, FIU, FSU).
- MPH ranked #5 of Most Affordable Online MPH Programs in 2020 (Source: https://www.mphonline.org/cheapest-online-mph/)

Universities of Distinction funding will assist in elevating FAMU's Public Health programs to excellence at the state and national levels, as reflected below:

- Become a top 75 program nationally;
- Become a top 3 program in Florida; and
- Become a top 20 program nationally for affordability.

Universities of Distinction funding will also enhance the University's ability to increase community partnerships that target disease prevention and awareness. Specifically, the programs in Public Health are seeking to contribute to the overall health and wellness in the State of Florida through:

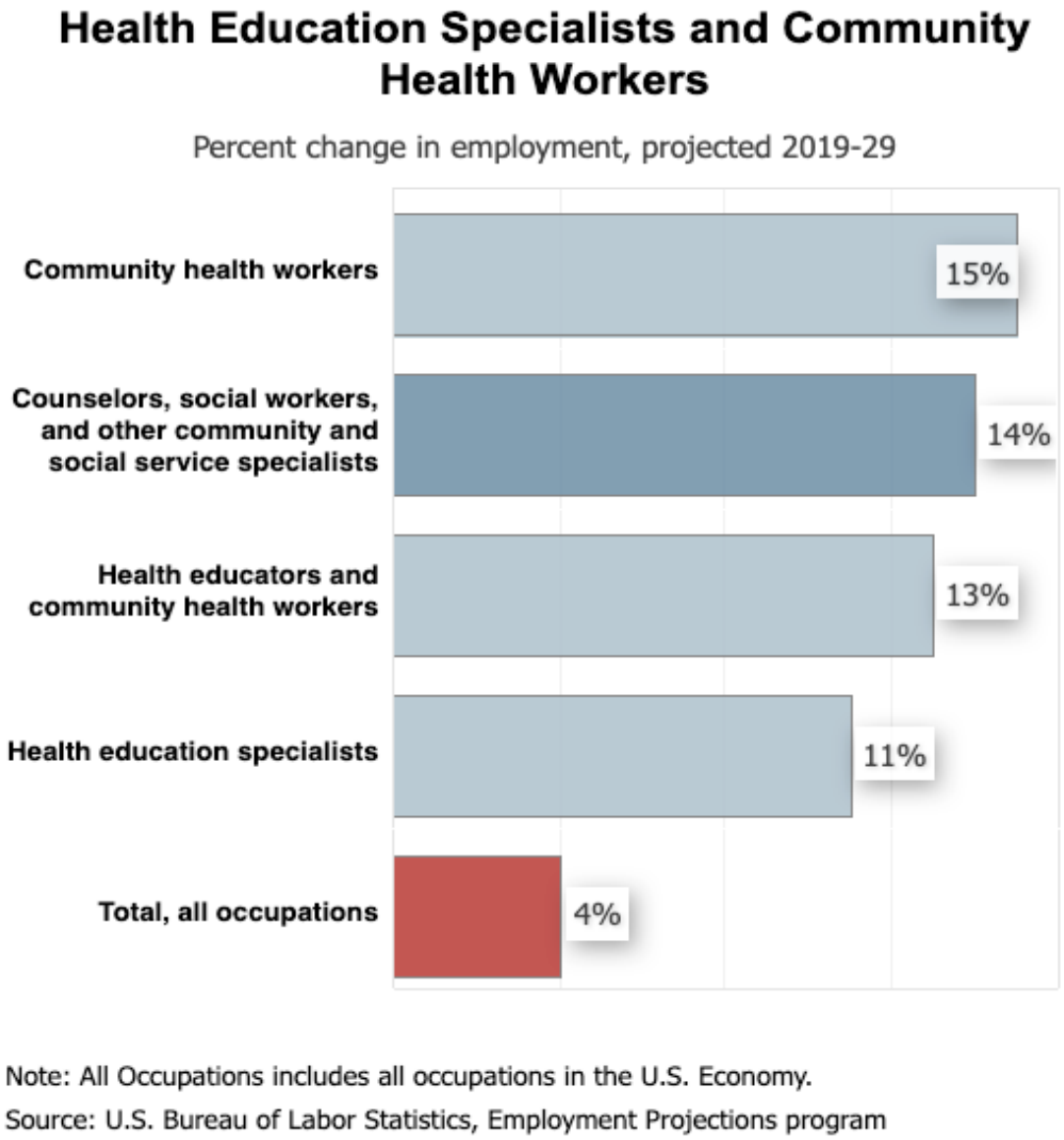
- Expanding initiatives and research to help combat the global pandemic COVID-19 (Years One and Two);
- Expanding current initiatives of conducting community-wide assessments in Leon and Gadsden counties to determine gaps in community public health needs (Year One);
- Increased collaborations with agencies to address the problem of childhood obesity (Year One);
- Expanding partnerships with counties in Florida to address environmental health concerns (Year One); and
- Increased collaborations to provide disaster management and emergency preparedness outreach including peer support and mental health services to first responders (Improvement Over Time).

D. Workforce Demand for Public Health Professionals

Job outlook for public health professionals overall is growing nationally and in the State of Florida, particularly as governments and health agencies try to reduce cost and favor practices that focus more on preventive care and teaching communities

how to sustain good health. Bureau of Labor Statistics (2018) data reports that employment for health educators and community workers is projected to grow by 11 percent between 2018 and 2028, much faster than the average for all occupations.

Figure 2 - BLS Data - Health Educators and Community Workers



Source: https://www.bls.gov/ooh/community-and-social-service/health-educators.htm#tab-6

The job outlook for Public Health professionals in the State of Florida is also impressive. Information from O*NET shows data for some of the top occupations in public health with a bright outlook. A review of the top five occupations, which

are listed below, reveals that the projected growth for the State of Florida ranges from an average of 5 percent to 15 percent from 2016-2026.

1. Occupational Health and Safety Specialists
2. Health Education Specialists
3. Medical and Health Services Managers
4. Community Health Workers
5. Health Specialties, Teachers, Postsecondary

Source: https://www.onetonline.org/find/quick?s=public+health

BLS data (2020) also shows Florida ranked as one of the top five states with the highest employment level of health education specialists.

Table 2 – Employment of Health Education Specialists, by state, May 2020 (BLS)

State	Employment	Employment Per Thousand Jobs	Hourly Mean Wage	Annual Mean Wage
California	6,600	0.40	$33.77	$70,230
New York	4,190	0.48	$27.80	$57,830
Texas	3,420	0.28	$26.18	$54,460
Florida	3,230	0.38	$28.26	$58,770
Pennsylvania	2,770	0.50	$30.10	$62,620

Source: https://www.bls.gov/oes/current/oes211091.htm#st

Because of the versality in the public health sector, MPH and DrPH graduates can work in a variety of fields within public health with median salary ranges from $33,000 - $162,000 annually.

Table 3 – Public Health Highest Paid Occupations –Employment, Wages, and Projections

Occupation	Median Salary May 2020	% Growth by 2029
Biostatistician	$92,390	33%
Epidemiologists	$74,560	5%
Environmental Scientists and Specialists	$73,230	8%
Health and Safety Engineer	$94,240	4%
Medical and Health Services Managers	$104,280	32%
Social and Community Service Manager	$69,600	17%

Sources: https://www.publichealthdegrees.org/highest-paid-public-health-jobs and Bureau of Labor Statistics

FAMU graduate programs in Public Health train graduates for each of the below occupations as well as additional disciplines. Specifically, the MPH and DrPH have areas of specialties as listed below:

- Behavioral Science (MPH, DrPH);
- Health Education (MPH, DrPH);
- Epidemiology and Biostatistics (MPH, DrPH);
- Environmental Occupational Health (MPH); and
- Health Policy Management (MPH).

Salaries for FAMU graduates of Public Health fall near or within the range of occupational salaries shown above and the mean range ($39,930 - $54,520) for community and health workers in the State of Florida for 2018. Graduates with doctoral degrees are employed at higher rates. Data from the Florida Education and Training Placement Information Program (FETPIP) reports salaries on FAMU graduates employed in the State shows the following.

Table 4 - FAMU MPH and DrPH Graduates' Salaries (State of Florida)

	2015-16	**2016-17**	**2017-18**	**2018-19**
MPH	$43,800	$39,388	$34,256	$40,100
DrPH	$69,716	$55,628	N/A	N/A

Source: FETPIP, 2015-2019, http://www.fldoe.org/accountability/fl-edu-training-placement-info-program/state-university-reports.stml

The demand for public health professionals has further heightened due to current events and the rapidly spreading coronavirus. Much emphasis has been focused on frontline clinicians, intensive care, acute care, and emergency department capacity of hospitals, which are essential in caring for moderate and severe cases. In addition, community and public health professionals, epidemiologists and other public health workers in state and local governments are essential at this time (*Emerging Health Workforce Strategies to Address COVID-19*). Individuals in with a background in public health may be responsible for conducting rapid case identification and trace contacts for COVID-19 testing, isolation of confirmed cases, and quarantine of individuals who have been in close contact. With a background in these disciplines, graduates of public health can aid states and counties in their efforts for keeping milder COVID-19 cases at home and towards maintaining health care services to reduce the burden on hospitals. FAMU's MPH

and DrPH trained graduates that are highly qualified to work in these capacities and help address the growing pandemic.

Section III:
Overview of FAMU's Health Administration (MHA) Program

A. Master of Health Administration (MHA) Program Profile

The Master of Health Administration (MHA) degree program was established at FAMU in 2000 with the first class in 2001. The program was designed to train students in areas critical to the improvement and offerings of quality health services. Specifically, it was designed to provide the necessary skills for those seeking leadership management careers in a variety of public, private nonprofit, and for-profit health care organizations, including, but not limited to, hospitals, long-term care organizations, integrated delivery systems, insurance firms, medical group practice, ambulatory care organizations, mental health agencies, managed care, and health care consulting. Its mission is to provide students with a firm foundation to discover, define and refine compassionate leadership utilizing a competency-based, applied curriculum in health administration. Faculty within the program have over 95 years of collective experience in healthcare, teaching, research, and service, which adds depth and breadth to the quality of training for our graduates. The program has graduated 173 students since inception. FAMU's MHA program also holds the distinction of being the only CAHME- accredited program at an HBCU. CAHME, the Commission of the Accreditation of Healthcare Management Education is the premier organization that accredits graduate health administration programs nationwide.

B. Strengths of FAMU's Master of Health Administration (MHA) Program

Changes in a diverse nation and growing economy are having a direct impact on the healthcare industry. With these changes come a number of challenges. As more individuals become qualified to lead in the healthcare field, a greater impact can be made to address the challenges of the 21st century. By the year 2030, the number of people over 60 years of age will increase by 56 percent. To accommodate this drastic change, organizations will need to continuously update their practices and have qualified health care leaders to manage operations and services. FAMU's Master of Health Administration contributes to meeting this growing demand by producing qualified graduates each year trained in health management and services. The MHA program also helps to diversify Florida's economy for health management and services occupation. Data from the U.S. Department of Health and Human Services (2018) shows that only 12 percent of managers in medical and health services in 2018 were Black/African American.

Table 5 - Medical and Health Services Managers by Race, 2020 (BLS)

White	Black or African American	Asian	Hispanic or Latino
77.6.0%	13.3%	5.6%	11.5%

Source: https://www.bls.gov/cps/cpsaat11.htm

Through this initiative, FAMU will help to address a specific need as it relates to the management of nonprofit long-term care facilities, which is a critical need in the U.S. and Florida. This will impact the healthcare challenges stemming from the baby boomers' era and the current state of the nation as it continues to fight COVID-19. As part of its current offerings, the MHA program will enhance opportunities for enrolled students by providing unique experiences tailored to nonprofit healthcare facilities through the establishment of an Executive Residency Program for Nonprofit Organizations. A review of peer institutions with MHA programs reveals that none currently offer an Executive Residency Program specific to nonprofits.

The coronavirus pandemic has brought to light the need for greater focus on data and data analytics as the primary driver of decision-making. For example, an article by Kent (2020), stated, "data analytics tools will play a major role in mitigating the spread of the virus going forward" (https://healthitanalytics.com/news/how-will-big-data-analytics-factor-into-the-next-phase-of-covid-19). The MHA program is positioned to provide students with additional training in this high demand area of the health care industry. Further evidence of FAMU's distinct capacity to train the next generation of health care leaders is shown through the program's partnerships and the faculty's established record of excellence as it relates to research and collaboration. Such accomplishments include:

- Strategic partnership with one of the largest healthcare systems in the U.S., Hospital Corporation of America (HCA), recruits FAMU MHA graduates for its Executive Residency Program. This program fast tracks students for executive positions in one of their many locations throughout the state of Florida. FAMU MHA graduates are highly sought after for the quality of their education and contribution to diversifying the health management and services industry.

- Strategic partnerships with health care organizations that provide internships, fellowships, and future career opportunities. The current list of strategic partners includes Leading Age, Cantex Continuing Care Network, ProMedica, Baptist Hospital System, Yale New Haven Hospital System, and several others.

- Partnership with American College of Healthcare Executives (ACHE). The Division is a member of the ACHE Higher Education Network (HEN), which provides several benefits to students. The HEN is designed to assist health care management programs in mentoring the next generations of healthcare

managers through an expanded support for student organizations. Through this partnership, FAMU faculty will continue to work with ACHE to plan and host local continuing education programs.

- Partnership with National Association of Health Services Executives (NAHSE). The Division has partnered with the NAHSE Florida Chapter to create experiences for healthcare management students to gain an understanding of, and to interact with a variety of health care professionals, and to increase NAHSE visibility in Tallahassee by forming a leadership team, increasing memberships and hosting annual educational programs.

- The Director of the Division of Health Care Management, Dr. Jullet Weaver, is the co-editor for a special issue of the Journal of Health Administration Education focused on post-acute care.

- The MHA Coordinator, Dr. Marisa Lewis, received one of twelve grants awarded by the Medical Marijuana Education and Research Initiative to explore the knowledge and perceptions of community members specific to the compassionate use of marijuana.

- Drs. Robbya Green-Weir and Marisa Lewis are Board Members at Large with the National Association of Health Service Executives, Florida.

- Drs. Vanessa Crowther and Robbya Green-Weir were awarded a $30,000 U54 grant to focus on combating food insecurity in Leon County. Using a portion of the funding, the project team will build an informational app.

- The Director of the Division of Health Care Management, Dr. Jullet Weaver, was appointed to Board of Directors for the Association of Undergraduate Programs in Health Administration. As of July 1, Dr. Weaver assumed the role of the Board Chair-Elect.

C. Program-Specific Rankings

FAMU's Master of Health Administration was ranked amongst the top 10 programs in the State of Florida in 2019 and 2020.

- Best Health Administration Colleges in Florida, 2020: Ranked 9 out of 169 (Source: https://www.universities.com/find/florida/best/healthcare/health-administration).
- Best Health Administration Colleges in Florida, 2019: Ranked 9 out of 169 (Source: https://www.universities.com/find/florida/best/healthcare/health-administration).

D. Workforce Demand for Health Administration and Services Professionals

According to the Bureau of Labor Statistics (BLS), health administration is one of the fastest-growing sectors, with a projected growth rate of 32

percent, much faster than average, between 2019 and 2029. This growth is heavily impacted by the large baby-boomer population and people who remain active later in life. Prospective administrators usually have experience in an administrative or clinical role in a hospital or other healthcare facility, which is also the case for MHA students at FAMU. A master's degree in healthcare administration (MHA), along with related experience puts one at the top of the career ladder in healthcare facility leadership in positions such as hospital administrators, HMO managers, and chief medical officers in prestigious surgical practices. These positions command top dollar and demand the highest credentials. BLS reports that the median annual salary for health services managers is $104,280 per year (https://www.bls.gov/ooh/management/medical-and-health-services-managers.htm). Other important roles in public health services include reputable agencies, such as the CDC (Centers for Disease Control), of which FAMU students have completed internships.

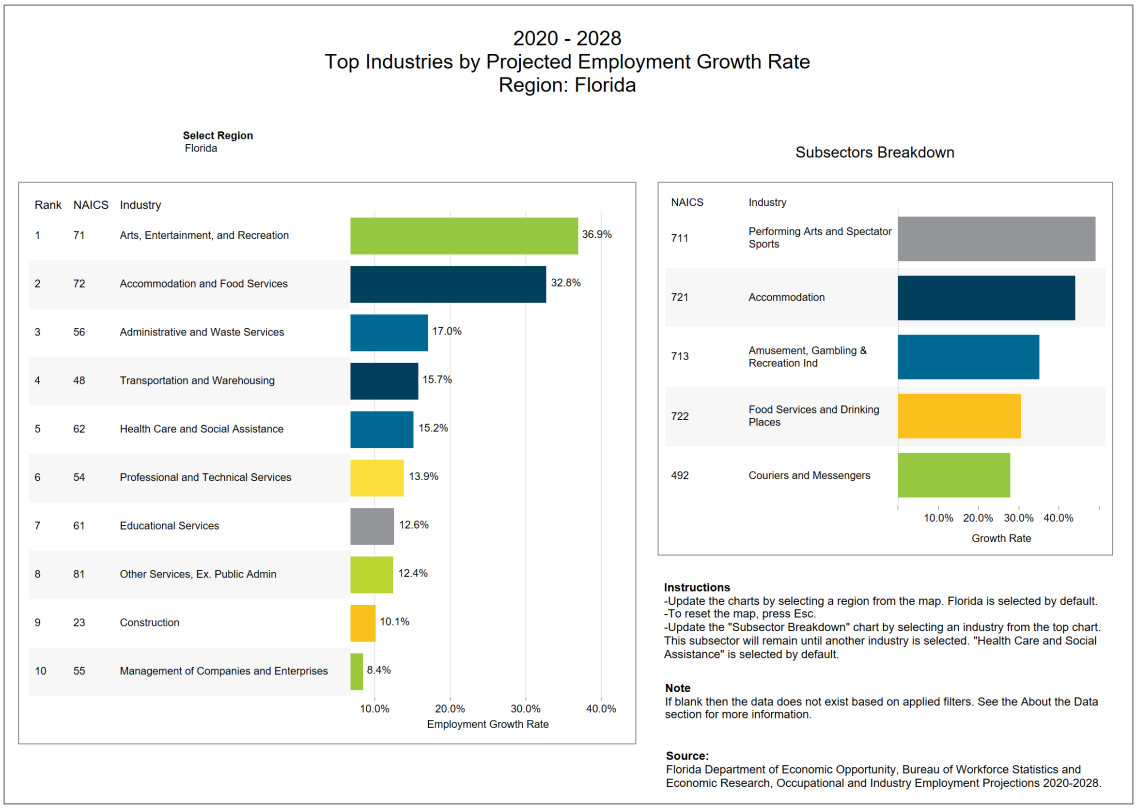


Figure 3 – Fastest Growing Industries in Florida

Source: https://floridajobs.org/economic-data/employment-projections/fastest-growing-industries

Florida Department of Economic Opportunity, Bureau of Workforce Statistic and Economic Research (Occupational and Industry Employment Projections 2020-2028) also shows that Healthcare and Social Assistance is ranked number five as the fastest growing industry in this region, which includes occupations in

hospitals, nursing and residential care facilities, and social assistance, where graduates of public health and health administration would seek employment.

Source: Florida Department of Economic Opportunity, Bureau of Workforce Statistics and Economic Research, Occupational and Industry Employment Projections, 2020-2028.

Specifically, the demand for hospitals will grow by 7.8% (n= 26,203), 16.2% for nursing and residential care facilities (n=29,916), and 20.6%% (n=27,788) for social assistance between 2020-2028. Source: http://www.floridajobs.org/workforce-statistics/data-center/statistical-programs/employment-projections

Table 6 – Industries with the highest levels of employment for Medical and Health Services Managers

Industry	Employment	Percent of Industry Employment	Annual Wage Mean
General and medical surgical hospitals	126,410	2.26	$127,330
Offices of physicians	49,480	1.91	$112,700
Outpatient care centers	29,520	3.07	$117,200
Nursing/skilled care facilities	25,380	1.65	$100,160
Home health care services	20,540	1.37	$100,880

Source: https://www.bls.gov/oes/current/oes119111.htm

Data from FAMU graduates indicates that between 75-80 percent remain in Florida after graduation and are employed in positions directly related to their discipline in occupations as noted below.

Table 7 - Employment Sectors of FAMU MHA Graduates

EMPLOYMENT SECTOR	%FAMU GRADUATES
Hospital/Health System	25%
Veteran's Administration	11%
Health Insurance	18%
Public Health	18%
University or Research Institution	25%
Non-Profit	4%

Source: FAMU Alumni Surveys

Section IV:
Economic Impact and Innovation

Florida continues to have an increasingly aging population, which correlates directly with the prevalence of chronic diseases. Effective methods for increasing awareness and implementation of primary prevention and disease intervention (secondary prevention) options are crucial in reducing and/or mitigating these adverse health outcomes. Data from the Florida Department of Health (2018) suggests that demand for more graduates trained in Public Health will help to address concerns related to challenges of a modern-day healthcare system.

- Succession planning – FLDOH reports that 49 percent of Florida's workforce is over the age of 50. Developing a succession plan that ensures continuity of operations during transition is essential.
- Training for the existing public health workforce, particularly in areas that relate to community health assessment or community health improvement plans.
- Assessment of how policies, programs, and services address social determinants of health.
- Advocating for population health services and programs.

Source: Florida Health Community Health Assessment Resource Tool Set, Florida Health Charts, 2018.

Graduates from FAMU programs in Public Health and Health Administration contribute greatly to improving the quality of life and healthy communities in the State of Florida. Many of the traditional occupations for MHA graduates typically are in hospital-related settings. However, the growing demand for graduates trained in diverse care delivery settings, such as nursing home administrators, hospice administrators, home-healthcare administrators, etc., can be distinctively served by FAMU's MHA program, which has the capability to produce more graduates through this initiative on Improving 21st Century Health and Wellness.

Opportunities for innovation and greater impact abound as graduates are also prepared to not only become managers, but also to lead and impact change as entrepreneurs and owners of their own agencies or in consulting roles for healthcare organizations. FAMU programs provide a solid foundation in business management. As a result, graduates are prepared to develop, implement, and improve upon programs that will impact the economic climate within a community or particular population. FAMU programs have already shown impact through both partnerships and developing new programs within the Leon County area and statewide, several of which are highlighted below:

- Implementation of a COVID-19 testing site at FAMU Bragg Stadium. The site has tested nearly 360,000 individuals since its opening April 25, 2020.
- Development and implementation of a FAMU Vaccine Administration Center testing nearly 13,000.

- Development of 2nd Alarm Project to provide peer support and mental health services to first responders (on-site in the wake of the disaster in Surfside, Florida
- Development and implementation of a state-wide COVID-19 program to address vaccine hesitancy in the state of Florida.
- Development and implementation of a focused, county-wide community health need assessment (utilizing asset mapping – Gadsden County), resulting in a blueprint and community health strategic plan for addressing these concerns.
- Galvanization of over 80 organizations/agencies, within Leon County, to address the problem of childhood obesity (Tallahassee Childhood Obesity and Prevention Education (COPE) (funded by the Florida Blue Foundation)– resulting in a myriad of initiatives promoting the consumption of healthy foods, access to healthy foods, increased physical activity, decreased screen time, increased sleep hours (9) and no tobacco use.
- Progress has been made in addressing environmental health concerns from community exposure to lead contaminated ash from a former incinerator in Jacksonville and the development of a worker exposure survey for former workers potentially exposed to heavy metals from a former wood treatment facility.

Partnerships have been developed with state-wide universities (e.g., University of Florida, Florida State University, University of Miami) and institutions on research and/or training (e.g. UF Agricultural Center, UF College of Pharmacy, DOH Office of Minority Health, Moffett Cancer Center, Florida Alliance Scholars Program (FSU)). The Program continues to also partner with Harvard University regarding research and pipeline programs.

Section V:
Budget

- Five DrPH/MPH @ $105,000; four MHA@ $90,000 faculty for a total of $885,000 plus fringe ($1,239,000). The hired faculty will be at a tenure track level. Faculty will enhance the research capacity and rigor, attract new funding, and train graduate students.

- Research Associates for PH (3 A&P) and MHA (3 A&P) @ $50,000 plus fringe ($420,000). Research associates will assist newly hired faculty by enhancing the depth and rigor of Public Health and Masters' of Health Administration programs.

- Three Staff hires @ 50,000 plus fringe ($220,000). A staff member is needed for the support of the 3 programs: Public Health (MPH, DrPH) and Master of Health Administration.

- Graduate Fellowships to fund graduate students in the three programs ($1,200,000). Fellowship will include competitive stipends, tuition, health insurance, and support for travel to a conference for 45 graduate students (30 PH, 15 MHA) annually.

- Talented Pipeline Scholars for attracting and engaging high-achieving students into the public health and health services administration fields ($1,200,000).

- Enhance Community Engagement ($1,165,000). The requested funds will provide cost for educational programs, seminars, workshops, and media focusing on community health needs.

- Technology Enhancements ($556,000). Funds are needed to purchase computers and technology equipment for all three programs.

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.*

FAMU has a unique distinction in its ability to **Improve 21st Century Health and Wellness**. Building on the strengths of FAMU graduate programs in Health Administration and Public Health adds greater opportunities to not only work towards improving health outcomes, but also to provide high-quality managers to oversee healthcare facilities, including hospitals, emergent and long-term care entities. Utilizing a collaborative approach between the programs, FAMU can significantly impact and Improve 21st Century Health and Wellness, while at the same time meeting the workforce demands of a growing healthcare industry in the State of Florida. Specifically, an investment of $6 million in FAMU will help via:

- Increased opportunities to attract high-level students for competitive opportunities;
- Increased number of graduates contributing to the talent pipeline in the State;
- Increased state-wide community-based collaborations and partnerships to address awareness, prevention, and intervention of diseases impacting the public sector, particularly communities impacted by health disparities, a component of FAMU's Public Health programs' mission;
- Increased evidenced-based research resulting from faculty hires and research associates;

- Expanded outreach and participation in Culturally Competency Module to help overcome racial and health disparities, a strength of FAMU programs in Public Health designed to address HIV/AIDS, and other infectious and chronic diseases, for all county health departments; and
- Enhanced training and delivery of programs offered through the Region IV Public Health Training Center. The FAMU Public Health program currently serves as the Florida Public Health Training Center.

An investment in FAMU via Universities of Distinction will elevate the targeted academic programs toward state and national excellence as leaders in **Improving 21st Century Health and Wellness** and help to meet Florida's 2030 Blueprint for Success to "Improve Florida's Talent Pipeline for a Better Workforce" and for "Creating Good Jobs by Diversifying Florida's Economy."

Measures of Success

Table 8 – Metrics Used to Determine Success

Goal	Assessment Outcome	Timeline
Increased number of graduates trained in Public Health to meet the demand of high-quality public health professionals.	# Graduates annually	Year One
Increased number of graduates trained in Health Management and Services.	# Graduates annually	Year One
Increased partnerships and collaborations tailored towards disease awareness, prevention and intervention.	#MOUs developed and trainings in community-based sectors	Year One
Increased job placements for individuals employed in the State of Florida in the public health sector.	# Graduates employed in the State of Florida	Return on Investment
Increased job placements for individuals employed in the State of Florida within healthcare management and services.	# Graduates employed in the State of Florida	Return on Investment
Upward mobility in national rankings for MPH and DrPH.	Positive change in rankings by at least two levels Increased evidenced-based research	Excellence and Prominence
Established Executive Residency Program for Non-profit organizations within the MHA.	Creation and implementation of Executive Residence Program	Improvement Over Time

Increased job placement outcomes in non-profit agencies.	# Students completing Executive Residence Program # Graduates employed in nonprofit agencies related to healthcare management and services	Return on Investment

III. Personnel – *Describe personnel hiring and retention plans, making sure to connect both plans to initiative(s) and goal(s) described in section I. State the amount of faculty FTE and staff FTE and estimated funding amounts used for retention and new hires in each category. In describing faculty hires, provide overall hiring goals, including academic area(s) of expertise and anticipated hiring level (e.g. assistant professor, associate professor, full professor. Please describe how funds used for faculty or staff retention will help the institution achieve its stated goals. University of Distinction proposals should clearly note how anticipated hires or retained individuals will help the institution elevate a program or area to national or state excellence.*

Faculty Hiring Plan

FAMU's University of Distinction initiative **Improving 21st Century Health and Wellness** is requesting $1,239,000 of funding for nine (9) new tenure-earning faculty. Increased faculty for the programs in public health and health administration will help to attract high performing students, expand capacity for the program, and raise the national profile of the academic programs. New faculty hires will also aid in the production of research to develop practical solutions for an aging workforce and to address societal demands related to public health.

Table 9 – Proposed Faculty Hires

FTE	Discipline	Rank	Amount Requested for New Hires (salary & f.b.)	Goal Alignment
5	Public Health	Assistant Professor	$688,333	Degree production in Programs of Strategic Emphasis
4	Health Administration	Assistant Professor	$550,667	Degree production in Programs of Strategic Emphasis

Staff Hiring Plan

To support increased degree production in the Programs of Strategic Emphasis and research productivity of faculty, $420,000 is requested for six (6) Research Associates; 3 for public health and 3 for the MHA. Three new staff hires at $220,000 is also requested to support the three programs: Public Health (MPH, DrPH) and Master of Health Administration.

Table 10 – Proposed Staff Hires

FTE	Positions	Amount Requested for New Hires (salary & f.b.)	Goal Alignment
6	Research Associates	$420,000	Increased Scholarly and Research Productivity; Degree production in Programs of Strategic Emphasis
3	General Staff Support	$220,000	Increased program performance, student retention, and matriculation; Degree production in Programs of Strategic Emphasis

IV. Facilities (*If this issue requires an expansion or construction of a facility, please complete the following table.):* **Not Applicable.**

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

2022-2023 Legislative Budget Request

Education and General

Position and Fiscal Summary

Operating Budget Form II

University: **Florida A&M University**

Issue Title: **Improving 21st Century Health and Wellness**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	9.00	0.00	9.00
Other (A&P/USPS)	9.00	0.00	9.00
Total	18.00	0.00	18.00
Salary Rate			
Faculty	$885,000	$0	$885,000
Other (A&P/USPS)	$450,000	$0	$450,000
Total	$1,355,000	$0	$1,335,000
Salaries and Benefits	$1,879,000	$0	$1,879,000
Electronic Data Processing	$556,000	$0	$556,000
Graduate Fellowships and	$1,200,000	$0	$1,200,000
Enhance Community Engagement	$1,165,000	$0	$1,165,000
Talent Pipeline Scholars	$1,200,000	$0	$1,200,000
Total All Categories	**$6,000,000**	$0	**$6,000,000**

State University System
Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	**Florida Atlantic University**
Request Title:	University of Distinction Proposal **Applied A.I. & Big Data Analytics ("AI/Data")**
Date Request Approved by University Board of Trustees:	**September 13, 2021** (pending)
Recurring Funds Requested:	**$12.8M**
Non-Recurring Funds Requested:	**$5.3M**
Total Funds Requested:	**$18.1M**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	☒

I. Purpose – *1. Describe the overall purpose of the plan, specific goal(s) and metrics, specific activities that will help achieve the goal(s), and how these goals and initiatives align with strategic priorities and the 2021 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.*

Applied A.I. & Big Data Analytics

Florida Atlantic University seeks to leverage its robust and rapidly-growing focus of **Applied Artificial Intelligence and Big Data Analytics ("AI/Data")** as an exemplar interdisciplinary pillar for FAU and the State of Florida. The university focused on its AI/Data portfolio since first including it as a platform in the *Strategic Plan for the Race to Excellence, 2015-2025*. To increase the rate of acceleration in this area, FAU requests significant investments from the Legislature to continue to build itself as a **University of Distinction.**

This proposal will build on the university's strategies to A) enhance and expand innovative AI/Data academic programs that underpin student success and state economic growth, B) further lift FAU's reputation in applied AI/Data research to support the state economy and national priorities, and C) promote AI/Data-driven engagement with industry in the region and state.

FAU's *Strategic Plan for the Race to Excellence, 2015-2025*

Since embarking on its strategic plan in 2015, FAU has seen rapid success by building on the strength of specified institutional "pillars" and "platforms." These represent formal, FAU Board of Trustees-approved priorities for the institution. Each year, the university's BOG accountability plan articulates its ongoing commitment to invest in and support these priorities.

According to page 5 and 6 of FAU's 2025 strategic plan:

> ***Pillars*** define institutional programs focused on creating knowledge that benefits society
>
> ***Platforms*** represent scholarly activities that apply to and support all *Pillars*

The *Race to Excellence* articulates how the university will operationalize these priorities. The strategic plan notes that the pillars and platforms "guide institutional goals and strategic actions" (p. 5). Furthermore, the document establishes a commitment for FAU to "hire or retain strong interdisciplinary leaders for *Pillars* and *Platforms*" (p. 8), as well as to "develop external funding framework to permanently sustain *Pillars* and *Platforms*" (p. 12). Given the documented success of this plan – with outcomes including more-than doubling the 4-year graduation rate and the research expenditures—it's clear that the *Race to Excellence* is a living and actionable document. Each day, FAU follows its strategic plan, including its support of pillars and platforms.

Strategic Plan Pillars

Since 2015, the university launched research institutes to support each of the four approved pillars. The following framework showcases the commitment of the university to implement its strategic plan:

1. The Institute for Human Health and Disease Intervention (I-HEALTH) supports the Healthy Aging pillar;
2. The Stiles-Nicholson Brain Institute supports the Neuroscience pillar;
3. Harbor Branch Oceanographic Institute supports the Ocean Science and Engineering / Environmental Sciences pillar; and
4. The Institute for Sensing and Embedded Network Systems Engineering (I-SENSE) supports the Sensing and Smart Systems pillar.

Strategic Plan Platforms

Similarly, FAU formalized nine platforms, such as *undergraduate research* (with the establishment of the Office of Undergraduate Research and Inquiry) and *global perspectives and participation* (with the establishment of the Center for Global Engagement). The platforms support FAU's academic and research programs and are signature themes for the institution. The university has embedded platforms in its curriculum and expanded co-curricular activities to ensure adequate infrastructure is in place to support these themes – both in terms of the educational experience for all students and priorities for faculty and student researchers.

The Rise to Prominence of FAU's AI/Data Platform

One of the most widely-supported strategic plan platforms has been **Big Data Analytics**, which in recent years has evolved to also include a focus on the applications of high-volume data science in the world of automation, machine learning, deep learning, and artificial intelligence.

Throughout the implementation of the university's strategic plan, FAU's colleges and units have shown tremendous buy-in regarding the Big Data Analytics platform. The executive leadership team and the FAU Board of Trustees included the topic as the first platform in the *Strategic Plan for the Race to Excellence* due to its emerging success throughout the university's research enterprise. In Fall 2014, while President John Kelly and his leadership team conducted in-depth visits with faculty from each department in the university, researchers repeatedly focused on the theme of Big Data and it's A.I. applications. Now, FAU boasts 80+ AI/Data faculty researchers.

As a result of early investments in infrastructure related to Big Data Analytics and the ability to run highly advanced simulations with massive amounts of information, FAU has positioned itself to become the leader in the state – and potentially the entire Southeastern US – in the field of AI/Data. In September 2014, the NSF awarded $600K – with a $250K institutional match – to Dr. Taghi Khoshgoftaar of the College of Engineering and Computer Science to upgrade the existing data mining lab and expand the university's big data capabilities.

FAU has sought to establish itself as a leader in the field, and the university was proud to host its first academic and research conference on the topic (www.math.fau.edu/big_data_science) in 2018. According to the organizers of that conference, the Big Data platform is "bringing together research interests of FAU faculty and local industrial leaders to stimulate collaboration." Key stakeholders from the private sector, such as FPL, presented on the topic of AI/Data and machine learning in the context of renewable energy. FAU will continue to host this annual summit and others described in this request.

Most importantly, FAU in 2015 committed to the following in its strategic plan:

> This plan must remain flexible in its approach to strategic actions and initiatives, so that Florida Atlantic is able to react to changes in the external and internal environments. Likewise, the concept of *Pillars* and *Platforms* can continuously evolve to meet institutional priorities. **Interdisciplinary programs and activities will be included in the *Pillars* and *Platforms* as they rise to prominence at the University.** The faculty, staff, and students will then have the opportunity to develop new and existing programs into institutional *Pillars* and *Platforms*. (pp. 13-14)

This proposal is the embodiment of this explicit commitment. FAU intends to follow through on the framework laid out in the strategic plan to transition big data analytics from its existing prominent role as an institution-wide platform into **a formal AI/Data pillar – with a research institute to support it.**

In line with the strategic vision for assessment and stability of the strategic plan, the FAU Board of Trustees in June 2019 approved amendments to University Regulation 2.006 – Centers and Institutes. This regulation established a path for emerging laboratories and research programs to become centers and, eventually, institutes once they meet appropriate benchmarks. Already the AI/Data platform appears poised for classification as an institute, which the regulation stipulates must be organized around a broad area that "transcends department, school, college, or even campus boundaries" and "usually will involve a greater interdisciplinary and inter-institutional involvement of faculty." AI/Data already meets these qualifications. The university would use new funds, if allocated, as described in the following proposal to further develop the institution's AI/Data leadership team and to create related organizational infrastructure for academic and research programs in this particular area of distinction.

Investing in the AI/Data Pillar at FAU

There are multiple compelling reasons for the Board of Governors to support a request to the Florida Legislature to transform FAU's existing university big data analytics platform into the state's leading pillar/institute for AI/Data:

- **Building on a record of AI/Data success at Florida Atlantic University-** This request will further launch FAU on a path towards being a *University of Distinction* in the AI/Data world. Peers throughout the region, the state, and the country might already be somewhat familiar with the State of Florida's first NSF-funded AI and Deep Learning (AIDL) laboratory – or the Rubin and Cindy Gruber Sandbox, which houses the Machine Perception and Cognitive Robotics Lab. FAU's AI/Data projects received national media attention, and this will continue to accelerate. By shining a light on the numerous successes in this academic area, and by strategically growing enrollments (both undergraduate and graduate), research programs, and corporate partnerships, FAU will continue to build a strong brand for AI/Data.

- **Establishing a more diverse AI/Data workforce in Florida-** There is a critical national need to produce more AI/Data professional who identify as underrepresented minorities. Roughly only 20% of workers in this field are black or of Hispanic origin. This is an important differentiating feature and strategic advantage for FAU as a *University of Distinction*. By growing AI/Data at the state's most diverse public university (per *US News & World Report* and *Chronicle for Higher Education*), FAU will contribute to a diversified, emerging workforce. The State of Florida has the opportunity to leverage the racial and ethnic diversity among the university's student body, using FAU as a vehicle to award more minority undergraduate and graduate degrees in AI/Data areas. Accordingly, the state can produce more AI/Data professionals who come from underrepresented minority backgrounds.

- **Benefitting from an efficient, rapidly-improving university-** FAU has accomplished so much primarily by leveraging funds earned through its enhanced and continual improvement in the state's performance-based funding model. Performance-based funding set the stage for this AI/Data request. FAU has redesigned itself as a resilient, lean organization—achieving at the highest rates. Significant targeted investments would catalyze more improvements, as outlined in this request for classifying FAU as a *University of Distinction* in AI/Data.

- **Aligning with direction from statewide industry workforce reports-** Growth in the technology sector, in general, is a clear priority for the State of Florida. More specifically, the Council of 100's *Project Sunrise* refers to the need to focus on "Information and Technology" as an occupational area that is primed for growth. Furthermore, the report details Florida's gaps in terms of technological infrastructure. This AI/Data proposal would attend to both recommendations. In addition, the Florida Chamber of Commerce's *Florida 2030: The Blueprint to Secure Florida's Future* talks about the need to "introduce and develop Internet of Things, artificial intelligence, and other emerging technology within state, regional, and local infrastructure" (p. 9). In 2021, the Florida Chamber Foundation, with support from the Bill and Melinda Gates Foundation, listed "IT/Math" as the most rapidly growing sector out of four career areas showing promise of advanced wages and long-term resiliency, with cloud data modeling as an example of such a career (p. 10). FAU sees an opportunity for AI/Data programs to serve the state by developing a workforce that can build, maintain, and operate within the infrastructure of technology.

Three-Tiered Proposal for AI/Data at FAU

As illustrated through the university's SUS alignment of strategic goals document that the BOG approved in 2018, FAU is in sync with the direction of the State of Florida. Importantly, this specific proposal attends to all three major goals of the 2025 SUS strategic plan: A) teaching & learning; B) scholarship, research, & innovation; and C) community & business engagement. The following subsections align with these components.

While the university will continue to improve in these areas without additional state investments, AI/Data growth is a timely issue due to the critical workforce need. With adequate funding, FAU can ensure the transformation of its AI/Data platform into an institutional pillar to benefit all of Florida.

A. Enhancing and expanding FAU's AI/Data academic programs

Following the inclusion of AI/Data as a strategic plan platform, the faculty throughout the university began the process of updating curricula in particular colleges to focus on big data analytics and its applications in artificial intelligence and automation. The university designed and launched these innovative degree programs, often taking advantage of interdisciplinary

collaborations that crossed traditional organizational structures, like departments or colleges. FAU's strengths exist not just in technological capacity but also the *application* of AI/Data a variety of industries and sectors.

As evidenced by FAU's curricular offerings, the university is already preparing graduates to lead in the 4th industrial revolution, which will focus on AI/Data and Autonomy. Funds from this proposal will enhance the university's ability to recruit high-ability students who can succeed in these programs, as well as the faculty who will be teaching in AI/Data degrees. This proposal then is a logical component of FAU's long-term plans – and it simply elevates the existing successful platform of big data analytics into a pillar of excellence.

Recent headcount enrollments in the areas of AI/Data:

- 526 students in Engineering and Computer Science (sample high-enrollment courses include CAP4630 Intro Artificial Intelligence, CAP5768 Intro to Data Science, CAP6618 Machine Learning for Computer Vision, and CAP6673 Data Mining and Machine Learning)
- 107 students in College of Business (includes various Business Analytics concentrations and Big Data graduate certificates)
- 57 students in Charles E. Schmidt College of Science (students working in Computational Biology, Cybersecurity, and Machine Olfaction)
- 260 students in Dorothy F. Schmidt College of Arts and Letters (with students conducting AI-related research in Linguistics, Computational Linguistics, and Language Technologies, as well as Political Science, Archeology, and Visualization of Data)
- 59 students in Harriet L. Wilkes Honors College (with students enrolled in courses such as IDS 3932 Art/Science Data Visualization and conducting research projects related to Computational Science)

As noted, the university previously launched and is continuing to expand on a number of innovative degrees, concentrations, and certificates that cumulatively contribute to the case for FAU to be classified as a *University of Distinction* for its AI/Data programs:

- The Harriet L. Wilkes Honors College and the College of Engineering and Computer Science jointly launched two **BA/BS → MS graduate pathway programs with data analytics tracks** in computer science and information technology management (also in conjunction with the College of Business).
- The Harriet L. Wilkes Honors College launched both a **major concentration in data analytics** and a minor concentration in data science, which focuses on disciplinary knowledge and the emerging field of the ethics of data use.
- The Charles E. Schmidt College of Science and the College of Engineering and Computer Science offer a **joint undergraduate certificate in data science**.

- The College of Engineering and Computer Science offers **a Ph.D. in computer science with a concentration in data analytics**.
- The College of Business and the College of Engineering and Computer Science offer **a joint graduate certificate in big data analytics**.
- In June 2019, FAU's Board of Trustees approved a new **master's in artificial intelligence**, which is offered by the College of Engineering and Computer Science and launched Fall 2019 as the first program of its kind in the State of Florida.
- In June 2019, FAU's Board of Trustees approved a new **master's in data science and analytics**, which is offered jointly by five different academic colleges and launched Fall 2019 with 4 concentrations including data science & engineering; data science *via* scientific inquiry; data analytics in business; and data science in society.
- In June 2020, FAU's Board of Trustees approved a new **bachelor's in data science and analytics**, which is offered jointly by five different academic colleges with more than 60 data science courses across various contexts that can be used to fulfill elective requirements. This innovative new degree program launched Spring 2021 with 3 different concentrations including data science in the natural sciences, data science and engineering, and data science in business. In the coming year, there are also plans to launch a data science in society concentration. The program includes a capstone course for students to address real-world interdisciplinary problems with data-driven tools.
- In June 2021, FAU's Board of Trustees approved a new **master's in business analytics** to prepare future business leaders with skills to collect, organize, visualize, and analyze data in corporate settings. The novel degree program is ready to launch as soon as Fall 2021.
- Beginning Fall 2021, the Christine E. Lynn College of Nursing and the College of Engineering and Computer Science will offer a new **combined program in nursing and artificial intelligence**. The BSN and MS in AI will be key to preparing highly qualified healthcare workers who can use AI for treatment and patient care decision making.

This request seeks to enhance these degree programs in line with the *Strategic Plan for the Race to Excellence* goal of Boldness (i.e. student success). As outlined in the expenditure plan at the end of this proposal, the university will develop a) innovative recruitment incentives to build a globally-competitive student body and b) new models for teaching undergraduates with a plan to overhaul graduate-level teaching at FAU, prioritizing AI/Data students in these efforts.

Locally, startups and established companies have difficulty recruiting AI/Data professionals due to the scarcity of qualified professionals. Nationally, not just the economic side but also the security side, the US needs to invest heavily in AI/Data to be competitive. Other countries spend billions of dollars in AI research and education. The economic imperative justifies these investments.

For instance, increased employer demand for AI/Data-related professionals indicates an opportunity for further enrollment growth and program development. The Florida Department of Economic Opportunity projects **21,716 new jobs statewide** in the area of AI/Data by 2026. The Bureau of Labor Statistics projects that the US will add **491,700 new jobs nationwide** in the area of AI/Data by 2028. Additionally, reported high earnings in relevant occupations will attract even more prospective students to these degree programs. In 2018, AI/Data professionals earned an annual median income of **$86,821 statewide** and **$103,859 nationwide.** These remarkable statistics were compiled using federal Standard Occupation Codes (SOCs) that are cross-listed under the specific CIP codes affiliated with FAU's degree programs in the areas of AI/Data. The projected outcomes could have been even further enhanced with a more inclusive SOC list for more general IT professionals.

Importantly, local projected growth outpaces the state's projected growth, which in turn outpaces the nation's projected growth. The university's geographic location is then well-primed for AI/Data expansion. South Florida is home to many startups and large companies with demands of developing smart devices and products. Recently, a number of local companies such as Magic Leap, Cendyn, and Florida Power and Light (FPL) came to FAU to seek AI/Data professionals, which led to the curricular developments outlined above. Given the demand, degree programs in AI /Data will produce professionals who serve the region, state, and nation. FAU will need to continue to increase the number of graduates of these programs to contribute to meet the needs of these employers. Additionally, more students will support the research enterprise by serving as graduate research assistants. This will all have a positive impact to the local/regional/state economy, as described in detail within the ROI section at the end of this proposal.

As presented in the report by McKinsey Global Institute on "Big Data: The Next Frontier for Innovation, Competition, and Productivity," the United States faces a growing shortage of 140,000 to 190,000 workers with analytical expertise and shortage of 1.5 million managers and analysts with the skills to understand and make decisions based on the analysis of big data. In 2015 4.4ZB of data were generated and less than 10% was analyzed in time. Further compounding this problem, the data being generated is on pace to double every two years.

Also important to acknowledge, McKinsey Global Institute released a February 2021 report on "The Postpandemic Economy: The Future of Work after COVID-19," which highlights that industries across sectors will seek to automate more and deploy AI solutions at higher volumes. This trend will require more AI/Data experts in order to facilitate the coming acceleration, which is driven primarily by reductions to "workplace densities," strategies to address "demand variabilities," enhanced efficiencies and various industries' desires to meet consumer preferences for "contact-free service" (p. 6). With so many uncertainties in a postpandemic economy, one thing that seems clear is the marketability of university graduates who have experience with AI applications and automation technologies.

Of note, on a national basis, less than 10% of students in the field closely related to AI/Data are black, and the numbers are similar for women and Hispanic populations. Currently, the university's highest-enrolled racial/ethnic demographic is Hispanic students (27%), followed by black students (21%). By encouraging minority and women students to pursue studies in AI/Data, FAU will produce more female and minority technology professionals.

The following projections further showcase the increasing (1.5%-2% annually) demand for AI/Data professionals on national, state, and local levels:

Nationwide Occupational Projections for AI/Data-related Professionals

Occupation	Employment		Employment change, 2018-28		Median annual wage, 2018
	2018	2028	Number	Percent	
Computer / Info. Research Scientists	31,700	37,000	5,200	16.5	$118,370
Computer / Info. Systems Managers	414,400	461,100	46,800	11.3	$142,530
Computer Network Architects	159,300	167,700	8,400	5.3	$109,020
Computer Occupations, All Other	412,800	455,000	42,200	10.2	$90,270
Computer Systems Analysts	633,900	689,900	56,000	8.8	$88,740
Database Administrators	116,900	127,400	10,500	9	$90,070
Information Security Analysts	112,300	147,700	35,500	31.6	$98,350
Multimedia Artists and Animators	71,600	74,700	3,000	4.2	$72,520
Software Developers, Applications	944,200	1,185,700	241,500	25.6	$103,620
Software Developers, Systems	421,300	463,900	42,600	10.1	$110,000
Nationwide Projections	**3,318,400**	**3,810,100**	**491,700**	**14.8%**	**$103,859**

Source: US Bureau of Labor Statistics, 2019

Statewide Occupational Projections for AI/Data-related Professionals

Occupation	Employment		Employment change, 2018-26		Median annual wage, 2018
	2018	2026	Number	Percent	
Computer / Info. Research Scientists	544	592	48	8.8	$95,722
Computer / Info. Systems Managers	12,548	14,237	1,689	13.5	$119,870
Computer Network Architects	18,574	20,227	1,653	8.9	$77,022
Computer Occupations, All Other	11,132	12,464	1,332	12	$75,005
Computer Systems Analysts	19,913	21,959	2,046	10.3	$78,874
Database Administrators	7,929	8,973	1,044	13.2	$81,994
Information Security Analysts	5,160	6,489	1,329	25.8	$82,638
Multimedia Artists and Animators	3,454	3,819	365	10.6	$55,474
Software Developers, Applications	37,467	47,389	9,922	26.5	$87,797
Software Developers, Systems	17,263	19,551	2,288	13.3	$97,469
Statewide Projections	**133,984**	**155,700**	**21,716**	**16.2%**	**$86,821**

Source: Florida Department of Economic Opportunity, 2019

Palm Beach County Occupational Projections for AI/Data-related Professionals

Occupation	Employment		Employment change, 2018-26		Median annual wage, 2018
	2018	2026	Number	Percent	
Computer Occupations, All Other	305	346	41	13.4	$70,283
Computer / Info. Systems Managers	869	991	122	14	$136,282
Computer Network Architects	1,552	1,722	170	11	$81,578
Computer Systems Analysts	1,069	1,189	120	11.2	$81,682

Database Administrators	536	612	76	14.2	$86,986
Multimedia Artists and Animators	104	116	12	11.5	$59,987
Software Developers, Applications	2,522	3,215	693	27.5	$95,243
Software Developers, Systems	1,011	1,162	151	14.9	$95,597
Palm Beach County Projections	**7,968**	**9,353**	**1,385**	**17.4%**	**$93,311**

Source: Florida Department of Economic Opportunity, 2019

Broward County Occupational Projections for AI/Data-related Professionals

Occupation	Employment		Employment change, 2018-26		Median annual wage, 2018
	2018	2026	Number	Percent	
Computer Occupations, All Other	643	712	69	10.7	$62,629
Computer / Info. Systems Managers	1,635	1,892	257	15.7	$128,253
Computer Network Architects	1,971	2,189	218	11.1	$82,202
Computer Systems Analysts	2,838	3,198	360	12.7	$79,019
Database Administrators	795	904	109	13.7	$95,867
Multimedia Artists and Animators	140	153	13	9.3	$61,277
Software Developers, Applications	4,583	5,911	1,328	29	$87,235
Software Developers, Systems	1,985	2,286	301	15.2	$86,902
Broward County Projections	**14,590**	**17,245**	**2,655**	**18.2%**	**$88,645**

Source: Florida Department of Economic Opportunity, 2019

This proposal responds to growing demand in the labor market. With preexisting degree programs that could be leveraged for enhancement and expansion, and with ideal positioning between large cities such as West Palm Beach and Fort Lauderdale, FAU is uniquely prepared to produce a workforce that will contribute to the State of Florida's rapidly-growing AI/Data field.

B. Continuing to lift FAU's reputation in AI/Data research

In addition to a growing portfolio of related academic programs as outlined in the section above, research activity in AI/Data is currently thriving at FAU. The university is similarly poised to receive recognition as a *University of Distinction* for its AI/Data – and is growing the number of student researchers who can support the ongoing work in labs and centers.

FAU boasts **80+ faculty researchers** and **$35M in active grants in AI/Data**, which includes some projects that were initially funded nearly a decade ago and those continuously-funded through today, as well as more recent awards.

As a formally-designated *2025 FAU Strategic Plan* platform, big data analytics has succeeded in its ability to support all four of the institutional pillars (and associated research institutes). Under each of the pillars below is just some of many examples of active AI/Data research projects/laboratories.

1. **Healthy aging - Institute for Human Health and Disease Intervention (I-HEALTH),** Executive Director Dr. Gregg Fields
    - $7M grant to faculty in the Christine E. Lynn College of Nursing, focusing on health data analytics and big dataset curation related to older adults and extended care facilities

- Additional projects related to the use of data in electronic medical records, the use of AI tools to stop social media abuse, encryption of biometric data and secure computations, nuances of compliant storage protocols and solutions, cloud-based medical diagnostics, bioinformatics/human genomics, fraud detection in healthcare, and advancement of autonomous robotics and regenerative nerve systems

2. **Neuroscience - Stiles-Nicholson Brain Institute,** Executive Director Dr. Randy Blakely
    - $1M gift from Rubin and Cindy Gruber a 3,400-square-foot the Ruben and Cindy Gruber Sandbox resource center to enable students to directly engage with the fast-advancing field of artificial intelligence
    - Additional projects related to data mining, machine learning, language processing, automating electron microscopy, and neural segmentation
3. **Ocean science/engineering and environment science - Harbor Branch Oceanographic Institute (HBOI),** Executive Director Dr. Jim Sullivan
    - $1.25M grant from the United States Office of Naval Research to support autonomous unmanned marine vehicle platforms
    - Additional projects related to the impact of automation on land use, integration with robotics and bio-robotics (e.g. the novel soft robot jellyfish), as well as the monitoring of marine structures
4. **Sensing and smart systems - Institute for Sensing and Embedded Network Systems Engineering (I-SENSE),** Executive Director Dr. Jason Hallstrom
    - $652,820 grant from the National Science Foundation (NSF) to establish the State of Florida's first NSF-funded Major Research Instrumentation (MRI) Artificial Intelligence and Deep Learning (AIDL) Training and Research Laboratory
    - Additional projects related to media technology (i.e. how virtual reality interfaces improve learning and empathy), spatial computing and eye tracking for autonomous cars, the role of AI in transportation, spatial network data processes, and data-driven evacuation planning in emergency management

The platform of big data analytics has played a growing role at the university. Each one of these pillars houses a number of experts who conduct research in AI/Data, and the time is appropriate, with the formulation of a critical mass of expertise in the field, to **transition to a standalone AI/Data pillar.**

The capacity of the university's AI/Data researchers to support a new pillar occurs through big data analytics, data mining, data sorting, and data processing. All of these mechanisms are possible due to advances in the areas of sensing and computing systems. Without such developments, AI (in which machines have the capability to make assumptions, test, learn, and decide

autonomously) and machine learning (in which data trains machines to learn environments and actively engage in intelligent processes) could not exist.

To showcase the university's expertise in AI/Data with broader audiences, FAU will host a Data Science and Analytics Conference in November 2019, as well as the 18th IEEE International Conference on Machine Learning and Applications in December 2019. In Spring 2020, the university planned to host a conference on Connected Vehicles in Smart Cities: The Future of Transportation and Logistics as well as a National Conference on Emerging Technologies in Multimedia. Due to disruptions from the pandemic, the conference is rescheduled for Fall 2021. Additionally, FAU will soon introduce the North American Computational Linguistics Olympiads.

To rapidly advance the field of artificial intelligence and autonomy, Florida Atlantic University's College of Engineering and Computer Science recently unveiled its "Center for Connected Autonomy and Artificial Intelligence" (CCA-AI), a cutting-edge center designed to accelerate the development of innovative artificial intelligence and autonomy solutions. Housed in the state-of-the-art Engineering East building on the Boca Raton campus, the CCA-AI (ca-ai.fau.edu) is immersed in projects focused on underwater, surface, air and space applications that are supported by autonomous resilient machine-to-machine wireless networking. The center includes a robust team of highly-trained experts in artificial intelligence and real-time operational stage monitoring – all of which is based on software-defined, continuously self-optimized joint communication/computing platforms.

The university also recently created "The Center for the Future Mind," which explores scientific and philosophical innovations to achieve a richer understanding of emerging technologies and the future of the mind. The Center brings together researchers to investigate ethical matters for rapidly accelerating technological advancements and impacts on society.

Additionally, the future for federal spending in the area of AI is bright. The importance of AI as a national priority was memorialized in Executive Order No. 13,859, 84 Fed. Reg. 3967 (February 14, 2019). Federal agency leaders have already been instructed to prioritize their budgets with significant investments in AI, as well as plan for increased collaborations with research universities and industry in order to operationalize these efforts.

The evidence that this proposal will attract research funding exists in FAU's broader track record of increasing total research expenditures over the course of the last five years. The number of funded awards is up from 231 in FY15 to 423 in FY19. In FY15, the university's research expenditures were $29.6M. By FY19 (only four years later) that figure was $70M. Proposals are also trending positively, reflecting the comprehensive faculty buy-in to increase research productivity along strategic themes. In line with its strategic plan, FAU more than doubled research expenditures and will continue to increase.

Federal funding agencies such as NSF, NIH, DARPA and ONR have provided numerous opportunities in AI/Data and its related areas. These funding

opportunities have helped the US capitalize on the full potential of AI/Data to strengthen our economy, better our society, and improve our national security (NSF, 2018). With specialized programs in AI/Data, the university will attract likeminded faculty and students who are passionate about big data, automation, and their applications.

With a formal pillar to support and organize the work being undertaken, it is anticipated that more competitive proposals will be written by the AI/Data faculty with the help of undergraduate and graduate student research efforts.

The following offers some insight into the scope of AI/Data research at FAU:

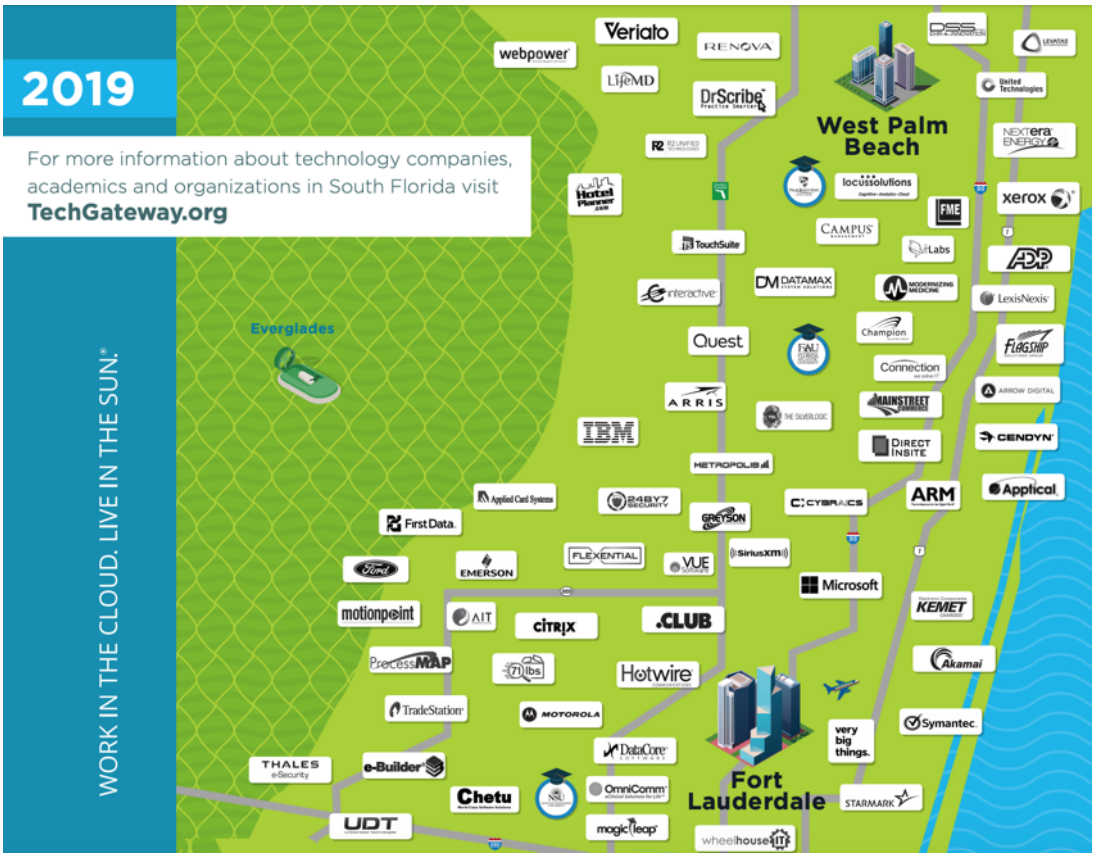
- 32 faculty members in the College of Engineering and Computer Science, including **Eric Engeberg –** robotics; **Manhar Dhanak** - autonomy; and **Stella Batalama -** cognitive networking
- 15 faculty members in the Charles E. Schmidt College of Science, including **William Kalies** - combinatorics and **Francis Motta** - topological machine learning
- 13 faculty members in the Dorothy F. Schmidt College of Arts & Letters, including **Susan Schneider** - philosopher of mind, artificial intelligence (AI), astrobiology, metaphysics and cognitive science who is also a distinguished scholar at the Library of Congress and NASA; **Marcella Munson** - computational linguistics and **Topher Maraffi** - augmented reality and virtual reality
- 8 faculty members in the College for Design & Inquiry, including **Jesse Saginor** - automation of workforce and **Sameer Hinduja** - social media data mining
- 7 faculty members in the College of Business, including **Ravi Behara** - predictive healthcare and **Ken Johnson** - buy vs rent index
- 5 faculty members in the Harriet L. Wilkes Honors College, including **Yaouen Fily –** collective fish movement and **Annina Ruest –** data visualization and technology
- 3 faculty members in the Christine E. Lynn College of Nursing, including **Ruth Tappen –** health analytics and **David Newman –** multilevel modeling and statistics

C. Promoting AI/Data-driven engagement with industry

FAU is geographically well-positioned to become a *University of Distinction* in AI/Data. According to the South Florida TechGateway (a partnership between Palm Beach County's Business Development Board, the Greater Fort Lauderdale Alliance, and the Miami-Dade Beacon Council), the region is home to "nearly 80,000 information and communication technology workers" with an average wage of more than $100,000. Additionally, these three counties rank #1 in the United States for startup activity.

Notably, the first IBM PC was created in Boca Raton, which is home to FAU's largest campus. More than 1,400 technology companies are located in Palm

Beach County alone (Business Development Board, 2019). With global reach and three international airports all within driving distance of multiple technology-based national and international corporate headquarters, South Florida is the third most-populous state but home to the fourth-greatest number of technology companies (BDB, 2019). FAU would like to change this by serving as the nucleus for the AI/Data industry.



One of the university's foremost strengths is in applied research across all of the disciplines. For example, the Council on Undergraduate Research in 2017 ranked FAU as the #1 doctoral-level university in the nation for its robust undergraduate research offerings. Students in any academic field have the opportunity to participate in hands-on projects to better understand basic concepts and to gain valuable experience prior to joining the workforce.

The vision that FAU has for AI/Data is one of intimate collaboration with the large, powerful corporations that neighbor the university. Ideally, the university will leverage its undergraduate and graduate researchers as problem solvers for partners in industry. In other words, a company that encounters an intractable AI/Data problem will articulate the issue to FAU – and the university will pair the company with the appropriate group of students and faculty members to provide a solution. This is a national model for higher education, and FAU already possesses the infrastructure to help.

Additionally, the university would seek to partner with industry in order to pilot AI/Data solutions in a test environment. Universities have access to a diverse array of end users who would be suitable for such opportunities. These

types of reciprocal relationships are the basis for FAU's efforts in community engagement, as defined by the Carnegie Foundation for the Advancement of Teaching. The university submitted its application for "community engaged" classification to Carnegie in Spring 2019 so that it can formally recognize the mutually beneficial partnerships that it shares with its surrounding community. AI/Data serves as an important institutional platform on which FAU can continue to build its community engagement.

The diversity of corporate fields is likewise growing, and FAU is actively involved with preparing highly-skilled workforce that will eventually do jobs related to AI/Data that do not yet exist. With more than 6 million residents, the metropolitan region of South Florida is home to corporations that will have a variety of AI/Data applications, including healthcare, transit/logistics, communications, security/defense, agriculture, tourism/hospitality, manufacturing, and the financial industry, among others. Thanks to enhanced technological capacity through AI/Data, these companies will need to rethink their entire approach to human resource management and planning. Each of these industries will have the opportunity to engage their respective disciplines – throughout all of FAU's ten colleges – for support in discovering solutions to business processes and other AI/Data applications.

FAU's specialization regarding AI/Data is focused on applied research, which is ideal for industry partnerships and corporate contract development. As noted previously, data analytics is a growing area of focus not just for conducting research in basic science and technology – but also for fields that are working with the private sector and benefitting from data mining, high-scale simulations, and AI-powered tools (e.g. FAU has immense analytical capacity to study marketing, finance, real estate, sport management, social media, data visualizations, augmented reality, and medical records). The university's track record of industry collaboration in the robust South Florida economy, paired with its capacity of 80+ AI/Data faculty researchers, makes it ripe to become a *University of Distinction* in this targeted field.

Proposal for FAU's Applied A.I./Big Data Analytics Pillar

The university has outlined the following spending plan for its AI/Data Pillar proposal, which will further fuel efforts as a University of Distinction.

Pillar expenditure plan

Boldness - a uniquely competitive and globalized student body (**recurring)**

$2.8M	Employment-based student incentives
$1.2M	Success networks for undergraduate students
$4.4M	Enhanced instruction *via* graduate students

Synergy - prominent teams of researchers and scholars (**recurring)**

$1.0M	Institute for Sensing and Embedded Network Systems Engineering (I-SENSE)
$2.0M	Harbor Branch Oceanographic Institute (HBOI)
$1.4M	Institute for Artificial Intelligence, Autonomy, and Data Analytics (ArIADA)
$12.8M	**Recurring request**

Synergy - prominent teams of researchers and scholars (**nonrecurring)**

$3.0M	Jupiter High Performance Computing (HPC) - AI/Data processing
$0.5M	Fort Lauderdale Media Technology and Entertainment (MTE) Lab for AI integration with virtual/augmented/extended reality
$1.8M	AI Robotics Testbed - Ocean/sea-surface/ground/air
$5.3M	**Nonrecurring request**

$18.1M	**Total request**

The spending plan for this legislative budget request is rooted in best practices, as well as proven institutional practices. The benefits of such allocations are intended to, in a targeted manner, enhance the experience of FAU's students (both undergraduate and graduate), its research enterprise, and industry relationships as it becomes a ***University of Distinction*** for AI/Data.

Additionally, the proposal leverages FAU's existing *Race to Excellence* strategic plan framework to formally transition the successful big data analytics platform into **an institutional AI/Data pillar.**

Expenditures will generally fall under the following categories:

$2.8M Employment-based student incentives

In order to both recruit and retain the highest-achieving students, FAU will leverage offers to students to participate in on-campus employment and other financial support programs, with priority given to AI/Data students. The university has a preexisting undergraduate research and inquiry framework (ranked #1 in the nation in 2017 by Council for Undergraduate Research) that can engage industry through AI/Data problem-solving. Notably, students who receive offers for employment in on-campus positions are more engaged and more likely to succeed in their collegiate careers. This makes sense, as these students are spending more time with the campus community focusing on their disciplines of choice rather than working in unrelated part-time jobs.

Additionally, employment offers come in the form of stipends or bi-weekly checks, which can indirectly fund their cost of attendance but not necessarily reduce their eligibility for financial aid in the same way that a scholarship would. FAU believes that this program would serve as an effective recruitment and retention mechanism, providing high-achieving students (like those in AI/Data programs) with the opportunity to spend more time on campus, earn a wage, and build a portfolio of experience solving problems for industry.

$1.2M Success networks for undergraduate students

As the university strategically grows its AI/Data enrollments, it will not lose sight of the importance of student success. FAU's role as a *University of Distinction* will rely on having globally-competitive students who will succeed in these rigorous programs. Accordingly, the university will continue to develop a variety of student success initiatives that promote retention and four-year graduation rates. Already, it has established a comprehensive system of analytics and student success support teams who are working daily to monitor student progression and promote timely graduation. At FAU, a "Success Network" is established for each student, consisting of academic advisors, financial aid coaches, and career counselors, in addition to faculty instructors, librarians, and others. This network specifically identifies, in a novel technological platform, the individual members of their own network.

This proposal would allow the university to make strategic investments in order to enhance and grow Success Networks and other student support services. For instance, the university's award-winning academic coaching program will need to enhance its ability to engage students. At the same time, the brand-new Science Learning Center in the Schmidt Family Complex for Academic and Athletic Excellence, which recently opened, will need to continue to boost services, especially if more high-achieving AI/Data students enroll and seek out support from the center. In the coming year, FAU also plans to enhance its Learning Assistant programs across disciplines. New funds would enhance these operations as they provide specialized support.

$4.4M Enhanced instruction *via* graduate students

In order to continue to build a uniquely bold student body that thrives, especially in areas of AI/Data, FAU will need to enhance its undergraduate instruction. In introductory-level college coursework, this often comes through graduate teaching assistants. At FAU, the vast majority of graduate instructors come from master's-level programs. The university will convert these students into doctoral students, with priority given to AI/Data programs. Benefits include growth of doctoral programs and a longer time period for graduate instructors to refine their teaching skills (i.e. 4-5 years rather than just 2).

To attract the finest graduate instructors, FAU will offer competitive stipends. This will also directly support the growth of AI/Data graduate programs throughout all colleges, given the wide breadth of disciplines that already offer AI/Data courses, degrees, certificates, and program tracks/concentrations.

$1M Institute for Sensing and Embedded Network Systems Engineering (I-SENSE)

One of four pillars established in *FAU's 2025 Strategic Plan*, I-SENSE was envisioned as a clearinghouse for sensing, communication, data management, data analytics, and security expertise. It was designed to operate as an interdisciplinary hub, catalyzing research initiatives that crosscut disciplines, academia, government, and industry. The institute's mission is to catalyze a culture of research excellence in sensing and smart systems; to develop, demonstrate, and operate technological solutions with high societal impact; and to attract and support future generations of researchers and practitioners.

The team currently includes two full-time administrative staff, three full-time engineering staff, nine Faculty Fellows, approximately 40 affiliated faculty, approximately 30 graduate students, three postdoctoral researchers, and approximately 15 undergraduate researchers. On average, I-SENSE Faculty Fellows secure, as Principal Investigator, $2.15 for every $1 invested. Affiliated I-SENSE faculty, excluding I-SENSE Faculty Fellows, were responsible for approximately one-third of all new awards in 2019 ($24M). The team's work is broadly supported through active investments from the NSF, NIH, NIST, DOD, state, municipal, and industry partners.

The proposed plan will support emerging opportunities in optogenetics, bio-photonics, tissue diagnostics, and potentially, next-generation networking architectures. Importantly, healthcare-related areas benefit significantly from computer vision expertise.

Attracting outstanding postdocs and graduate students remains an important opportunity to accelerate growth. Fellowship programs are a powerful financial mechanism to attract top-tier talent. The budget includes support to establish a postdoctoral fellowship program and a graduate fellowship program, at levels comparable to analogous federal awards. In each case, use of the internal fellowship funds to attract an external candidate will require a one-to-one match with external, non-state funds. The model retains the

institute's emphasis on external support, while enabling I-SENSE researchers to attract the best postdocs and graduate students in the country.

The proposal includes funding for part-time student employees, and the budget also includes $350K in materials and supplies for start-up laboratory purchases, $15K for graduate student tuition, and $10K for domestic travel

Additionally, this request includes the following personnel:

1. Faculty hire $281.6K (salary + fringe) at full professor rank
2. Staff engineer $80.9K (salary + fringe) as exempt administrative/professional staff member
3. Two postdoctoral researchers $94.4K (salary + fringe) / each
4. Two graduate fellows $30.6K (stipend) / each
5. Two undergraduate student workers $17K (hourly wage) / each

$2M Harbor Branch Oceanographic Institute (HBOI)

As the University's northernmost campus, HBOI's recent research innovations include creating novel autonomous sensing systems, designing next generation ocean-observing tools, developing new shellfish and fish species for sustainable aquaculture and food security, searching the deep ocean for cures for disease, and monitoring fragile Florida ecosystems like the Indian River Lagoon. As one of the four research pillars of FAU, HBOI is building upon the strengths that lie within the institute and the university and embarking on a new quest to expand innovation and success through collaborative research and education.

Florida's coasts and waterways are a critical environmental and economic resource for the state. Unfortunately, Florida finds itself on the front lines of many significant and recurrent problems related to climate change, land use practices and pollution in these environments. FAU proposes to develop the next generation of "in-water" coastal observatory nodes similar to the Land-Ocean Biogeochemical Observatory (LOBO) network HBOI currently supports (http://fau.loboviz.com), but one that is more amenable to expansion and inclusion of new technologies and sensors and with improved data visualization and automated interpretation through artificial intelligence. Development of this transformational technology will provide comprehensive, coordinated and integrated monitoring systems for Florida's estuaries and coastal waters.

The next generation of sensor systems and data loggers will integrate with real-time communications and visualization software. HBOI intends to populate Florida waterways with technology to incorporate novel sensors (e.g. in-situ holographic microscopes, in-situ toxin assays, acoustics, etc.) into the nodes for much improved coastal monitoring and assessment.

When made functional, the coastal network could improve Florida's monitoring of harmful algal blooms (detection and early warning), climate change effects (sea level rise, acidification, coastal hypoxia, etc.), coral reef health, fisheries, eutrophication (nutrient pollution) effects, etc. With this investment, Florida could become a national and international leader is developing the technology and vision for responsible management and control of these problems that have world-wide relevance.

The budget request includes new HBOI faculty hires, post-doctoral and graduate student researchers and engineering technicians as well materials and supplies for system and sensor development. In terms of expenses, the university proposes $375K for permanent sensor installation, $400K for materials and supplies, $400K for faculty research startup funding, $15K for domestic travel, and $30K for graduate student tuition.

Additionally, this request includes the following personnel:

1. Two faculty hires $217.6K (salary + fringe) / each at full professor rank
2. Staff engineer $91.8K (salary + fringe) as as exempt administrative/professional staff member
3. Two postdoctoral researchers $71.4K (salary + fringe) / each
4. Two graduate fellows $30.6K (stipend) / each

$1.4M Institute for Artificial Intelligence, Autonomy, and Data Analytics (ArIADA)

Building on the recently-established Center for Connected Autonomy and Artificial Intelligence" (CCA-AI), a brand-new Institute to support AI / Data will serve to synergize research and curricular development among the faculty and students on all campuses at FAU. Already, the strategic plan platform of Big Data Analytics is a focal point for collaborative research and AI/Data curricular enhancements in all forms. The university will be empowered to expand data curation and data mining techniques and processes across all colleges. Through these activities, the institute will enable FAU to become the leader in AI/Data research, applications, and training in South Florida.

Instead of siloed, discipline-specific advancement of elements in the AI ecosystem, the proposed institute is applied-solution-centered that will create AI/Data products in thematic areas of distinguished research expertise and track-record at FAU. The solutions will incorporate all necessary elements in the AI-ecosystem stack as defined by NSF -- from data acquisition, massive data analytics and management, machine and deep learning, modeling, AI infrastructure – all the way to autonomy and human-machine interaction. FAU will serve as a regional resource, providing access to AI/Data infrastructure and also conducting training for industry and even social service agencies.

Through this funded proposal, the show of support from the State of Florida (and recognition for establishing a new institute for AI/Data) will further

enhance the level of research funding coming from federal and private agencies. Additionally, the State's support will multiply the impact of the already-strong engagement with local and national industry. The focus on applied AI will open the doors of the university to companies that are seeking FAU's research know-how (e.g. FPL, GE) or recruiting the university's well-trained graduates (e.g. Belcan, FPL).

To build capacity, the university proposes to invest $120K in computing hardware and $200K in cloud computing capacity.

Additionally, this request includes the following personnel:

1. Faculty Director $250,000 (salary + fringe) at full professor rank
2. Faculty Associate Director $150,000 (salary + fringe) at associate professor rank
3. Administrative support $75,000 (salary + fringe) as exempt administrative/professional staff member
4. Two faculty hires $150,000 (salary + fringe) / each at associate professor rank
5. Four postdoctoral researchers $300,000 (salary + fringe) / total

$3.0M **Jupiter High Performance Computing (HPC) - AI/Data processing** (nonrecurring)

As a follow-up to the announcement in January 2019 of the NSF MRI-funded AI training and research laboratory, FAU seeks to expand its existing high-performance computing (HPC) center in Jupiter. If funded, this project would result in FAU becoming the number one AI-supporting organization in the State of Florida – and possibly the entire Southeastern United States.

This HPC center would expand existing support provided by the University of Florida's HiPerGator AI supercomputer, which was made available to all of the State University System institutions for both classes and research. FAU has trained one lead faculty member, Dr. Oge Marques, and 4 additional faculty members. Already, Dr. Marques started the process to become an NVIDIA certified deep learning instructor. Currently, FAU and UF offer research projects through FAU's Center of Connected Autonomy and AI (CCAAI) and other research labs as well as course projects offered through the master's in AI. Already, students in the MS degree program can leverage the HiPerGator when implementing developments at higher scales. The Jupiter HPC would just expand this capacity to additional users as outlined below.

FAU seeks $3M for core computing nodes and supporting hardware, which would reside in the existing HPC data center in Jupiter. Upgrades would enable the university to equip two existing computer labs with AI/Data infrastructure to provide students and researchers with direct access to the technology. Additionally, versions of lab units would also be available for use by off-campus industry. Essentially, the upgrades will allow AI/Data users to

directly run jobs on the HPC cluster from one of the two labs – or even their own office if they are equipped with compatible high-quality user interfaces.

Some examples of "shovel-ready" HPC applications across disciplines:

- **Developing personalized (precision) medical systems**, including analyzing patterns in genomics data; machine/deep learning for computer-aided diagnosis/screening; high resolution image reconstruction; predictive modeling for healthcare; clinical decision support systems; and AI-powered drug discovery. Health information is doubling every 76 days. The challenge is how to make meaningful use of high-volume data to create a healthcare model that is more personalized, predictive, and proactive, and that can be delivered at lower cost. Currently, FAU's top NIH-funded genomics medical researcher, Dr. Janet Robishaw, relies on Geisinger Health System and University of Pennsylvania to provide machine learning infrastructure expertise that does not exist at the university (or elsewhere in the state). With the initial investment in infrastructure above, FAU could establish itself as a clearinghouse for Florida's community hospital system.

- **Integrating with the Nikon Center of Excellence at FAU's Stiles-Nicholson Brain Institute,** further supporting collaborations in instrumentation design, as well as providing training courses on basic and advanced microscopy techniques. HPC upgrades could further fuel developments in the visualization of the complex structures and functions of nervous systems in 3D, in multicolor, and with the motion of real life.

- **Hands-on training in deep learning at the Rubin and Cindy Gruber Sandbox in FAU's Wimberly Library,** which would be available to students across a broad range of levels and disciplines (both from within and outside FAU) and would culminate in a certificate in deep learning, one of the first of its kind in the world granted by a research university. The HPC upgrades will also enable students and researchers to run AI jobs at the Sandbox, which will be equipped with advanced visualization stations, robotics, rovers, and project kits. Additionally, the Sandbox is developing a data-warehouse of pre-processed data-sets and models that are ready-to-use in classes and for future research projects. FAU will provide these to faculty throughout the various colleges, as well as to other state institutions.

- **Benefiting methods/analytics courses across disciplines,** allowing students to run HPC jobs in fields like real estate and health administration. Upgrades will benefit spatial analyses in criminology and urban planning.

- **Supporting the recently-launched Max Planck Academy (MPA) at FAU in Jupiter,** which was launched in 2018 in conjunction with the world-renowned Max Planck Society of Germany (FAU is their only dual enrollment high school partner in the world). At the MPA, high school students will have the opportunity to conduct advanced applied research

with some of the world's most successful AI/Data scientists. Already, FAU has piloted the MPA with FAU High School students who studied analytics alongside researchers from the Max Planck Institute. The pilot was so successful that FAU is now pressing forward with expansion with Jupiter High School, which will launch Fall 2020 and benefit from HPC upgrades.

$0.5M **Fort Lauderdale Media Technology and Entertainment (MTE) Lab for AI integration with virtual/ augmented/extended reality** (nonrecurring)

The School of Communication and Multimedia Studies at FAU is uniquely positioned to offer a state-of-the-art, comprehensive, and interdisciplinary approach to AI/Data. Researchers will use cutting-edge technology to work on AI to move and expand the current Media Technology and Entertainment lab to Fort Lauderdale. Projects will include the use of extended reality (XR) technologies to improve learning and empathy (AI in particular will open the doors to new user experiences). Additionally, researchers specialize in the production of games, animation, interactive media (G.A.I.M), which would produce a synergy with the highly-populated downtown Fort Lauderdale by attracting students and making connections with local industry leaders.

Funding would enable researchers in the lab to craft stations where students can have observable/reflective experiences with AI (not just make it – but engage it). In collaboration with the School of Architecture, AI/Data technology ultimately interacts with humans, so a trans-disciplinary lab would include not just the infrastructure for creating such technology, but also space for evaluating its use from a variety of different lenses. This approach can also lead to more developments for empathic and socially-engaged technology.

Much of the research on the impacts of AI/Data throughout the country and the state is taking place in traditional silos, with practitioners, engineers, and developers isolated from rhetoricians, ethicists, and scholars of media, communication, and technology. Because the School of Communication and Multimedia Studies (SCMS) encompasses both cutting edge media production and extensive scholarly research at the intersection of communication, technology, and social change, the School is poised to become a leader in the study and practice of artificial intelligence technologies. This is an opportunity to capitalize upon SCMS's strengths to ensure that developments in AI/Data not only address, but also avoid, the current problems that plague this emerging field. This unique lab will contribute to the AI/Data initiative not only through its technological implementation in virtual reality (VR), augmented reality (AR) and spatial computing, but also in the level of oversight—socio-political, philosophical, and aesthetic—researchers can provide in unravelling the implications of nascent AI/Data technology.

$1.8M **AI Robotics System Testbed - Ocean/sea-surface/ground/air** (nonrecurring)

FAU proposes the university's first shared testbed for research and education in AI, machine learning and multi-domain connected robotics. These resources will help develop state-of-the-art technology, connecting robotic systems across domains such as ocean, sea-surface, ground and air. Interdisciplinary researchers will work together to develop and validate testbed solutions for applications related to AI-driven coastal monitoring and resilience, AI-assisted emergency management, cybersecurity, AI-enabled 5G devices, as well as Internet of Things smart environments.

The system output would involve "autonomy in-a-box." When the "box" is attached to a programmable device (computer, robotic system, drone, vehicle, etc.), it converts/upgrades the programmable device to an autonomous system. Box-enabled individual robotic systems can then self-form networks of connected robotic systems. When a high-level mission/task is issued to one or more of the box-connected robotic systems, then AI technology will enable execution and performance of the mission/task by autonomous members of the robotic network.

Costs for this project include $300K wireless networking platforms and cloud computing. Additionally, FAU will expend $1.5M to develop a network for ocean/sea-surface/ground/aerial robotics, humanoids, bio-inspired soft robots, as well as motion capture space and a drone cage for safe testing.

Summary of total AI/Data expenses broken into spending categories

$2.8M	**Employment-based student incentives**
$2.8M	OPS - undergraduate stipends
$1.2M	**Success networks for undergraduate students**
$1.2M	Expenses - technology and initiatives
$4.4M	**Enhanced instruction *via* graduate students**
$4.4M	OPS - graduate stipends
$1.0M	**Institute for Sensing and Embedded Network Systems Engineering (I-SENSE)**
$470.4K	Salaries and benefits – faculty including postdocs
$80.9K	Salaries and benefits – staff
$76.2K	OPS – graduate stipends
$34K	OPS – undergraduate stipends
$360K	Expenses – materials, startup, equipment
$2.0M	**Harbor Branch Oceanographic Institute (HBOI)**
$578K	Salaries and benefits – faculty including postdocs
$91.2K	Salaries and benefits – staff
$91.8K	OPS – graduate stipends
$1.2M	Expenses – materials, startup, equipment
$1.4M	**Institute for Artificial Intelligence, Autonomy, and Data Analytics (ArIADA)**

$1M	Salaries and benefits – faculty including postdocs
$75K	Salaries and benefits – staff
$320K	Expenses – materials, equipment

$12.8M Recurring request

$3.0M	**Jupiter High Performance Computing (HPC) - AI/Data processing**
$3M	Expenses – materials, equipment
$0.5M	**Fort Lauderdale Media Technology and Entertainment (MTE) Lab for AI integration with virtual/augmented/extended reality**
$500K	Expenses – materials, equipment
$1.8M	**AI Robotics Testbed – Ocean/sea-surface/ground/air**
$1.8M	Expenses – materials, equipment

$5.3M Nonrecurring request

$18.1M Total request

Succeeding in Education, Research, and Industry Engagement

By bridging all the disciplines in its *FAU 2025 Strategic Plan* platform of big data analytics, FAU has already launched novel degree programs, expanded its research enterprise, and promoted economic development. AI/Data is where the federal government is heading, and it's where the local and state industry partners are already working with FAU to enhance the South Florida region's AI/Data capacity. With appropriate resources, the university is prepared to do much more. This proposal comes with the immediate benefits of delivering to the state higher volumes and quality of student and faculty technical experts in AI/Data.

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.*

Measures of Success

- **Year-one accomplishment →** AI/Data enrollments
    a. Student credit hours in AI/Data courses

b. Headcount in AI/Data programs

- **ROI →** AI/Data student outcomes
    a. Degrees awarded in AI/Data
    b. Median salary of graduates from AI/Data programs
    c. Percent of graduates employed from AI/Data programs
- **Year-one accomplishment →** AI/Data research grant proposals
- **ROI →** AI/Data research expenditures
- **Ranking →** *US News and World Report* artificial intelligence program ranks
- **Ranking →** Work with industry to establish new ranking system for applied AI/Data research, corporate contracts, and collaborations

Enhancing the State of Florida's reputation for research and excellence

Despite the fact that Florida is the third most populous state in the country, according to the National Science Foundation (NSF), the state only ranks 8th in federal research expenditures and 19th in industry R&D expenditures (https://www.nsf.gov/statistics/2018/nsb20181/data). The responsibility for positively impacting this figure has fallen on the backs of a select few preeminent institutions, as well as those that are designated as very-high research institutions in terms of their Carnegie Classifications by the Center for Postsecondary Research. This plan thrusts FAU forward from its current designation as a high research institution, helping the state with its standing in research funding, and stimulating the economy as it does so.

The National Institutes of Health (NIH) estimate that every "$1.00 increase in public basic research stimulates an additional $8.35 of industry R&D investment after 8 years" (https://www.nih.gov/about-nih/what-we-do/impact-nih-research/our-society). With the 2025 target of FAU reaching $200M in research expenditures, which is $172M increase from the baseline, the university projects that its efforts to expand its research enterprise will result in approximately $1.4 billion impact in private sector R&D by 2033.

This particular formula does not take into account the economic impact of the increased numbers of degrees awarded at a more efficient pace, or the likewise precipitous rise in the region's tertiary economy that supports the university, its employees, and its students.

III. Personnel – *Describe personnel hiring and retention plans, making sure to connect both plans to initiative(s) and goal(s) described in section I. State the amount of faculty FTE and staff FTE and estimated funding amounts used for retention and new hires in each category. In describing faculty hires, provide overall hiring goals, including academic area(s) of expertise and anticipated hiring level (e.g. assistant professor, associate professor, full professor. Please describe how funds used for faculty or staff retention will help the institution achieve its stated goals. University*

of Distinction proposals should clearly note how anticipated hires or retained individuals will help the institution elevate a program or area to national or state excellence.

The vast majority of the requested expenditures fall under non-personnel expense categories rather than faculty or staff salaries and benefits. Out of the $12.8M recurring funds that make up this *University of Distinction* request, the university would only use $2.3M (less than a fifth of the proposal for recurring dollars) for faculty/staff hires. For the purposes of this request, postdoctoral researchers are treated as faculty. Total faculty FTE in the proposal is 15.0 and staff FTE is 3.0.

In addition to the new hires, the remaining $5.3M in nonrecurring funds and $10.5M in recurring non-personnel expenses will help to retain an additional 80+ existing faculty members by giving them the infrastructure to conduct research as well as fulfillment from working with high-achieving undergraduate and competitive graduate students as noted in the first three components of the proposed expenditure plan. Together these faculty produce an estimated $35M annually in research spending, which will increase in line with the details of the plan above. As noted, FAU has already made significant investments in human capital in line with Board of Governors and university strategic planning and is now seeking the resources to support the existing teams of researchers and scholars that are in place.

The university proposes to use $2.3M recurring funds to create a total of 18.0 FTE *new* positions, which are all AI/Data-focused employees within the context of the respective research institute as outlined below (e.g. computer science or engineering faculty or staff members who have expertise in the application of AI/Data). They will fall under the following areas:

Institute for Sensing and Embedded Network Systems Engineering (I-SENSE) - 3.0 faculty FTE, 1.0 staff FTE

Personnel hired into this research institute will build on six years of I-SENSE pillar success deploying remote sensing technology and analyzing massive datasets. One of the most active units at FAU in terms of research expenditures, adding faculty to this institute will lead to additional federal funding and national recognition for novel application of large-scale embedded systems and the high volume of data produced by these sensing networks.

1. Faculty hire $281.6K (salary + fringe) at full professor rank
2. Staff engineer $80.9K (salary + fringe) as exempt administrative/professional staff member
3. Two postdoctoral researchers $94.4K (salary + fringe) / each

Harbor Branch Oceanographic Institute
(HBOI) - 4.0 faculty FTE, 1.0 staff FTE

Founded as an independent research institute in 1971 and acquired by FAU in 2007, HBOI has a longstanding record of ocean research, particularly in the area of deep sea submersibles. As the University's northernmost campus, HBOI's recent research innovations include creating novel autonomous sensing systems, designing next generation ocean-observing tools, developing new shellfish and fish species for sustainable aquaculture and food security, searching the deep ocean for cures for disease, and monitoring fragile Florida ecosystems like the Indian River Lagoon. With this request, HBOI intends to populate Florida waterways with technology to incorporate novel sensors (e.g. in-situ holographic microscopes, in-situ toxin assays, acoustics, etc.) into the nodes for much improved coastal monitoring and assessment. With this investment, FAU could become a national and international leader in the technology and analysis of concerns such as nutrient pollution and early warning systems.

1. Two faculty hires $217.6K (salary + fringe) / each at full professor rank
4. Staff engineer $91.8K (salary + fringe) as exempt administrative/professional staff member
2. Two postdoctoral researchers $71.4K (salary + fringe) / each

Institute for Artificial Intelligence, Autonomy, and Data Analytics
(ArIADA) - 8.0 faculty FTE, 1.0 staff FTE

Building on the recently-established Center for Connected Autonomy and Artificial Intelligence" (CCA-AI), a brand-new Institute to support AI / Data will serve to synergize research and curricular development among the faculty and students on all campuses at FAU. With additional faculty members to lead and coordinate these efforts, ArIADA will expand data curation and data mining techniques and processes across all colleges. These hires can ensure university-wide coherence, as the institute will enable FAU to become the leader in AI/Data research, applications, and training in South Florida.

1. Faculty Director $250,000 (salary + fringe) at full professor rank
2. Faculty Associate Director $150,000 (salary + fringe) at associate professor rank
3. Administrative support $75,000 (salary + fringe) as exempt administrative/professional staff member
4. Two faculty hires $150,000 (salary + fringe) / each at associate professor rank
5. Four postdoctoral researchers $300,000 (salary + fringe) / total

IV. 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.	N/A	N/A	N/A	N/A

2022-2023 Legislative Budget Request
Education and General

Position and Fiscal Summary
Operating Budget Form II
(to be completed for each issue)

University: **Florida Atlantic University**

Issue Title: **University of Distinction AI/Data**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	15.00	0.00	15.00
Other (A&P/USPS)	3.00	0.00	3.00
Total	18.00	0.00	18.00
Salaries and Benefits	$2,295,000	$0	$2,295,000
Other Personal Services	$7,402,000	$0	$7,402,000
Expenses	$3,080,000	$5,300,000	$8,380,000
Operating Capital Outlay	$0	$0	$0
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	$12,777,000	$5,300,000	$18,077,000

State University System

Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	**Florida Gulf Coast University**
Issue Title:	**University of Distinction**
Date Issue Approved by University Board of Trustees:	**09/15/2020**
Recurring Funds Requested:	**$4,000,000**
Non-Recurring Funds Requested:	
Total Funds Requested:	**$4,000,000**
Please check the issue type below:	
Shared Services/System-Wide Issue	☐
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 2019 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.*

This Legislative Budget Request to support The Water School at Florida Gulf Coast University is supplemental to the 2020-2021 LBR for $3,000,000 approved by the Board of Governors of the State University System of Florida.

The Water School addresses water-related issues in Southwest Florida by combining expertise from different academic disciplines; forging partnerships with local communities and with organizations involved in environmental education/outreach; collaborating with research institutions across the state; and building research capacity in the region. Part of its charge is to educate and train the next generation of leaders responsible for addressing the region's environmental issues, especially those related to water. Core academic programs include undergraduate degrees in Marine Science, Environmental Geology, and Environmental Studies, and graduate (Master's) degrees in Environmental Science and Environmental Studies. In addition to the core faculty supporting these STEM programs, affiliate faculty have been appointed from across the university, representing four colleges and thirteen other departments.

This LBR aligns with multiple objectives associated with three of the five critical areas—pillars—that guide FGCU, as outlined in its 2017–2022 Strategic Plan.

Student Success

- Improving retention and 4-year graduation rates
- Providing intentional opportunities for student engagement with faculty and staff to build a sense of community and an atmosphere designed to achieve success

Academic Excellence

- Increasing externally sponsored research by 100% in next 5 years.
- Resources and structures to foster faculty research and scholarship while expanding opportunities for undergraduate and graduate student research

Community Engagement & Outreach

- Increasing awareness of our people, programs and impact
- Strengthening our outreach, engagement and ties to our region
- Building partnerships and relationships with our five school districts, area businesses and organizations to optimize opportunities to put FGCU expertise to work to support the region's economy, model innovative and sustainable practices and advance the community

The LBR also supports two of the top three Key Initiatives and Investments in FGCU's 2019 Accountability Plan:

- Meeting the Workforce Needs of Southwest Florida
- Applied research to address issues critical to Southwest Florida

<u>Student Success</u>

First year retention rates (2013–2017 cohorts) for undergraduate programs (80% Environmental Studies; 81% Marine Science) are in line with those for similar majors nationwide (CIP 03 Natural Resources and Conservation: 79%; CIP 40 Physical Sciences: 81%, respectively; NSCR Center 2019). Second year retention rates for these programs are 75% and 68%, respectively. A *Sophomore Experience Survey* conducted by the National Resource Center for the First Year Experience and Students in Transition (2017) reported that less than 15% of sophomores interacted in a significant way with faculty and that the only campus experience predicting positive outcomes for these sophomores was the level of interaction and satisfaction with faculty. In addition, many FGCU students work off campus to support their education or simply do not enroll in enough courses each semester to graduate within 4 years. For example, 23% of students in Environmental Studies and 19% of students in Marine Science enroll part time and 79% and 69%, respectively, take less than 15 credits per semester (2016–2019).

To improve these indicators of success, we will create and implement freshman orientation and sophomore retention programs for each undergraduate major in The Water School. Freshman orientation will give students a sense of connection to

each other as they begin their general education courses, introduce them to faculty and more senior students, and provide them an overview of program requirements and expectations. Sophomore retention events will connect students directly with their majors and future career paths, and will provide additional opportunities for them to interact with program faculty. The hiring of additional faculty will also increase the number of opportunities for Water School students to work alongside program faculty through internships and senior research projects. To promote timely graduation (4 years), The Water School will offer additional scholarships to encourage students to enroll for a minimum of 12 credits per semester.

There is a robust and growing workforce need for graduates of Water School programs. At the state level, projected job openings for related fields number over 7,900, with a projected 10% growth for 2019–2027; in Southwest Florida projected job openings total 313 for the same period, with a projected growth of 11% (FDEO 2020). To help meet these workforce needs, as identified as a Key Initiative and Investment in the 2019 Accountability Plan, we will use LBR funding to connect Water School students with future career paths through the proposed sophomore retention program and by organizing and sponsoring an annual career fair that specifically targets our majors.

Academic Excellence

Southwest Florida is known for water-related issues that threaten its economy, human health, natural resources, and quality of life. In response, The Water School has invested significant research effort in the areas of climate change, hurricanes, sea level rise and coastal vulnerability, harmful algal blooms, water quality, and environmental restoration. This research is applied, collaborative with other institutions and community partners, and addresses issues that are critical to the region (see 2019 Accountability Plan). We will use a significant portion of this LBR to enhance research productivity and stimulate additional external grant funding in these and other critical areas by hiring new faculty and staff from various disciplines. These individuals will contribute to the understanding of how water issues impact the region—including the human, economic, and social dimensions of these impacts.

Funding will also go toward expanding opportunities for undergraduate and graduate research. Undergraduate research helps students hone their critical thinking and communication skills, and trains them to develop specific skill sets needed to be successful in STEM careers or graduate school. Graduate-level research is more focused and prepares students to enter the workforce at a more advanced level with concomitantly higher salaries. External funding from faculty research helps drive undergraduate and graduate research.

Community Engagement & Outreach

FGCU will use LBR funding to expand significantly its community outreach and engagement efforts in Southwest Florida. We will partner with school districts to

expand participation in the semester-long Watershed Teacher Leadership Academy (WeTLAnd) directed by The Water School, and we will formalize our STEM Summer Camp for High School Girls, initially funded through the Southwest Florida Community Foundation. We will expand participation in The Water School Leadership Academy, a yearlong program that takes a cohort of community leaders through immersive education, training, and networking on water-related issues at strategic sites throughout the region. We will continue to help support the work of the Southwest Florida Regional Resiliency Compact that, when implemented, will bring together representatives from three counties and ten municipalities to develop a regional plan for adapting to climate change and increasing coastal resilience. We will also expand our in house lecture series *The Water School Presents* to bring eminent speakers from around the country to engage community members as well as FGCU students, faculty, and staff in important issues of our time related to water, the environment, and their human, economic, and social dimensions. To facilitate communication with local communities, The Water School will create a new social media footprint to engage local communities and will develop and operate a new web site that will function as a portal to special events, highlight research conducted at FGCU and its relevance to the region, and provide insight on important water-related issues by FGCU experts.

Budget Description

The spending plan (LBR Form II) advances the objectives of The Water School by providing necessary faculty, staff, student support, operating funds, and equipment. Faculty positions comprise 15 full-time equivalent (FTE) lines spanning multiple academic disciplines. Funding will also target faculty retention. New faculty will support academic programs within The Water School and create additional interdisciplinary connections across academic units. Instructor positions will help accommodate general education enrollment and support release time for faculty active in research to seek external grants and mentor student research. Staff positions (5 FTE) will support operational needs and outreach programs and will include an Environmental Education Coordinator, a Web and Social Media Coordinator, a Grants Specialist, and research technicians to assist faculty research and supervise undergraduate and graduate students. This LBR will also fund summer internships for undergraduate research experience and assistantships to support graduate student research. Scholarships will allow us to recruit and retain high-quality undergraduate (30 x $12,000) and graduate students (8 x $15,000) to Water School programs (STEM) and to encourage timely graduation.

Operating expenses will support research activities and student research projects, enabling us to purchase software, non-capital equipment, and consumables required for the day-to-day operation of on- and off-campus facilities. A recurring equipment budget will support start-up funds for new faculty, enhance existing research capacity and develop additional capacity to target emerging research questions and will allow for maintenance and replacement of existing equipment,

instrumentation, vehicles, and vessels as necessary. We will also use operating expenses to implement new programs such as *The Water School Presents* lecture series, fully fund existing programs such as the STEM Summer Camp for High School Girls and The Water School Leadership Academy, and expand existing environmental education and outreach programs such as WeTLAnd.

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.*

Program outcomes 1–4 for this LBR (Table 1) focus on STEM degree production and research and have been carried over from the 2020–2021 LBR (targets were not adjusted due to COVID-19 related uncertainties and new targets may need to be adjusted for this LBR for the same reason). Outcomes 5–8 are new and focus on student success and community outreach/engagement. All outcomes are Water School specific. Data were mined using Tableau data visualization software.

Table 1. Metrics used to evaluate program effectiveness of The Water School. Historic benchmarks: 2014–2015 (1–4), Fall 2016 (5), 2013 cohort (6), 2011 cohort (7), and 2018–2019 (8). Current/recent data: 2018–2018 (1–4), Fall 2019 (5), 2017 cohort (6), 2015 cohort (7), and 2019–2020 (8). Trend w/o investment projections made using regressions, when significant, or 5-year averages.

Program Outcomes	Historic Benchmark	Current/ Recent	Trend w/o Investment 2022-2023	Trend w/ Investment 2022-2023 (% Improvement)
1. STEM degrees UG/GR)	64	114	146	162 (11.0)
2. Research expenditures	$1,272,684	$853,504	$425,334	$1,200,000 (182.1)
3. Graduate Assistantships	19	27	27	30 (11.1)
4. Undergraduate Research	46	67	86	100 (16.3)
5. Students ≥12 Credits	76%	82%	78%	79% (1.3)
6. Retention (Sophomore-Junior)	67%	67%	70%	72% (2.9)
7. 4 Year Graduation Rate	23%	43%	25%	27% (8.0)
8. Number Teachers Trained	0	5	15	20 (33.3)

We expect in the first year of funding to see growth in research expenditures.

- ✓ One-year Goal: 2021-2022: $1.1 million in externally funded research expenditures in support of water research

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

Not Applicable

2022-2023 Legislative Budget Request
Education and General
Position and Fiscal Summary
Operating Budget Form II

University: **Florida Gulf Coast University**
Issue Title: **The Water School**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	15.00	0.00	15.00
Other (A&P/USPS)	5.00	0.00	5.00
Total	20.00	0.00	20.00
Salary Rate (for all positions noted above)			
Faculty	$1,428,947	$0	$1,428,947
Other (A&P/USPS)	$225,000	$0	$225,000
Total	$1,653,947	$0	$1,653,947
Salaries and Benefits	$2,129,945	$0	$2,129,945
Other Personal Services	$281,050	$0	$281,050
Expenses	$839,005	$0	$839,005
Operating Capital Outlay	$250,000	$0	$250,000
Scholarships	$500,000	$0	$500,000
Total All Categories	$4,000,000	$0	$4,000,000

State University System
Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	**Florida Polytechnic University**
Request Title:	**Engineering Program of Distinction**
Date Request Approved by University Board of Trustees:	
Recurring Funds Requested:	**$3,500,000**
Non-Recurring Funds Requested:	
Total Funds Requested:	**$3,500,000**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	**XX**☐

I. Purpose – *Describe the overall purpose of the plan, specific goal(s) and metrics, specific activities that will help achieve the goal(s), and how these goals and initiatives align with strategic priorities and the 2021 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.*

This Legislative Budget Request outlines how additional recurring investment for critical initiatives necessary to fulfill the University's mission and position Florida Poly as an Engineering University of Distinction will benefit the state of Florida and its people.

The Florida Chamber 2030, Florida Council of 100 Project Sunrise and the regional Economic Development Councils agree that strong investments in a talented core STEM (engineering, mathematical and physical sciences) workforce are necessary to continue to grow the high-wage, high-tech economy. The dependency on STEM for industries like aerospace are obvious, but others are less so. For instance, the National Institutes of Health (NIH) states that some of the biggest gains in healthcare will come not from the life sciences, but from engineering, computer science, and data analysis as applied to health care problems. The finance and insurance industry employ mathematicians and data scientists to make better decisions, as does the logistics industry. Information

sciences, driven by Artificial Intelligence (AI), Virtual Reality (VR) and the continued sophistication of the tools of the information age, are pervasive throughout many of the high-tech industries and are critical to growing industry sectors like autonomous vehicles, simulation, and defense. But as Project Sunrise pointed out, 80,000 high skill jobs in STEM are left unfilled each month, and Florida is not producing enough STEM graduates, ranking only 38th in the nation for STEM degree production.

Florida Poly was created to meet this need by providing a high-skilled, high-wage workforce in Florida. Our graduates are in high-demand, low supply fields and are getting good paying jobs and graduating with minimal debt. Poly is the only 100% STEM institution in the State University System and has met every legislative mandate it was given since opening in 2014. Florida Poly received professional accreditation through ABET in 2019 (retroactive to October 2017) for our strong engineering programs and offer a high-touch, small classroom experience with applied learning projects. This model becomes increasingly important as 67% of the top high school graduates in Florida interested in an engineering education are looking at universities outside the state. In many cases, these students are not interested in a large comprehensive university experience, but in a smaller setting with a strong work-ethic culture built around competitions, hands-on problem solving, and undergraduate research and work experiences.

The vision for Florida Poly as a university is to be an upper-tier engineering school for the state of Florida, and we have made great progress towards that vision in just five years. As a young university, we are already attracting highly distinguished students from across the state, and we have built a strong curriculum around twelve engineering and related programs. We have built strong relationships with over 200 technology companies and are providing them with a talented workforce. This Legislative Budget Request provides a roadmap and funding request for Florida Poly to become an Engineering University of Distinction and to start the climb to being a top 15 engineering school without a doctorate degree program. To accomplish this, we will need to focus on growing our students, faculty, curriculum, and support services.

1. **Growing the Student Body**
    a. Having a highly distinguished student body is an important step in becoming an Engineering University of Distinction. This effort will provide funding for additional scholarships to help attract and retain the most talented high school graduates interested in STEM. Our goal is to have a student body with average entering test scores comparable with the top-tier universities in the United States. As part of this effort, we will also grow the student body to over 2250 students by the fall of 2025 to help fill workforce gaps, and we will graduate over 400 engineers per year by 2026.

b. To attract these students, we must have programs of distinction with world-class faculty. The table that follows shows the funding needed to build a minimum of two new engineering programs that support Florida industry. These new programs will be in emerging fields as determined by market analyses in each program area before bringing them forward for approval.
c. This growth has already started with our current projection on an incoming class for Fall 2021 to be over 600 students. To put this in context, we welcomed approximately 400 new students to campus two years ago, approximately 500 new students last year. Funds are necessary to continue this growth in incoming students with the appropriate quality.

2. **Growing the Faculty**
   a. Florida Poly will hire an additional 20 faculty in existing and new programs. With a new Applied Research Center and a growing faculty body, we will strengthen our focus on applied research and strong industry connections in all programs. As we, along with the rest of the nation, began to emerge from the COVID19 pandemic, we opened an aggressive search for new, highly qualified faculty. While these searches were very late in the classic academic faculty hiring cycle, we are projecting that we will welcome several new faculty to the start of the Fall 2021 semester. Included in these hires are two critical leadership hires: a new Chair for the Mathematics from the Air Force Academy, and a high-profile researcher from the University of Maryland, College Park as Chair for Electrical and Computer Engineering. To continue to grow a true world class faculty, we will need to invest in recurring salary funds for these individuals.
3. **Growing and Broadening our Curriculum and Support Services**
   a. We have continued to commit resources to improvements in the first and second year curriculum. Last year we introduced a new course that ties mathematics to engineering systems at a foundational level; for this year, we will introduce a new course that is project based and supports teamwork and open-ended problem solving. These efforts are focused on building a student culture that is invested in its success and that transitions to academic excellence and self sufficiency early in the undergraduate program. To continue these efforts we will need an ongoing investment.
   b. In addition, we are continuing to grow and improve our graduate program. The Masters in Engineering program provides upper division courses for a few of our ultra-talented undergraduates and also supports the faculty in their research endeavors. This indirectly supports growth in our reputation. Increasing our

number of faculty directly supports the growth in the graduate programs.

c. Finally, we will enhance student services around retention and 4-year graduation rates, which are troublesome metrics for engineering schools. For the Fall 2021, we have reconfigured our support services personnel and are adding both a leadership program and a peer mentoring program to build a positive student culture. Our overall efforts focus on retention and success and in addition, will continue to implement best practices into the foundational courses for our common freshman year. In addition, we will grow our career services and internships, noting that a cornerstone in our curriculum is the requirement for an internship for each student. Florida Poly will continue to grow the capstone projects motivated by Florida industries and our entrepreneurship program. Project Sunrise highlighted startups as an opportunity, and we will continue to focus on growing and keeping our graduates in Florida to work with small and medium sized businesses that are essential to a strong economy.

Below is the detailed spending plan that builds each initiative over a five-year period:

	2022-23	**2023-24**	**2024-25**	**2025-26**	**2026-27**
Scholarships:	$2.0	$2.0	$2.0	$2.0	$2.0
Programs:	$0.0	$1.0	$1.5	$1.5	$1.5
Faculty:	0.75	$1.0	$2.0	$3.0	$3.0
Services:	$0.75	$1.5	$2.0	$2.0	$2.0
TOTALS:	**$3.5**	**$5.5**	**$7.5**	**$8.5**	**$8.5**

These expenditures support the following Florida Poly strategic plan goals.

Goal 1: Enroll a high quality and diverse incoming class.
Goal 2: Grow a faculty body committed to excellence.
Goal 4: Grow the number of academic programs in strategic disciplines.
Goal 6: Help students achieve academic goals.
Goal 7: Build essential skills in communications, leadership, design and business.
Goal 8: Embed projects in a sustainable manner to enhance professional development.
Goal 9: Support students through work experience programs and career opportunities.

Florida Poly graduates carry low debt loads, earn starting salaries averaging over $50,000 per year and are prepared to be lifetime employable. But we cannot rest on our achievements thus far. We need the funds to move Florida's 100% STEM

university to the next level of excellence as an Engineering University of Distinction. We believe our past success makes us worthy of investment for the future.

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.*

The overarching goal of this request is to as quickly as possible, raise the profile of Florida Poly to be a top 15 ranked university in the category of Engineering Schools that do not grant a doctoral degree. The ultimate goal is to achieve this ranking in a five-year term. Underpinning this goal are a range of other issues tied to our anticipated outcomes.

1. **Growth in the student body**
    a. Here we intend to continue to grow the student body both through increased size in each admission class and also through strongly improved retention. Our overarching goal is to reach over 2300 students by the fall of 2025 (noting that we will open the fall of 2021 with ~1450 students).
    b. Funds from this request would improve our recruiting and retention efforts for the entering class, fall of 2023 (the funds need to be in place to use them to improve the campus) and would allow us to exceed our existing goal of ~1850 students. With the help of this funding, we would work to open the fall of 2024 with 2100 students and the fall of 2025 with ~2300 students.
2. **Improvements in retention rate (Academic Progress rate)**
    - The leading indicator for student success in a four-year degree journey is the formal Academic Progression Rate (APR). This proposal would further our existing efforts and starting in 2024, we would raise our APR projection from 83% to 85%.

Our additional Board of Governor's metrics include:

1. **One metric to demonstrate year-one accomplishment of success**
    a. Hiring success for the student services positions that ultimately are funded and hiring success (in terms of offers accepted) for new faculty positions.
2. **Two metrics that demonstrate a return on investment to the state**
    a. Growth of the campus that exceeds our existing growth plans

i. In terms of direct return on investment, the cost per student at Florida Poly will continue to go down as the campus grows.
ii. In terms of indirect return, the economic report done last year indicates that every dollar invested by the state returns over 13 dollars to the state. The degrees that we offer remain in the high value fields so this return on investment will continue to be high.

b. Improvements in Academic Progress Rate and Graduation rate
i. These measures will show that the university is more efficient at attracting and keeping students. Higher rates show that we invest in more students that succeed at Florida Poly.

3. **Metrics that demonstrate how the program has improved over time as a result of the funding**
   a. The metric on job placement rate and initial salary received will demonstrate our success, and the success of our students, in the marketplace.
4. **Metrics and/or rankings to demonstrate program elevation to excellence and prominence**
   a. The ultimate goal is that in five years we reach the top 15 list for undergraduate engineering programs for universities that do not offer a doctorate.

III. Personnel – *Describe personnel hiring and retention plans, making sure to connect both plans to initiative(s) and goal(s) described in section I. State the amount of faculty FTE and staff FTE and estimated funding amounts used for retention and new hires in each category. In describing faculty hires, provide overall hiring goals, including academic area(s) of expertise and anticipated hiring level (e.g. assistant professor, associate professor, full professor. Please describe how funds used for faculty or staff retention will help the institution achieve its stated goals. University of Distinction proposals should clearly note how anticipated hires or retained individuals will help the institution elevate a program or area to national or state excellence.*

For the first year of the program, we have budgeted $750,000 for faculty hiring, $400,000 for increases to Academic Support Services, and $350,000 for Increases to student life.

For Faculty Hiring, this will support 5 to 6 hires with the majority of hires at the Assistant Professor level. Fields will be Computer Science (likely three hires), Environmental Engineering (one hire, Associate Professor or Professor), Data Science (Assistant Professor), and Business Analytics (Assistant Professor). We have currently begun discussions with the foundation to add foundation support to one to three hires either as a distinguished chair, or a developmental chair.

The growth in the student body requires an investment in the support services that are student facing. This is five individuals in the academic support services area that serve advising and retention efforts and then another five individuals to support student life efforts. Both of these areas are starting to show strong signs of strain due to the increase in the student body size, and we must invest in these services to continue to provide services and improve them.

IV. 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.				

2022-2023 Legislative Budget Request
Education and General
Position and Fiscal Summary
Operating Budget Form II
(to be completed for each issue)

University: **Florida Polytechnic University**
Issue Title: **Engineering Program of Distinction**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	4.00	0.00	4.00
Other (A&P/USPS)	6.00	0.00	6.00
Total	10.00	0.00	10.00
Salaries and Benefits	$750,000	$0	$750,000
Other Personal Services	$521,430	$0	$521,430
Expenses	$0	$228,570	$228,570
Operating Capital Outlay	$0	$0	$0
Electronic Data Processing	$0	$0	$0
Financial Aid	$2,000,000	$0	$2,000,000
Special Category (Specific)	$0	$0	$0
_____	$0	$0	$0
_____	$0	$0	$0
_____	$0	$0	$0
Total All Categories	$3,271,430	$228,570	$3,500,000

State University System
Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	**Florida International University**
Request Title:	**FIU Program of Distinction on Environmental Resilience**
Date Request Approved by University Board of Trustees:	**Expected September 2021**
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. Purpose – *1. Describe the overall purpose of the plan, specific goal(s) and metrics, specific activities that will help achieve the goal(s), and how these goals and initiatives align with strategic priorities and the 2021 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

The FIU Program of Distinction on Environmental Resilience is aimed at supporting the Board of Governors Strategic Plan and FIU's 2025 Strategic Plan of achieving exceptional student-centered learning and graduate success, producing meaningful research and creative activities, and leading transformative innovation. In addition, this proposal directly addresses recommendations from both the Florida Council of 100's Project Sunrise report and the Chamber of Commerce 2030 report. Specifically, this proposal will create a "Strong Florida" through the creation of policies and projects that improve the health of Florida's cities and communities, and through a future workforce able to communicate across disciplines and implement convergent research approaches. This budget request addresses two pillars of FIU's strategic framework: 1) Accelerate Preeminence & Research and Innovation Impact, and 2) Amplify Learner Success & Institutional Affinity. The Environmental Resilience program concentrates collaboration across several of FIU's Preeminent research centers that have gained distinction through State and Federal investments in the recruitment of nationally recognized faculty. These

centers and programs, which have secured over $400M in research awards over the last 10 years, 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 the Center for Children and Families (CCF).

FIU's leadership in environmental research and public health grew out of FIU's distinctive geographic location, diverse population and vulnerable South Florida ecosystem. From FIU's inception, faculty have focused on environmental research because of the Everglades, the Florida Keys, the coastal regions such as Florida and Biscayne Bays, 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 unique public health challenges.

The FIU Program of Distinction on Environmental Resilience is designed to advance our current research programs and lead to innovative solutions for 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. If funded, this proposal for the Program of Distinction will enable FIU to further attract and retain the best, most productive faculty, cultivate future leaders, and nurture all students, post-doctoral scholars, researchers, and staff to excel.

The metrics measuring program success will be as follows:

- At least one metric must demonstrate a year-one accomplishment or success.
    - 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 six months of the year.
    - Within the first year of funding, the Environmental Resilience program will submit at least one student training grant application to the NIH or NSF to financially support students being trained in the program.
    - Within the first year of 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.

- At least two metrics must demonstrate a return on investment to the state.
    - 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.
    - Enhanced water quality monitoring statewide, securing Florida's coastlines which are crucial for its economic activity from tourism and sustaining its natural marine resources.

- Development of the Environmental Finance program to provide sustainable environmental policies and practices for government and ensure the proper operation of free markets and property rights.
- FIU will develop a series of professional development workshops and technical reports that will be provided to stakeholders, policy makers, business, and government entities to explore new ways to link finance with environmental resilience.
- Continued improvement in the U.S. News and World Report "Best States" category as tracked by the Florida Council of 100.

- Metrics that demonstrate how the program has improved over time as a result of the funding.
  - FIU's Program of Distinction has been a leader in Florida's Everglades restoration efforts with its "FIU in the Everglades," leading numerous discussions, workshops, and research studies.
  - Centers within the Program of Distinction continue to be successful in proposing and securing external research funding for their projects.
- Metrics and/or rankings to demonstrate program elevation to excellence and prominence.
  - Over the first five years, based on research expenditure growth, of the academic fields associated with the Program of Distinction, the rankings will improve in the NSF HERD's STEM field categories as follows:
  - Psychology – From current #9 of 438 programs among public universities to top 5.
  - Computer Science – From current #54 of 430 programs among public universities to top 40.
  - Environmental Sciences – From current #65 of 431 programs among public universities to top 50.
  - Health Sciences – From current #90 of 448 programs among public universities to top 75.

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

This Program of Distinction addresses important environmental challenges: (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 Florida's 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 create health risks and had significant negative impacts of up to $130 million on tourism as reported by the Tampa Bay Regional Planning Council in

2018. Most recently, we have observed first-hand our near-shore Bay assets, such as Biscayne Bay, as they continue to deteriorate due to infrastructure failures as well as declining water quality.

It is imperative that 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 necessary tools to provide the real-time data needed to make predictions regarding harmful algal blooms, fish kill events, and water quality deterioration.

In this initiative, we propose to acquire and employ a real-time, distributed sensing platform to measure and predict the occurrence of water quality and infrastructure issues and their likely severity and impacts on coastal ecosystems. In order to improve ecological models that predict the presence and locations of harmful coastal inputs, FIU seeks to understand the factors driving coastal water quality collapse.

To model the timing and spatial distribution of contaminants and pollutant inputs and water quality issues, 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, as well as other water quality-induced phenomena such as fish kill events. We will also develop sensing techniques specific for brevotoxins, which are known to be harmful to humans.

To fully utilize the data, FIU 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 elements 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

FIU established an Environmental Finance and Risk Management Program ("Environmental Finance") to provide useful data and sustainable environmental policies for government and the private sector. The goal of the program is to apply the most sophisticated financial modeling to the latest environmental data in real time, so that the market has an accurate picture of the environmental risks.

A main focus of the program is to help ensure the proper operation of efficient markets within a sound public policy framework. For example, the programs help make sure that flood and hurricane insurance are priced correctly, and that investments in mitigation and adaptation measures are accurately reflected in the price. By linking theories and modeling techniques of finance and environmental sciences via mathematics and data science, and then studying the practical applications of this to environment-linked securities, the Environmental Finance program will offer a first-of-its-kind academic model for assessing, managing, and reducing the most serious environmental risks facing Florida and the world.

About the Program

FIU's Environmental Finance program provides solutions to environmental challenges that require research from many different fields to address. This program includes researchers and faculty from engineering, finance, mathematics, data analytics, risk management, resilience, sustainability, environmental law and policy, and coupled systems. It will also emphasize environmental finance's relevance to a growing number of commercial and policy applications. This integrated, interdisciplinary program will prepare a generation of leaders with expertise in those disciplines to meet the gravest environmental challenges, and either find or create high paying careers.

The program uses a unique "convergent" research approach that combines financial engineering and environmental science. This integration of finance and environmental science can be achieved by applying advanced financial models to environmental data in real time, so that governments and markets can correctly "price" the full array of environmental risks. Without this quantitative approach, many of our most crucial resiliency strategies are a matter of speculation with the potential for enormous social losses, whether risks are underestimated or overestimated, inflicting losses on taxpayers one way or the other.

The Environmental Finance program is built like a pyramid, with research at the base, followed by education, stakeholder outreach, and solutions at the apex.

- **Research.** With a focus on environmental parameters as triggers for financial flows, EFRM's basic research will help governments and markets to assess and price environmental risks in real time on the basis of the latest data. These applications can help strengthen and advance virtually every area of sustainable finance, from disaster preparedness and resilience to climate change mitigation and environmental sustainability, through advanced financial instruments such as catastrophe bonds, weather derivatives, index insurance, carbon emissions trading systems, debt-for-nature swaps, mitigation banking, green bonds, and ESG investments
- **Education.** The program will offer an undergraduate major, and graduate and professional certificates (a series of for-credit courses taken together to achieve a level of understanding and proficiency). Full master's and Ph.D. programs are being developed. The certificate programs will be taught in-person and fully online for working professionals. The certificates will also be made available to non-degree-seeking students from around the state, country, and internationally.
- **Outreach.** EFRM also has a robust program of community, state, and national outreach. Program researchers are working with government entities to increase awareness of regional resiliency efforts and are working with stakeholders to develop reports and recommendations for a coordinated regional strategy for addressing critical environmental challenges.
- **Solutions.** Building on those foundations, our program will craft innovative solutions to critical environmental problems that governments and the private sector need in order to prepare for future challenges.

4. Family Preparation and Resilience to Disasters

Given increasing risk from severe weather and other shock events in Florida, preparing the state's most vulnerable populations is critical, in both pre- and post-impact periods. FIU's Center for Children and Families (CCF) and Extreme Events Institute (EEI)/International Hurricane Research Center (IHRC) are well positioned to address this critical challenge. The CCF-EEI/IHRC teams will coordinate to develop workshops focused on promoting storm- and shock-related media literacy for Floridians by helping families (a) make sense of meteorology reports, storm updates, and shock event coverage, (b) learn to distinguish actionable updates from more "spectacle-focused" coverage, and (c) appreciate the negative impacts that extensive media exposure can have on child and family functioning. Parents will receive coaching on how to talk to children across

different developmental levels about impending storms and shock events and about destruction and loss, and will be trained on how to identify signs of significant impact and adjustment difficulties in their children and themselves.

In the context of shock or severe weather events, addressing emotions and preparation is not only critical from a public mental health perspective, but also from a public safety perspective. Research documents how stress and irrational public behavior constrain responsible decision-making and place Floridians at risk. During storm watches for example, 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 that they will not be able to access needed fuel along the way.

Once the shock- and 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 be used as a dissemination site as it is attended by mental health professionals from around the state. Further, the CCF has extensive experience disseminating information to 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 shock- and storm-related prevention materials. The dissemination effort will also be facilitated through the extensive networks of FIU's Extreme Events Institute (EEI) and International Hurricane Research Center.

C. Workforce of the Future

The future workforce will need to be able to communicate across disciplines, implement convergent research approaches, and navigate the technological innovations of coming decades. Attracting and retaining top research faculty will 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 innovative workforce training components. The U.S. Bureau of Labor Statistics, Employment Projections program highlights that future jobs will require degrees, credentials, and skills offered by trans-disciplinary programs, such as Environmental Risk Management, Engineering, Public Health, and Disaster Management.

Alongside the research programs mentioned above, we will develop the workforce needed to enhance environmental resilience locally and nationally. A few specific programs to be added to our current offerings include:

Certificate in Environmental Finance and Risk Management.
As mentioned above, very few students or faculty have training in both finance and environmental science. This initiative will link our pre-eminent Institute of Environment with our nationally ranked programs in mathematics, statistics, finance, policy, law, business, and engineering to establish a graduate/professional 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 dynamic coupled Earth Systems.

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.

To further disseminate the findings, FIU will develop a series of professional development workshops that can be provided to stakeholders, policy makers, 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 the Environment

The Institute of 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 threats. 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): 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 master's students.
- The Florida Coastal Everglades (FCE) LTER Program: 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 near - 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 and have significantly diminished the threat of catastrophic algae bloom in the Everglades.

- 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 of 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, bridges, communication, energy, wastewater 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 in 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. Dr. Tomas Guilarte is the director of the Program and 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 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, CDC, and AHRQ) and national organizations (AAP, AACAP, APA, CHADD, NICHQ, SDBP). The CCF conducts 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 mental health professionals throughout Florida.

E. Funding Categories (excluding Personnel listed in Section III)

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. Staff will be essential in providing the necessary 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 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 listed earlier 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 research and development are 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. This request focuses on Accelerating Program of Distinction Research, Student Success and Innovation Impact.

III. Personnel – *Describe personnel hiring and retention plans, making sure to connect both plans to initiative(s) and goal(s) described in section I. State the amount of faculty FTE and staff FTE and estimated funding amounts used for retention and new hires in each category. In describing faculty hires, provide overall hiring goals, including academic area(s) of expertise and anticipated hiring level (e.g., assistant professor, associate professor, full professor. Please describe how funds used for faculty or staff retention will help the institution achieve its stated goals. University of Distinction proposals should clearly note how anticipated hires or retained individuals will help the institution elevate a program or area to national or state excellence.*

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 by 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 back their research. Successful postdoctoral scholars conduct research, add to the research funding, and assist in the training of undergraduate and graduate students.

IV. 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.				

2022-2023 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: **FIU 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

NEW COLLEGE OF FLORIDA BOARD OF TRUSTEES

Meeting Date: June 5, 2021

SUBJECT: Universities of Distinction Legislative Budget Request —Educating for 21st Century Work

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PROPOSED BOARD ACTION

Consider approval of New College of Florida's 2022-23 Universities of Distinction Legislative Budget Request to be submitted to the Board of Governors for consideration.

BACKGROUND

In 2019, the BOG identified the *Universities of Distinction* (UoD) as one of three Pillars of Excellence to support the nine non-preeminent institutions in the SUS. UoD proposals are to represent a "unique focus" for each institution by identifying a "program or program area that is a core competence capable of reaching national or state excellence." UoD proposals must "demonstrate how current or future workforce needs will be addressed, with a focus on producing high quality talent" and identify metrics for measuring success.

New College of Florida serves its statutory mission (FS § 1004.32) as Florida's residential liberal arts honors college by engaging in educational reform that combines innovation with excellence. Guided by this mission and our strategic plan, New College proposed a UoD plan with three strands: (1)enhance our strategic plan to become the top ranked public liberal arts and sciences institution in the US, (2) inflect the student experience toward the world of work, and (3) serve our region better by increasing collaboration with nearby academic institutions. The modified proposal, which is New College's sole operating Legislative Budget Request for 2022-2023, focuses exclusively on strand 2. Itmakes career preparation and workforce readiness the College's highest tactical priority. New College is known nationally for its success preparing students for graduate and professional programs. Achieving comparable success in "Educating for 21st Century Work" will allow us to prepare students equally well for the jobs that our economy requires (thereby guaranteeing us the increased enrollment necessary to move up in the rankings and to collaborate more fully with other institutions).

Stated simply, the College now recognizes that focusing on the second strand of our original proposal will allow the College to move along all 3 strands of our original proposal and achieve the same outcomes with far less funding than was originally requested in last year's LBR.

Universities of Distinction was formally established by the 2020 Legislature, in FS § 1001.7065.

If approved, NCF intends to submit this UoD proposal to the Board of Governors for consideration.

Supporting Documentation Included: Universities of Distinction proposal

University of Distinction Guidance for Fiscal Year 2022-2023

Facilitators/Presenters: Chief of Staff Brad Thiessen

Other Support Documents Available: N/A

State University System
Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	**New College of Florida**
Request Title:	**University of Distinction: Educating for 21st Century Work**
Date Request Approved by University Board of Trustees:	**May 27, 2021**
Recurring Funds Requested:	**$ 500,000**
Non-Recurring Funds Requested:	**$ 25,000**
Total Funds Requested:	**$ 525,000**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	☒

I. Purpose

New College of Florida serves its statutory mission (FS § 1004.32) as Florida's residential liberal arts honors college by engaging in educational reform that combines innovation with excellence. Guided by this mission and our strategic plan, New College set out toadvance along three dimensions: (1) enhancing our strategic plan to become the top rankedpublic liberal arts and sciences institution in the US, (2) inflecting the student experience toward the world of work, and (3) serving our region better by increasing collaboration withnearby academic institutions. As we started down these paths, we quickly realized that in order to grow enrollment and strengthen our role within the region, we need to do more than just *inflect* toward the world of work. New College needs to make career preparation and workforce readiness *central to the entire student experience*.

In particular, New College will reimagine the liberal arts to produce graduates who will drive Florida's innovation economy and fill the most challenging state workforce needs.

To accomplish this, New College of Florida requests $525,000 to:

(a) Close the skills gap so that, in addition to the timeless skills imparted by a liberal arts and sciences education, <u>all</u> New College graduates acquire essential technical skills, credentials, and competencies needed to effectively fill jobs in Florida's fast changing economy.

(b) Place <u>all</u> New College students in internships, apprenticeships, or hands-on service learning programs that are related to their career goals prior to graduation.

(c) Respond to regional workforce needs through the development of the New College Innovation Hub.

Through these efforts, New College will increase its stature as a national model for educational excellence and innovation.

A. Closing the skills gap

> *If Florida is to become the global leader for talent, the state's employers must have ready access to workers with the right skills at the right time for the right industries. That's an increasing challenge as disruptions transform both the present state and the future of work.*
>
> *Successfully addressing this challenge, which many attribute to a gap in skills sought by employers versus those available among individuals seeking work, is a must for entities that contribute to Florida's talent development pipeline.*[1]

Few schools can match New College's performance in producing graduates with outstanding *academic* skills[2]. To help fill the most challenging local, regional, and state workforce needs, we will integrate *workforce readiness skills* into our unique academic program and close the skills gap Florida employers face.

Significant skills gaps prevent Florida employers from filling 25% of available jobs. For positions they *are* able to fill, employers mitigate skill gaps through outsourcing or post-hire training[3] (with 58% of employers investing in digital training[4]). Through this request, New College will partner with a leading online, personalized digital skills development platform to integrate career-focused hard and soft skills development into our courses. In keeping with our mission, New College will customize both our approach to career readiness and filling skills gaps at the student level.

This skills development platform will complement our academic program[5] to:

- provide each student with the business (SEO, marketing, project management, sales), technology (mobile development, blockchain, programming), and creative (user experience, VFX, product design) microskills that drive Florida's economy;
- track and assess the workforce readiness of our students;
- build each student's online presence and brand, and expand professional networks;
- prepare students for professional certifications (e.g., FAA, Google, Oracle, SAS, Salesforce, Six Sigma, Scrum, Unity); and
- track the skill profile of our faculty and staff to provide targeted professional development opportunities.

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[1] CareerSource Florida: A Look at Skills Gaps and Job Vacancies in Florida 2018

[2] Since gaining independence, New College ranks #9 among all universities (and #1 among public universities) in producing graduates who go on to earn doctoral degrees (in both STEM and non-STEM disciplines).

[3] CareerSource Florida 2018 Skills Gap and Job Vacancy Survey

[4] Florida Workforce 2030 - An Updated Look at Building America's Best Workforce (Florida Chamber Foundation)[5]

Partnering with an online provider is a cost-effective way to build business, technological, and professional skills of New College students without starting costly new academic programs.

This skills development platform won't simply be a tool available to students; we will integrate it deeply into our academic program and the experience of every New College student.

By offering professional development workshops and regularly updating equipment, technology, and software, we will train faculty to integrate workforce readiness skills and modern technological tools into their courses. Through ongoing instructional design workshops, we will maximize the effectiveness of our faculty in teaching these skills and incent them to innovate in the classroom.

Most importantly, though, we will integrate workforce readiness skills into New College's signature high impact practice — the senior project. In many ways, the semester-long senior project (almost always in the form of a senior thesis) forms the core of our academic program. We want to expand this core to allow students to demonstrate their career readiness in real work-based settings.

With funding from this request, we will work intensively with five of our academic programs each year to develop capstone *Professional Field Experience* internships. As an alternative to the senior thesis, students will be able to choose to complete a rigorous, semester-long, internship or apprenticeship that includes a written analytic/research component. Through these Professional Field Experiences, students will apply and expand their knowledge and skills under professional supervision in a structured learning experience.

In 2019-20, we successfully piloted this initiative with our Economics[6] program. Guided by our career center, faculty in the Economics program developed expectations and guidelines for the Professional Field Experience Internship, and built relationships with internship providers (including consultancy firms, local businesses, regulatory authorities, public administrations, and non-profit organizations). While it took a great deal of effort to develop, students and local employers have expressed substantial interest in expanding this pilot to our other academic programs. We're requesting funds to increase our capacity to develop Professional Field Experiences for all our academic programs.

Closing the Skills Gap — Funding Request Summary

Item	Request
Online skills development platform	$45,000
Professional development workshops; instructional design sessions	$25,000
Faculty stipends to integrate skills development platform into courses	$25,000

[6] Economics Professional Field Experience Internship

Equipment refresh cycle		$25,000
Professional Field Experiences development		$75,000
	TOTAL	**$195,000**

B. 100% placement and integrated post-graduation planning

The Florida Workforce 2030 Report[7] survey of Florida business leaders found:

- 70% indicate new employees require additional training to be ready to work.
- 75% believe internships and apprenticeships are "extremely valuable" and "a core component" when it comes to evaluating and hiring talent

These leaders emphasized that work-based learning should be a central aim of education and of developing employability skills.

If Professional Field Experiences are so great, shouldn't all New College students complete a work-based learning experience before graduating? Yes!

New College prepares intellectually curious students for lives of great achievement through an individualized education shaped to the needs and interests of each student. This means we strive to infuse career preparation and work-based learning into the experience of every student from day one to meet their career needs and interests. Through this request, we will place 100% of New College students in internships, apprenticeships, or hands-on service learning experiences prior to graduation.

Our early efforts to integrate career preparation into the student experience have produced tremendous returns. Through our Novo Career Advantage roadmap[8], the number of students meeting with career coaches increased 136% (with a 333% increase in total appointments). This coincided with:

- a 12% year-over-year increase (+24% over three years) in students finding gainful employment or continuing their education within one year of graduation;
- a 15% increase in the median starting salaries of New College graduates.

We want to capitalize on this progress by solving the one issue we still face — *placing our students in internships*. While internship providers overwhelmingly convey positive feedback about our students, we simply do not have the capacity to place enough New College students in work-based learning experiences.

We intend to hire an *Employer Relations & Internships* position (1.00 FTE) to build a sustainable program to ensure all New College students complete work-based learning experiences prior to graduation. This non-tenure-track faculty position will both educate and build relationships with local employers to cultivate opportunities to place all New College students in internships that meet their needs and interests.

100% Internship Placement — Funding Request Summary

Employer Relations & Internship Coord. (1.00 FTE faculty) - salary + benefits **$80,000**

[7] Florida Workforce 2030 - An Updated Look at Building America's Best Workforce (Florida Chamber Foundation)

[8] Novo Career Advantage roadmap: https://www.ncf.edu/ceo/students/advantage/

C. New College Innovation Hub

80% of Florida business leaders see the lack of key skills (employability, soft skills, digital skills) as a threat to their businesses.

More than 40% of Florida businesses have not yet engaged in public-private partnerships with local universities or state colleges for workforce training and skills development.[9]

Although 47% of employers blame higher education for the skills gap, only 31% are actively collaborating with colleges and universities to close the gap. We aim to fix that.

With funds from this request, we will create the *New College Innovation Hub* (NCIH) to scan the local market and respond to regional workforce needs. Staffed by part-time faculty with proven industry expertise, the NCIH will:

- identify skills and certifications that will close skills gaps for regional employers;
- offer courses and summer learning sessions to New College students and non-degree-seeking, working adults that target these skills;
- bundle these courses with the online skills development platform to develop certificate programs, minors, and pathways that lead to professional certifications;
- mentor New College students to build soft-skills, expand professional networks, and increase career opportunities;
- offer consultation services (directly and by coordinating student consulting project teams) to the local employers and the community to address current business operations challenges;
- conduct applied research to solve industry problems and stimulate the local economy; and
- further enhance New College's relationship with local industry.

The NCIH will be lean, focused, and nimble. In its first year, based on the interests of current New College students and the local community, the NCIH will focus on social entrepreneurship opportunities, partnering with local and regional interests, such as the City of Sarasota, Selby Botanical Gardens, and the Sarasota Manatee Airport Authority, with whom we have long-established relationships. As social entrepreneurship projects mature over the next year, the NCIH will scan the local work environment to choose the next area of focus that will benefit the local economy. Ideas for what might come next include supply chain management and logistics or cybersecurity, both of which are in high-demand in our community.

[9] Florida Workforce 2030 - An Updated Look at Building America's Best Workforce (Florida Chamber Foundation)

As the centerpiece of this request, the NCIH will contribute significantly to New College's mission to engage in educational reform by combining innovation with excellence. It will stimulate the local economy by serving as a hub where New College will engage with local employers to solve challenging problems, and it will further centralize career preparation into the New College student experience.

New College Innovation Hub — Funding Request Summary	
Item	Funds Requested
Part-time Professors of Practice (2.00 FTE) - recruitment + salary	$200,000
Operating expenses	$50,000
TOTAL	**$250,000**

Alignment with Institutional Mission and Universities of Distinction Goals

The following table demonstrates how the three components of this *Educating for 21st Century Work* initiative align with New College's institutional mission and the SUS Universities of Distinction goals:

Educating for 21st Century Work	NCF Strategic Plan (high-level tactics)	Universities of Distinction Goals
a) Closing the skills gap	**1. Recruit more students who will thrive at New College** Market research indicates that making hands-on, career-focused, credentialed learning experiences central to the student experience will increase applications to New College by 60%	• **Focuses on a core competency unique to NCF that achieves excellence at the national or state level.** This initiative integrates workforce readiness skill development into New College of Florida's unique, residential, liberal arts academic program. These efforts will propel New College into the top tier of all public and private liberal arts colleges in the nation.
b) 100% work-based learning placement	**2. Keep them here four years** Work-based learning experiences are High Impact Practices that have been positively associated with student learning and retention[10].	• **Meets state workforce needs.** By placing students into real work-based learning experiences, this initiative will ensure New College students demonstrate the soft and hard skills employers demand.
c) New College Innovation Hub	**3. Make their degree more valuable** Building students' professional networks and providing them direct pathways to gainful employment will increase the value of a New College degree.	• **Fosters an innovation economy that focuses on areas such as health, security, transportation, and STEM, including supply chain management.** The fundamental purpose of the New College Innovation Hub is to focus on areas

[10] National Survey of Student Engagement

		(such as entrepreneurship, supply chain management, and STEM fields) to foster an innovation economy within the local region.

II. Return on Investment

Year 1 Accomplishments

New College is primed to move quickly and aggressively to implement this Educating for 21st Century Work initiative. The following table summarizes what we fully expect to accomplish by the end of the first year of implementation:

Year 1 Accomplishments	Current	Year 1 Expectation
Number of New College students completing internships, apprenticeships, or service learning experiences for academic credit	75 (2019-20)	+60% (120 internships)
Number of fully-developed academic program Professional Field Experience internships	1 program (2020-21)	+5 programs (6 programs)
Number of skills courses completed by New College students (offered through the online skills development platform)	0	+100 courses (100 courses completed)
Student Credit Hours (SCH) in NCIH courses	0	+300 SCH (300 SCH in NCIH courses)
Number of local employers served by the NCIH	0	10 (10 employers served)

Improvement Over Time

Beyond the implementation success expected in the first year, our market research strongly suggests this initiative will increase enrollment (especially among students from underserved populations) and improve student retention. Furthermore, this initiative will result in *significant* improvements on metrics where New College has struggled:

Metric	Current Performance	Expected Improvement
PBF Metric #1: Percent of Bachelor's Graduates Enrolled or Employed ($30,000+) in the U.S. One Year After	60.2% (2018 graduates)	+20% (80% for 2026 graduates)
PBF Metric #2: Median Wages of Bachelor's Graduates Employed Full-time One Year After Graduation	$29,700 (2018 graduates)	+50% ($44k for 2026 graduates)
PBF Metric #5: Academic Progress Rate (2nd year retention with GPA above 2.0)	80% (2016-2018 cohorts)	+10% (90% for 2022 cohort)
PBF Metric #10: Percent of FTIC graduates completing 3+ High-Impact Practices	47% (2015-19 graduates)	+53% (100% for 2026 graduates)
Percent of graduating seniors completing an internship, apprenticeship, or hands-on service learning experiences	41% (2020 graduates)	+59% (100% for 2026 graduates)

Undergraduate Pell recipient enrollment	247	+52%

	(2018-19)	(375 in 2025-26)
4-year graduation rate for Pell recipients	61% (2013-14 cohorts)	+19% (80% for 2024 cohort)
Transfer student enrollment	94 (2019-20)	+60% (150 in 2025-26)
2-year graduation rate for FCS AA Transfers	9% (2018-20)	+51% (60% for 2024 transfers)
Percent of graduates with multiple credentials	33% ('19 & '20 graduates)	+17% (50% for 2026 graduates)

Return on Investment to Florida

New College excels at preparing students with the timeless liberal arts and sciences skills they need to navigate their futures and live lives of great achievement. Within six years, New College graduates earn a median salary of $65,000 (36% more than the median salary in the state of Florida). This mirrors the long-term success of liberal arts graduates from across the country.[11]

Through this Educating for 21st Century Work initiative, we will jumpstart the careers of our students so they find immediate success after graduation. Increasing the median starting salary of our graduates by 50% (from $29,700 to $44,500) and increasing the percent who find immediate employment by 20% (from 60% to 80%) will increase the total earnings of our graduating classes of 300 students by more than $5.3 million per year.

Placing NCF students into internships provides $1,080,000 of labor to local employers each year. These businesses will also benefit from the productivity of those interns, the increased productivity of other employees (due to interns reducing their workload), the supervisory experience opportunities (of employees supervising interns), and improved loyalty and retention among interns converted to full-time employees.

The NCIH also provides a tremendous return on investment to Florida. Based on the average consulting fee charged to small businesses, the NCIH will provide $540,000 in consulting to local businesses each year. With the operational improvements that come from this consulting, the total economic impact to the local region will be much higher.

Florida's Return on Investment
1. $5.3 million annual increase in the total salary earned by New College graduates (by 2030)
2. $1.08 million annually to local businesses by placing New College student interns (by

[11] The Economic Gains of a Liberal Arts Education (Inside Higher Ed, 2019); The Unexpected Value of the Liberal Arts (The Atlantic, 2019); In the salary race, engineers sprint but English majors endure (NY Times, 2019); What's a Liberal Arts Degree Worth? (Wall Street Journal, 2019)

2025)
3. $540,000 annually in direct consulting and employment services to Florida businesses

Elevation to Excellence and Prominence

New College has long been recognized as a top public, liberal arts college in the nation (just behind the military academies). In meeting the performance targets for this initiative, New College will continue its ascent into the top tier of all public *and private* liberal arts colleges in the nation by 2030.

Beyond our continued recognition as a leading liberal arts college, this initiative will result in national recognition for New College's career preparation services. We will earn national recognition by 2025 and will be ranked among the top 20 best career schools in the nation by 2030.

Elevation to Excellence	**2019-20**	**2020-21**	**Expectation**
U.S. News and World Report: Best Liberal Arts Colleges (rank among all private and public schools)	102	84 (+18)	50 (+34 by 2030)
Washington Monthly: Liberal Arts College Rankings (rank among all private and public schools)	53	32 (+21)	10 (+22 by 2030)
National Association of Colleges and Employers (NACE) recognition of New College's career preparation program			Target Date: 2025
New College will be ranked among Princeton Review's top 20 "Best Career Services"schools in the nation.			Target Date: 2030

III. Personnel

For this request, NCF anticipates hiring three (3) faculty, which will cost an estimated $305,000:

- Employer Relations & Internship Coordinator - 1.0 FTE non-tenure track faculty
- Part-time Professors of Practice at the *New College Innovation Hub* (NCIH) – 2.0 FTE faculty

The faculty will be hired to strengthen New College student work-based skills and learning experiences, offer courses and pathways leading to professional certificates, and expand internship opportunities for New College students. In addition, they will help train other New College faculty on how to integrate workforce readiness skills and modern technological tools into their courses. Through ongoing workshops, we will maximize the effectiveness of our faculty in teaching these skills and incentivize them to innovate in the classroom. Furthermore, the faculty will be able to enhance the College relationship with the local industry and stimulate the local economy by providing consulting and conducting applied research services to local employers.

IV. Facilities

This initiative does not require expansion or construction of a facility.

	Facility Project Title	Fiscal Year	Amount Requested	Priority Number
1.	(not applicable)			

2022-2023 Legislative Budget Request
Education and General
Position and Fiscal Summary
Operating Budget Form II
(to be completed for each issue)

University: New College of Florida
Issue Title: Educating for 21st Century Work

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	3.00	0.00	3.00
Other (A&P/USPS)	0.00	0.00	0.00
Total	3.00	0.00	3.00
Salaries and Benefits	$305,000	$0	$305,000
Other Personal Services	$75,000	$0	$75,000
Expenses	$120,000	$0	$120,000
Operating Capital Outlay	$0	$25,000	$25,000
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	$500,000	$25,000	$525,000

State University System
Education and General
2022-2023 Legislative Budget Request.
Form I

University(s):	**University of Central Florida**
Request Title:	**UCF Powering Up Florida's High Tech Economy**
Date Request Approved by University Board of Trustees:	**June 30, 2021**
Recurring Funds Requested:	**$18,811,200**
Non-Recurring Funds Requested:	**$ 3,000,000**
Total Funds Requested:	**$21,811,200**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	☐

I. Purpose – *1. Describe the overall purpose of the plan, specific goal(s) and metrics, specific activities that will help achieve the goal(s), and how these goals and initiatives align with strategic priorities and the 2021 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.*

1.1. Overall Purpose of the Plan:

UCF's research enterprise and graduates are key drivers of Florida's high tech economy. This plan seeks to boost our ability to power up the high tech economy by building on existing strengths, targeting emerging transdisciplinary solutions to common, multi-business sector regional and national needs. The proposed overall plan has two overarching goals:

A: *Enhance Research, Educational Excellence and Industry Partnerships*: UCF will enhance and expand existing strengths to become the research and development partner of choice for Florida's high tech sector through strengthening UCF's partnerships in the areas of aviation, space, energy and entertainment that are core business foci of thriving industry sectors in Florida; building upon UCF's research excellence in enabling technologies, that drive technological advances in these application areas, such as AI/ML, AR-VR-MR, cyber security, space sciences and engineering, power systems, modeling and simulation and themed experiences; strengthening UCF's partnerships with defense agencies and

supported industries, mostly located in UCF's Research Park, comprising a strong modeling, simulation and training community that earned Central Florida's status as the Center of Excellence in Modeling and Simulation; delivering impactful research that is cross-cutting, synergistic and applicable across multiple business sectors that span a wider spectrum of business needs in aviation, space, energy, defense, entertainment, and themed experiences.

B: *Enhance Student Success*: UCF will increase the quantity, quality and diversity of the STEM talent, including engineers and computer scientists and the critically needed creative talent, who graduate with experience in working collaboratively in teams and across disciplines. This initiative is in direct response to the needs and requests of the high tech sector and is critical to sustain and expand Florida's innovation economy.

To accomplish this plan, new resources are requested through this LBR to accompany already existing resources at the University of Central Florida.

Industry Needs in the US, Industry Strengths in Central Florida:

According to the Florida Council of 100's *Project Sunrise* report "each month, an average of 80,000 high-skilled and 30,000 middle-skilled jobs are left unfilled." By 2025, there will be two million unfilled jobs in manufacturing in the US ([1]US News, March 27, 2018). The need for workforce talent in computing areas is equally significant. According to the Bureau of Labor Statistics[2], "Employment of computer and information technology occupations is projected to grow 12 percent from 2018 to 2028, much faster than the average for all occupations. These occupations are projected to add about 546,200 new jobs.

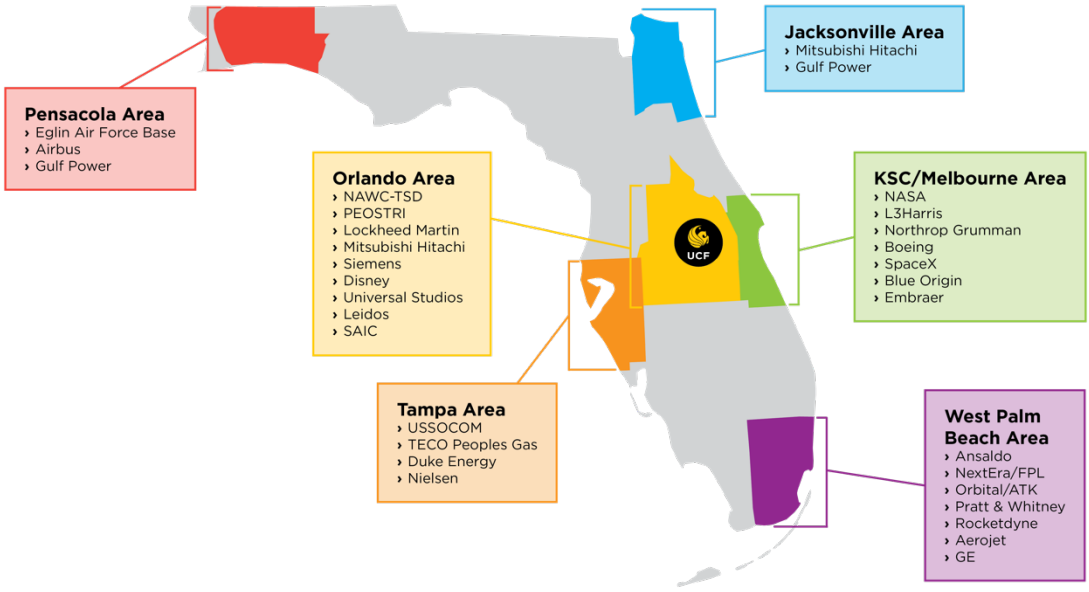

Figure 1: A diagram with Florida companies and their respective locations in the State of Florida. These companies have core businesses in the areas of Aviation, Space and Energy. UCF proposes to provide the enabling technologies such as Artificial Intelligence, Machine Learning, Augmented Reality, Virtual Reality, Cyber Security, Hypersonics, Power Systems, Advanced Manufacturing and Space Sciences and Engineering to power up the well-being of these industries that contribute to the economic prosperity of the State.

With ever greater urgency, industries will require a highly educated, high-quality, talented and creative supply of talent, ready to join a rapidly expanding STEM sector in and around Central Florida and the state. The aviation and defense industries along with the power industry in Central Florida are thriving and well-diversified. They conduct R&D tailored programs and have growing demands for highly skilled workers, fueling our economic engine and impacting business in nearly all 23 counties [floridahightech.com[3]].

A number of large industries in the state, such as Lockheed Martin, L3Harris, Northrop Grumman, as well as the entertainment giants, such as Disney and Universal reside in Central Florida and are close to UCF campus [Figure 1]. Similarly, two of three major global manufacturers, Siemens and Mitsubishi are located in Orlando and two of top five US utility companies, NextEra (FPL) and Duke, have a strong presence in Florida. These companies employ tens of thousands of employees, many of whom are UCF graduates who help to propel the state's high tech economy. The space industry is booming on Florida's east coast, involving space companies such as Boeing, Space X, Blue Origin, all with strong presence on NASA KSC's campus, a short driving distance from UCF's main campus.

In addition to being close to the aviation, space and energy industries and government organizations, UCF is located at the center of the international hub of the themed entertainment industry. Seven of the top twelve attended themed parks and four of the top five waterparks worldwide are in Orlando[4]. Appropriately, most of the leading themed entertainment firms have significant presence in Orlando including Universal Creative, SeaWorld Deep Blue Creative, and Hershend Entertainment. These industries need creative, innovative and technologically competent talent. The enabling technologies at the center of this initiative and the synergistic collaboration of three UCF colleges to stand up an encompassing themed experiences curriculum will meet this need.

Figure 2 below, provides a holistic view of industry's and government's technological needs that UCF intends to serve through this LBR. These needs, as emphasized above, will be served by (A) delivering impactful research that is cross-cutting, synergistic and applicable across multiple business sectors and (B) producing a talent pipeline that is creative, innovative and technologically competent in enabling technologies that are cross-cutting and synergistic.

Figure 2: Cross-cutting and synergistic business sectors that UCF will serve through this LBR.

UCF's Strengths and Industry Partnerships:

UCF is a major metropolitan university whose existing research infrastructure and student success are well-suited to support the technical challenges of the industry in the areas of aviation, space and energy. UCF's enabling technology know-how and research infrastructure that supports aviation, space and energy-related research, in conjunction with the strong presence of related industries, are the appropriate elements of an ecosystem that promises sustained excellence and growth. Our strengths in aviation, space and energy and technologies that fuel the success in these areas are illustrated by successful centers of excellence (energy, computer vision), clusters (cyber) and specialized academic programs (computer vision, cyber security, data analytics, AR/VR/MR, themed experiences). Other areas of UCF strength are evident by the strong faculty groups in AI/ML, AR/VR/MR that span expertise in multiple colleges/units, including the College of Engineering and Computer Science.

A testament of UCF's strength in the areas of focus for this LBR is that, according to Aviation Week, UCF has been named the No. 1 producer of graduates for the aerospace and defense industries (6 years in a row), while also enjoying a #2 national ranking for graduates with the skills most desired by employers in these industries. Another testament of UCF's strengths are the many multi-partner (involving industry and academia) funded contracts and grants in the aviation, space and energy areas. This requested investment will expand the diversity and strength of UCF's educational and research portfolio in these focal application areas and intensify the partnerships with the many related industries, most of them located in UCF's vicinity (See Figure 1). More than any other university, UCF is poised to maintain its stature as a dominant supplier of talented, highly compensated engineers for the aerospace and defense industries, as well as other industries and government agencies in Florida. More than any other University, UCF is poised to expand its partnerships with aviation, space, energy and defense companies that would advance the state of the art in technologies that impact the economic prosperity of these industries and thereby, the State of Florida.

Our research strengths that impact industries with focus in AI/ML, AR/VR/MR, aviation, space, energy and defense include but are not limited to rocket propulsion, hypersonic systems, technologies that deploy telescopes and satellites, Artificial Intelligence/Machine Learning augmented SSA (Space Situation Awareness) algorithms, high temperature durability of materials, turbomachinery, power systems and smart grid, and lunar and asteroid surface science. UCF has key infrastructure labs to conduct research in these areas and its faculty have published widely in high-impact publication venues. In all, UCF has garnered nearly $200M in external research funding in each of the last three years, has had 40+ years of partnership with Lockheed Martin and 30+ years of partnership with Siemens.

Orlando is the technological hub for modeling, simulation and training through cutting edge research in artificial intelligence, machine learning, computer vision, virtual and mixed reality. UCF's Research Park is a unique collaborative alliance formed by simulation and training R&D and acquisition commands, UCF, and a vibrant modeling and simulation industry boasting 100+ companies. The US Department of Defense in UCF's Research Park provides $6B in contracts annually to companies in UCF's vicinity as well as other companies nationwide. The state is significantly vested to sustain and enhance the status of Central Florida as the nationwide location of excellence in modeling and simulation and has invested in five Partnership buildings that co-house the military, the renowned UCF Institute for Simulation and Training and the National Center for Simulation (representing 250+ companies). UCF's

research strengths that fuel the region's excellence in modeling and simulation and support industries that focus on aviation, space and energy also lend themselves to cross-cutting application focal areas.

An example of a cross-cutting application focus is Digital Twin. Digital Twin is a digital replica of a physical object such as an aircraft engine or a transportation system[5]. It can be a digital reproduction of any system, from humans, to manufacturing processes, to transportation systems, to aviation, space systems, to power plants, and the list of possibilities is endless. A physical twin that is replicated on a virtual platform is a near-real-time digitized copy of a physical object. It is a bridge between the digital world and the physical world. Manufacturers are finding that this concept will reduce the development costs of the next generation of machines by well over 50 percent.

Digital Twin is of interest to all industries of focus in this LBR (aviation, space, energy, DoD entities and industries in UCF's Research Park including the prominent entertainment industry, such as Disney and Universal, located in UCF's backyard). Digital Twin can draw from UCF's strengths in the enabling technologies that support this area such as aerospace and space science and engineering, AI/ML, AR/VR/MR, transportation science and technology to mention a few.

A *Digital Twin* must "*age*" at the same time as the *Physical Twin* does. Since such engineered systems are based on complex laws of physical sciences and engineering principles, development of digital twin must be accompanied by corresponding physical testing, thus establishing a feedback loop among models, sensors, and test data. The Digital Twin concept offers the opportunity of a cross-cutting technology that span the expertise of multiple UCF colleges/units and creates new opportunities of expanding the partnerships with our leading industries in the region [Space (NASA, SpaceX, ULA, Blue Origin, L3Harris), Defense (LM, L3Harris, Raytheon), Government (DoD, NASA), Energy (Siemens, Mitsubishi), Entertainment (WDW, Universal, EA)], towards a common technology focus, that of Digital Twin. The capabilities that a Digital Twin focus will afford, if applied across all industries and systems, are beyond anything available today and will put Orlando/UCF/related industries on the national forefront as the primary developers and implementers of this concept. An investment of the magnitude that this LBR requests will accelerate the realization of this Digital Twin vision.

1.2 Program Goals, LBR Request

UCF has identified the College of Engineering and Computer Science (CECS) as a core unit within the institution to reach higher levels of national excellence. CECS has a number of programs under its umbrella, such as Civil, Environmental and Construction, Computer Science, Electrical and Computer Engineering, Industrial Engineering and Management Systems, Mechanical and Aerospace Engineering and Materials Sciences and Engineering, which serve to fuel the pipeline of workers with science, technology, engineering and math skills.

This proposal seeks funding to: provide targeted, cross-cutting education and research training to UCF students, thus enhancing the talent pipeline that Florida's high-tech industry needs; expand partnerships with high tech industries in Florida, thus enhancing the State's economic prosperity; improve CECS undergraduate and graduate program rankings, thus enhancing

UCF's national reputation. The specific LBR has two goals, as articulated earlier and expanded below.

- **Goal A (*Enhance Research and Educational Excellence/ Industry Partnerships*) –** To enhance the research and educational excellence, as well as industry partnerships, UCF proposes to hire faculty and support personnel, support student assistants, and support faculty start-up costs as well as lab upgrades. These new faculty hires will offer additional sections of courses in the high demand STEM areas, thus ensuring a larger and more competent STEM pipeline for Florida's industry. Furthermore, these faculty will expand the research portfolio of the institution (enhancing its national reputation) and partnerships with industries (fueling economic prosperity) in the key application areas of aviation, space and energy. Finally, these faculty will expand the partnerships with key industries and government entities that focus on modeling, simulation and training (Central Florida is already recognized by the state as a Center of Excellence in modeling, simulation and training). Attaining this goal will enhance the College's and UCF's national and international stature.
- **Goal B (Enhance Student Success):** To increase the capacity of programs that recruit, sustain and graduate a diverse STEM student population at high rates by focusing on STEM learning communities and early engagement in undergraduate research experiences, as well as programs that improve the math placement status of the incoming diverse FTIC thus enhancing their 4-year graduation rates. The College of Engineering and Computer Science is already ranked high (18th in the nation in the total number of degrees, and 3rd in the nation in the number of degrees to underrepresented minorities). Attaining this goal will propagate the College's stature at higher national ranking levels.

The cost of this LBR request amounts to: $14.8M recurring (64 faculty hires + 16 support personnel), $2M recurring (support for student assistants), $2M recurring (support of programs that enhance the quantity, quality and diversity of the STEM pipeline), $3M non-recurring (start-up support and lab upgrades), a total request of $21.8M ($18.8M recurring funds and $3M of non-recurring funds). These funds will target strategic areas of opportunity to further enhance UCF's pursuit of academic and research excellence as a Florida University of Distinction. This LBR request and related goals are in line with *UCF's 2021 Accountability Plan* to be one of the nation's leading metropolitan research university (Goal A) with a strong focus on student success (Goal B).

The College of Engineering and Computer Science has an obligation to our community and an opportunity to prepare our students and the next generation employees in future technologies. If UCF's LBR is funded, it would place the State of Florida in an enviable position by not only elevating the national stature of one of its universities but supporting the thriving aviation, space and energy industry in the State of Florida in ways that will lead to higher economic prosperity. Already recognized as one of the largest universities in the nation, this LBR also provides an opportunity for UCF to achieve high national ranking. Many other government entities and industries in Central Florida and the State of Florida will also benefit from such an investment.

1.3 Current Accomplishments: Talent Pipeline

The University of Central Florida's College of Engineering and Computer Science (CECS) is one of the State University System's most distinctive and nationally recognized pillars of excellence.

Originally founded as Florida Technological University to support Florida's space-related economy, UCF has long excelled in engineering, computer science and related disciplines. Through its commitment to partnering with regional industry to meet the increasing workforce needs of one of the growing, dynamic job markets in the country, CECS has become the talent pipeline of choice for Central Florida's STEM-related industries.

UCF is graduating students who contribute to Florida's economy with high-paying jobs. This is evidenced, in part, by:

- In 2018-19, **68 percent of engineering bachelor's graduates were employed in Florida** and earned average first-year salaries averaging $62,574.
- *Aviation Week* magazine has named **UCF the No. 2 preferred supplier in the nation** and the **No. 1 supplier in the nation of graduates** to the U.S. aerospace and defense industries for **six consecutive years**.
- A longstanding partnership with Lockheed Martin (LM) that spans more than 40 years. In 2018-2019 the number of **UCF STEM interns at LM exceeded 500.** According to a 2018-2019 LM report, UCF has been a top school for hires over the last 10 years, hires that include more than 3,500 UCF alumni. Among the higher echelons of LM employees that are UCF alumni, there is 1 EVP, 5 VPs and 29 Directors.
- NASA's Kennedy Space Center reports that **30 percent of its employees** hold UCF degrees, mostly from CECS.

1.3 Current Accomplishments: Strong national engineering reputation

In the most recent *U.S. News and World Report* rankings, UCF achieved Top 50 public university rankings for its undergraduate and graduate engineering programs.

U.S. News and World Report	Public Ranking	Overall Ranking
Graduate Engineering	41	71
Undergraduate Engineering	47	79

Table 1: 2022 U.S. News and World Report Graduate Engineering and 2021 U.S. News and World Report Undergraduate Engineering Ranking

UCF CECS' growing national reputation shows no signs of slowing. In the past five years of *U.S. News* Graduate Engineering rankings among the current top 50 public institutions, UCF was the **2nd fastest mover** having improved 11 spots.

U.S. News and World Report ranked **every graduate engineering program in the Top 44** among public institutions.

U.S. News and World Report	Public Ranking
Optical Sciences and Engineering	5
Computer Engineering	28
Industrial Engineering	29
Electrical Engineering	33
Aerospace Engineering	35
Materials Engineering	39
Environmental Engineering	41
Civil Engineering	44
Mechanical Engineering	44

Table 2: 2022 U.S. News and World Report Graduate Engineering Programs Ranking

1.3 Current Accomplishments: Strong national computer science reputation

UCF's College of Engineering and Computer Science ranked 51st among public institutions for Computer Science.

U.S. News and World Report	Public Ranking	Overall Ranking	SUS Ranking
Computer Science	51	82	2

Table 3: 2022 U.S. News and World Report Computer Science Ranking

Additionally, the UCF student quality in these fields is evident by the national performance of the UCF Cyber Defense team [C3 (Collegiate Cyber Competition) Team], such as **winning Raytheon's National Collegiate Cyber Defense Competition (NCCDC) in 2014, 2015, 2016, 2021** and earning a 2nd place in the same competition in 2018, 2019 and 2020. In all, UCF appeared eight out of nine times in the national cyber competition and no other competitor won as many trophies as UCF (four 1st place trophies and three 2nd place trophies).

UCF's Programming team has been in existence for more than 30 years. UCF has been a perennial presence in the Programming World Finals by winning the Southeast (SE) Regional Programming Competition 60 percent of the time. In the World Finals of 2017 and 2018, the UCF team **placed 13th worldwide (1st in the US) and 10th (1st in North America),** respectively, outperforming teams from prominent universities such as MIT, UC Berkeley, Cornell, Princeton, UT Austin, University of Illinois Urbana Campaign (UIUC), Stanford, Carnegie Melon University (CMU), University of Southern California (USC) and University of Maryland. UCF was selected to appear in the 2020 Programming World Finals (one of the 19 teams in North America chosen for the World Finals, where less than 0.1% of the teams competing globally earn a spot). The 2020 Programming World Finals have been delayed due to COVID. The 2021 North America Programming Competition (NAC) that will choose the 15 North America teams to advance to the 2021 Programming World Finals are slated to happen at UCF in August 8-15, 2021.

1.3 Current Accomplishments: Expanding Student Opportunity

Student diversity is well represented among those who graduate with UCF CECS degrees. Of approximately 2,250 degrees awarded in 2019-20, 44 percent went to minority graduates and 19 percent to female graduates.

Among bachelor's graduates, 43 percent were Pell-eligible, and 23 percent were the first in their families to attend college.

NATIONAL PUBLIC UNIVERSITY RANKINGS			
UCF	**Total Degrees**	**Degrees to African American Students**	**Degrees to Hispanic Students**
Engineering	9	5	4
Computer Science or Information Technology	5	7	2

Rankings from 2018-19 IPEDS data based on fields offered by UCF

Table 4: Engineering and Computer Science or IT National Public University Rankings

UCF has demonstrated outstanding success with previous additional state investments to improve engineering and computer science outcomes. In 2014, UCF was awarded a Targeted Educational Attainment (TEAm) Grant by the Board of Governors. UCF served as the lead institution in partnership with the University of South Florida and Florida International University to help close the gap between supply and demand in computer engineering, computer science, and information technology graduates (CSIT TEAm). The initiative promised the expansion of upper-level students and an increase in the graduation volume. After five years, **UCF achieved a 119 percent increase in these computer science-related graduates** – 288 graduates to 631 – to help address critical workforce needs.

1.3 Current Accomplishments: Quality of Student Pipeline (Honors College)

UCF's Burnett Honors College (BHC) recruits approximately 500 outstanding students annually. BHC currently enrolls about 2,200 students and is recognized as one of the top 20 honors colleges in the country. According to the Fall 2020 numbers, CECS had 137 out of the 316 UCF's National Merit scholars (43.4% of the UCF National Merit Scholars), and 272 out of the 657 UCF's Provost Scholars (41.4% of the UCF Provost Scholars). In Fall 2020, 234 out of the 534 Honors students were CECS students (43.8%). The quality of the Honors students recruited in CECS is illustrated by the fact that their average ACT, SAT and HSGPA are 32.9, 1,473 and 4.459, respectively.

1.3 Current Accomplishments: Research Excellence

External Research Funding

In terms of research success, UCF reported a new record of $204.9 million in new grants during 2020 (as of July 15 – excluding CARES Act funding), and of this total, engineering and related disciplines represented $74.2 million (36 percent) of overall grant funding.

National Ranking

Based on the National Science Foundation's 2018 Higher Education R&D survey, **UCF ranked 37th nationally for public universities** and second in the SUS for engineering research expenditures. The same survey **ranked UCF 9th nationally for public universities and first in the SUS** for computer science research expenditures.

Quality of Junior Faculty

In the last eight years, more than 80 new faculty (a significant number were junior faculty) were hired in the College of Engineering and Computer Science to improve the student-to-faculty ratio as well as to enhance research excellence. This faculty hiring focus has paid dividends in the short term and is expected to continue paying dividends in the long term. Not only have the research expenditures steadily improved (See Table 6 in Part II: Return on Investment), the NSF ranking of these research expenditures in both engineering and computer science programs has also significantly improved.

In 2019-2020, UCF led the state and ranked sixth in the nation for the number of NSF CAREER Award received by its faculty. Of these NSF CAREER awards the College of Engineering and Computer Science received seven awards, more than any institution as a whole in the State of Florida. CECS also received an additional 4 CAREER awards in 2020-2021. The NSF CAREER awards are among the most prestigious in the nation. Recognizing early-career professionals with promising research, the awards are part of the NSF's Early Career Development Program and are given to recipients who have the potential to serve as academic role models and lead their respective fields. The junior faculty in the College of Engineering and Computer Science have also received other prestigious Young Investigator awards from agencies such as NASA, Air Force Office of Research, Office of Naval Research and Defense Threat Reduction Agency.

These junior faculty have worked closely with undergraduates in UCF's Honors' college and participated in the EXCEL program (an NSF program that is now supported by UCF, which has achieved impressive results in improving the STEM graduation rates of UCF students) to provide a well-rounded education to UCF students that includes involvement in research, thus raising the quality of the produced talent pipeline. It is our intention to emulate and expand CECS's aforementioned junior faculty successes with the support from this LBR through the hiring of 64 new faculty.

Entrepreneurial Work Leading to Patents

UCF ranks 31st among public universities in the nation and among the top 100 universities in the world in generating patents, and according to new rankings released in 2019 by the National Academy of Inventors and the Intellectual Property Owners Association, UCF has ranked in the top 100 in the world for the past five years.

To spur the growth in research, UCF recently established a Big Data, Artificial Intelligence Initiative (cross-campus) with an accompanied announcement of COVID-19 seed grants. Additionally, Research for Undergraduates (REU) funded by the National Science Foundation has significantly enhanced the research capabilities of our students in the areas of Computer Vision (at more than 30 years running it is the longest-running NSF REU program in the nation), Cyber, Nano-technology and other areas.

1.3 Current Accomplishments: Employability Numbers

UCF engineering and computer science students are actively sought by industry, and the college is ranked by Aviation Week as the nation's No. 1 supplier of graduates in aerospace and defense industries. Manufacturing and computing are embraced by aerospace, automotive, medical, defense, photonics, microelectronics and other high-tech industries, such as the ones that gained Central Florida's reputation as the hub of a vibrant modeling and simulation community. CECS' current curriculum, addressing the aforementioned industry needs, accompanied with training through a plethora of internships (e.g., Lockheed Martin), is specifically designed so that students learn fundamental and practical skills needed for their professional success. In a 21st century economy, CECS students' educational experiences provide the potential for sustainable long-term employment in Florida. CECS graduates go on to become global leaders of Florida industries.

The College of Engineering and Computer Science surveys its graduating students six months after graduation to determine employment status. CECS' survey results for the 2018-2019 CECS graduating class indicated that:

- A vast majority of respondents reported being employed either full-time or part-time (88.1 percent undergraduate; 90.5 percent master's; and 92.7percent doctoral).
- Of those who reported employment, the majority of the respondents were employed on a full-time basis (93 percent undergraduate; 90.5 percent master's; and 92.1 percent doctoral).
- Of those who reported employment, many of the respondents indicated they were employed in Florida (66.1 percent undergraduate; 55.2 percent master's; and 52.6 percent doctoral).
- Of the undergraduates and graduate student respondents who provided their annual salary information, the average was $66,919 and $81,180, respectively.

In 2018-2019, CECS graduated 1,533 BS, 390 MS and 108 Ph.D. students. The employability numbers, mentioned above, indicate that CECS produced, in 2018-2019, more than 1,100 engineering and computer science graduates for Florida's economy. The number of graduates in CECS continue to increase from one year to the next. For instance, the 2020-2021 preliminary graduation numbers show that CECS has graduated 1,926 BS, 442 MS and 169 Ph.D. students. Furthermore, this LBR's focus on student retention and graduation (EXCEL learning communities, math boot camps, 4-year graduation of FTICs) are expected to further increase the number of CECS graduates in future years. Therefore, it is expected that CECS, by 2023-2024, will be producing, with this LBR's support, well over 2,500 engineering and computer science graduates (undergraduate and graduate), annually, for the State of Florida.

1.4. Projected Impact

UCF's Collective Impact Strategic Plan includes promises designed to elevate the university, demonstrate a commitment to students, and impact our region, state and nation.

Promise 1: Attract and cultivate exceptional and diverse faculty, students and staff. This promise directly relates to the proposed hiring plan and student support enhancements.

Promise 2: Deploy our distinctive assets to solve society's greatest challenges. This is supported by UCF's enabling technologies and the talent pipeline that UCF is generating in these fields.

Promise 3: Create partnerships at every level that amplify our academic, economic, and cultural impact and reputation. This is demonstrated by the partnerships detailed earlier and their potential illustrated in Figure 1.

The above promises will fulfill the two overarching goals of this LBR effort: Goal A: *Enhance Research and Educational Excellence/Industry Partnerships* and Goal B: *Enhance Student Success.*

The Overall Impact of *UCF Powering Up Florida's High-Tech Economy is* to **power the UCF College of Engineering and Computer Science past the Top 40 of the *U.S. News and World Report* undergraduate and graduate public university rankings by 2025, with an aspirational goal of the Top 25 by 2035.**

The specific LBR request is broken down in the table below (Table 5). Called *UCF Powering Up Florida's High Tech Economy*, the plan will enhance distinctive areas in engineering and computer science, referred to as enabling technologies, better serve the needs of the focal application areas of aviation, space, energy, while accomplishing the following transformative outcomes (impacts) described in this section.

UCF Powering Up Florida's High Tech Economy	
a. 64 faculty members	$13.4 million recurring
b. 16 support positions	$1.4 million recurring
c. EXCEL/Bridge Program Investments	$2 million recurring
d. Funds for Student Assistants	$2 million recurring
e. Laboratory Equipment Upgrades	$3 million non-recurring
Total	**$21,811,200**

Table 5: Breakdown of UCF Powering-Up Florida's High Tech Economy Resources Request

Impact 1: Attain higher research excellence and economic prosperity.

The additional 64 faculty lines included in this request will help enhance UCF's existing research strengths and industry partnerships in key application areas for the state, such as aviation, space and energy and the cross-cutting application area of digital twin. These research strengths and industry partnerships will positively influence a plethora of industries and government agencies, as Figure 1 illustrates. These new faculty lines will help the College of Engineering and Computer Science reach its goal of $115 million in research funding by 2023-2024, as well as enhance the quantity, quality and diversity of the talent pipeline needed by Florida's economy. The requested $3 million in laboratory equipment upgrades and additional 16 research support lines will provide the necessary infrastructure to propel UCF's research in the enabling technologies and related application areas to greater levels.

As Orlando's only public research university, UCF is the academic research leader for Central Florida. The university has achieved more than $1 billion in external research grants during the past decade and continues to be one of 94 public institutions in the nation designated as

an "R1: Doctoral University: Very high research activity" among Carnegie classifications. In the last two years, UCF set a university record with more than $200M each year in research awards.

UCF faculty drive Central Florida's research enterprise, both in their laboratories and through partnerships with industry and government agencies, advancing economic development through translational research. UCF faculty play a critical role in the pursuit of excellence. Below, we describe 1) the application areas of aviation, space, energy that this LBR focuses and 2) the expertise in enabling technologies that would propel UCF to higher level of research excellence, enhance the fortunes of industry whose core business is in these application areas and as such strengthen the state's economic prosperity. Figure 3 illustrates the application areas and enabling technologies in an illustrative graphic whose intersection emphasizes this LBR's expected impact. Central Florida provides a unique locational advantage for such an intersection of enabling technologies and application areas of focus and as such has the potential, through UCF-industry partnerships, as illustrated in Figure 3, to power up Florida's high-tech economy.

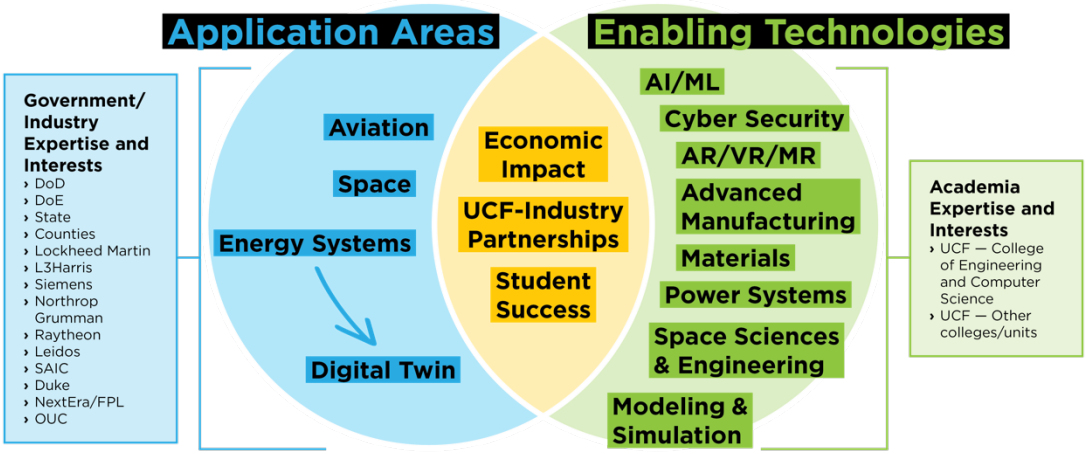

Figure 3: The graphic above illustrates the application areas of focus (aviation, space, energy), the industries that have core business units in these areas, UCF's strengths in enabling technologies (AI/ML, AR/VR/XR, cyber, aerospace science and engineering, power systems, modeling and simulation) that support these application areas and the importance of this collaborative existence that has the potential to power up Florida's high tech industry and achieve the illustrated impacts.

Impact 2: Enhance successful student outcomes/Improve talent pipeline to address industry needs.

Hiring 64 faculty strategically in enabling technology areas to address the industry needs in space, aviation, energy and other application areas, would increase student retention and graduation rates and shorten average time to degree. The improved educational and research portfolio of the new faculty will lead to student cross-cutting and creative training in areas that would power the future economy with more efficiency toward degree completion and reduced costs for students. Hiring more faculty members will ensure UCF meets *and exceeds* its institutional strategic plan goal of offering additional class sections, particularly for high-demand STEM pathway courses. Increasing the number of faculty enhances the student

experience by providing more opportunities for quality student-faculty engagement in both education and research.

The College of Engineering and Computer Science 4-year graduation rate is one of the focal pursuits of this LBR effort. While only 30 percent of CECS students graduate in four years, this is a significant improvement over the 23 percent 4-year graduation rate observed in 2016. Furthermore, our data show that another 14 percent graduate in just one extra semester, which indicates that there is a potential of significant improvement with a focused, targeted effort. If those students are able to graduate *one semester earlier*, the overall four-year graduation rate for UCF would immediately rise by 3 percentage points based on CECS improvements alone.

By hiring more faculty and graduate assistants, we would increase the capacity of programs that recruit, sustain and graduate a diverse population of STEM students at high rates by focusing on STEM learning communities and early engagement in undergraduate research experiences (e.g., EXCEL program at UCF). The increased faculty and graduate assistant resources would expand and enhance bridge programs, such as math bootcamps that improve the math placement status of incoming FTICs and thus enhance their 4-year graduation chances. These programs ensure our students are successful within their degree programs and are best prepared for high-paying jobs upon graduation.

UCF will Power Up student success in engineering and computer science by:

- **Tripling the EXCEL program**, including the expansion of the supported math courses from College Algebra through the Calculus sequence and into Differential Equations.
- **Tripling the EXCEL learning communities** that place cohorts of students into math, introduction to engineering, and science courses.
- Offering **10 times as many seats** in Math Bootcamps.

Originally started in 2006 with an NSF grant, UCF's EXCEL program focuses on the first two years of student enrollment and increases the likelihood of graduation in a chosen STEM discipline. EXCEL accomplishes this feat by creating STEM-learning communities that focus on math skills in year one, providing early engagement with undergraduate research experiences in year two, and expanding the personal advising that the students get in their first two critical years of their college experience. EXCEL has impacted more than 3,000 students, has improved STEM graduation rate by more than 50%, attained higher than 50% improvement in graduation rates for underrepresented groups, and is serving a highly diverse (high percentages of women and underrepresented minorities in its cohorts) student population. Through the proposed scaling up (a factor of 3) EXCEL successes will be expanded to a much larger number of a highly diverse student pool. EXCEL has recently implemented a summer math bootcamp for a small number of its students, where students are exposed, through a one-week 40 hour bootcamp, to math topics that they would need in their to-be-taken fall math courses. This refresher math bootcamp allows students to place (through a math placement test after the completion of the math bootcamp) at a higher level math course in the Fall semester, than they would have placed without the refresher course. The outcomes of this pilot program are impressive. Every student who participated in the EXCEL summer math bootcamp placed at one or two levels higher math fall class, where they performed well. This summer bootcamp approach gives the opportunity to students to graduate faster, preferably in 4 years. EXCEL's proposition to increase the seats in this

bootcamp by 10-fold will impact positively a lot more students and impact significantly the 4-year graduation rate of STEM students at UCF.

1.4 Focal Application Areas and Enabling Technologies

In Section 1.1, *Overall purpose of the Plan*, we briefly discussed the application areas that this LBR focuses on (aviation, space, energy, cross-cutting digital twin) and the enabling technologies that are multi- and transdisciplinary and support the application areas. It is worth mentioning that the enabling technologies that are current UCF's strengths, and are to be strengthened further through this LBR request, impact the core business of many DoD agencies (in UCF's Research Park with strong concentration on modeling, simulation and training), as well as many other industries that impact Central Florida's and the State's economy (e.g., entertainment industry). In this section we elaborate further on these core business areas and the associated enabling technologies.

Application Areas' Value for Florida: Space, Aviation, Energy, Cross-cutting Digital Twin

According to the National Association of Manufacturing (NAM)[6], manufacturers in Florida account for over 5 percent of the total output in the state, employing 4 percent of the workforce. The total output from manufacturing was $56B in 2018 from an average of 327,000 manufacturing employees in Florida, with an annual overall compensation of more than $66,000 per employee. The aviation, space and energy/power industries in Central Florida are thriving and well-diversified. UCF has robust partnership with many of these industries (e.g., Lockheed Martin, L3Harris, Northrop Grumman, Siemens, FPL, Duke), especially in the Central Florida region. Furthermore, UCF's strong relationship with the many DoD entities in UCF's Research Park that fuel the thriving modeling and simulation community in Central Florida, and across the nation, is a unique asset that UCF has relied upon for its past successes and will rely upon for its future, enhanced promised accomplishments.

There are 600+ aerospace businesses, 20 major military installations and $6.8B in annual Florida aviation and aerospace exports. Florida has a rich supply chain and highly skilled workforce to support aviation and space. Boeing, Embraer, Lockheed Martin, SpaceX, Blue Origin and ULA are just a few of the companies pushing the envelope in aviation and aerospace in Florida [Enterprise Florida]. In the energy and power generation sector, Siemens Energy, Pratt & Whitney, Mitsubishi Power Systems, Alstom/Power Systems Manufacturing, Aerojet Rocketdyne, Florida Turbine Technologies are some of the businesses located in Central Florida. Together with the two US utility companies, NextEra (FPL) and Duke, these businesses employ thousands of UCF graduates every year.

Enabling Technologies' Value for Florida: AI/ML, Cyber Security, AR/VR/MR, Space Engineering, Energy, Manufacturing, Automation, Modeling & Simulation

Enabling technologies that have brought and are projected to continue to bring economic prosperity in the State of Florida include the following (all computing-related areas of focus and of critical importance in the digital era): Artificial Intelligence, Machine Learning, Cyber Security, Augmented Reality/Virtual Reality/Mixed Reality, and Modeling and Simulation (AI-ML/Cyber/AR-VR-MR/MS).

The need for workforce talent in the computing areas is significant and part of the focus on this LBR will be to recruit faculty and train students in these areas. According to the Bureau of Labor Statistics[2], "Employment of computer and information technology occupations is projected to grow 12 percent from 2018 to 2028, much faster than the average for all occupations. These occupations are projected to add about 546,200 new jobs. Demand for these workers will stem from greater emphasis on cloud computing, the collection and storage of big data, and information security." In particular, for AI, a 2019 report from Gartner[3] shows that enterprise applications for AI have grown 270 percent in four years, fueling a level of demand that outstrips the current supply of qualified job candidates.

AI-ML, Cyber, AR-VR-MR are areas of increasing and sustained critical importance to the modeling and simulation community in Central Florida, which has been designated as the State's Center of Excellence in Modeling and Simulation. UCF's main campus is adjacent to Research Park, a unique collaborative alliance formed by U.S. leading military modeling and simulation R&D commands (PEO STRI (Army), NAWCTSD (Navy), AFAMS (Air Force), PM TRASYS (Marines)). UCF's Research Park is home to several branches of the military and a vibrant modeling and simulation industry boasting 100+ companies. The US Department of Defense in UCF's Research Park provides annually $6B worth of contracts to companies in UCF's vicinity as well as other companies nationwide. This year, the Navy established the NavalX Central Florida Tech Bridge and the Tech Grove, a public-facing entity formed through a partnership between NAWCTSD and UCF's Research Foundation to solve challenging warfighter problems. The state is significantly vested to sustain and enhance the status of Central Florida as the nationwide location of excellence in modeling and simulation and has invested in five Partnership buildings that co-house the military, the well-renowned UCF's Institute for Simulation and Training and the National Center for Simulation (representing 260+ companies). AI-ML, Cyber, AR-VR-MR are of increasing and sustained interest to a number of Aerospace and Defense companies, such as Lockheed Martin, L3Harris, Northrop Grumman, Raytheon, Leidos and SAIC, as well as entertainment giants such as Disney, Universal and Sea World, all of which are in short driving distance from UCF.

Enabling Technologies' Strengths at UCF: AI/ML, Cyber Security, AR/VR/MR, Space Engineering, Energy, Manufacturing, Automation, Modeling & Simulation

AI-ML, Cyber, AR-VR-MR, Modeling and Simulation are areas of existing strength at UCF. An example of strength of AI-ML related research at UCF is the Center for Research in Computer Vision (CRCV), established in 2012, which has been funded extensively by federal sources (e.g., DARPA, NSF) and industries (e.g. Lockheed Martin, L3Harris). Computer Vision's increased prominence in solving important problems in a number of application areas (surveillance, automation) relies on recent advances in AI (e.g. Deep Learning) and high-performance computing (e.g. GPU's). According to CSRankings.org Computer Vision Research at UCF is ranked in the top 20 in the nation ahead of many premier institutional powerhouses and every other institution in the State of Florida.

Another example of strength in AI-ML related research at UCF is Transportation Science and Technology led by faculty in Civil, Environmental and Construction Engineering (CECE). Transportation Science and Technology at UCF has been extensively funded by federal sources (USDOT) and state sources (FDOT). According to the 2020 ARWU (Academic Ranking of World Universities), UCF's Transportation Science and Technology has been ranked No. 5 in the U.S. ahead of some of the most prominent institutions around the nation.

UCF's increased prominence in Transportation Science and Technology is fueled by the increased focus on AI-ML, Big Data and the increased computing power that makes extraction of knowledge from big data possible.

A recently established Cyber cluster is providing strength in the Cyber area. This past year, the Cyber Cluster brought in a multi-million-dollar research portfolio funded by a number of federal agencies (e.g., NSF, DoD) and industry (e.g., Sophos). This strong research presence accompanied by the sustained and impressive accolades of UCF's Cyber team provides a multi-faceted UCF strength hard to emulate elsewhere. This year, UCF faculty and students partnered with industry and DoD to pioneer a cyber red team pipeline program to grow the next generation of cyber operators that conduct national defense cybersecurity assessments. This cyber workforce development program is vital for Central Florida as home to the National Cyber Range Complex and U.S. Cyber Command's Persistent Cyber Training Environment.

Faculty in the AR-VR-MR/Modeling & Simulation area are also housed in the College of Nursing, College of Medicine and College of Arts and Humanities, with a focus on the science and applications of these topical areas. The AR-VR-MR/Modeling & Simulation interest is further enhanced by the parallel interest of the entertainment industry (Disney, Universal), partially served by the Themed Experiences program, led by the College of Arts and Humanities with support from the College of Engineering and Computer Science and the Rosen College of Hospitality Management. This interest is also enhanced by the parallel interest of the medical community, spearheaded by the College of Medicine and the College of Nursing, to incorporate simulation-based education in medicine (education and research). More importantly, there is parallel increased interest of the education community (nationwide) to incorporate AR-VR-MR/Modeling & Simulation to more effectively engage in remote teaching and learning.

Strengths in Application Areas at UCF: Aviation, Space and Energy.

The topic areas represented in the application areas of aviation, space, energy are part of the core business areas for a number of large industries and government agencies in the state as emphasized in Section 1.1 and illustrated in Figure 3.

By providing targeted education and training for employees of the Florida companies previously mentioned, by collaborating on government-related research and by preparing our students as next generation employees in future technologies, UCF has taken a strong role in partnership with these companies. UCF has already established three energy-focused clusters.

One such example is CATER (Center for Advanced Turbomachinery and Energy Research), with strong, consistent support from industries such as Siemens, and through federal funds from agencies such as AFRL and DoE. CATER has several dedicated faculty conducting research in interdisciplinary areas of aerodynamics, alternative fuels, material coatings and integrity, and design and manufacturing. Areas of focus for this Center are improved composites, compact turbomachinery and energy storage for smaller power plants and digital twin. Digital twin refers to a cyber-physical system (CPS) that tracks aging and degradation of the physical twin and is accordingly continuously updated. CATER's digital twin focus will benefit from advances in AI, Big Data, cyber security and modeling and simulation of utilities and power generation systems. Power generation is undergoing disruptive changes with

interconnected dependence on water, and tomorrow's power generation systems will be extremely complex, thus requiring digital twin for plant control and maintenance. Similar prospects are available for aviation and space systems as well, where safety is of paramount importance.

Another example of an energy center is RISES (Resilient, Intelligent, Sustainable, Energy Systems). RISES has been funded extensively by DoE, NSF, and industries such as Siemens, Duke and FPL. The center aims to develop resilient and secure cyber-physical systems for critical energy and infrastructure systems through modeling and simulation, distributed optimization and control, and data-driven decision-making (AI-ML). The center leverages its domain knowledge in sustainable energy, intelligent transportation, and smart community. The center collaborates with Siemens on developing educational activities and established laboratories (Smart Grid Lab and Smart Infrastructure Data Analytics Lab). Two more labs have been recently branded by Duke, FPL and GE. An example of a digital twin application under the auspices of this Center would involve creating a digital twin of a building, followed by modeling and simulation of the building's various components and then a validation and testing of the digital twin model by using data.

UCF's strengths are multi-faceted in the space area. In a recent report[7] submitted by faculty in Mechanical and Aerospace Engineering, a number of UCF's existing expertise and research efforts that support many of NASA's 2020 Technology Taxonomy have been identified.

- In *Robotic and Autonomous Systems* some of the efforts include: development of intelligent user interfaces to assist humans on complex robot teleoperation tasks; designs of real-time optimal trajectories in a confined, crowded environment.
- In *Aerospace Propulsion, Power and Energy* some of the efforts include: combustion experiments that benefit from enhanced engine design schemes enabled by accurate multistage chemical kinetic models; novel low-cost solid-solid energy conversion technology experiments that would enhance NASA's abilities to operate thermal generation centers on hot environments such as Venus.
- In *Sensor, Sensor Deployment* some of the efforts include: structural diagnostics through laser based sensing; sensor deployment using deployable structures, balloon structures, thin-ply composite materials and development of active sensor materials; study of high-speed sensors and diagnostics for measuring critical key parameters for lunar exploration vehicles and propulsion systems.
- In *Shape Memory Alloys and Metamaterials*, efforts include: design, fabrication, and characterization mechanisms for robotic/autonomous assembly and deployment; characterization of ceramic coating systems and their lifetimes; studies on lunar dust, its mitigation and plume-surface interactions.
- On the topic of *3D Printing/Additive Manufacturing*, some of the efforts include: characterization of material and mechanical properties of additively manufactured parts to understand the effects of processing parameters and post-processing treatment.

In addition to the above efforts, the College of Optics and Photonics (CREOL) has been funded by several arms of DoD. For instance, CREOL currently has 11 projects with DARPA that include the development of the world's fastest laser, optical fibers, integrated photonics, nonlinear and quantum optics, sensing and display. These technologies have applications in

industry and manufacturing, communication and information technology, biology and medicine, energy and lighting, and defense and homeland security.

To continue to excel in our research and provide the talent pipeline to our industry partners, UCF will hire faculty that have expertise in the various focal application areas and in support of the enabling technologies that spearhead innovation and further development in these application areas.

LBR Request, Revisited

The additional 64 faculty lines included in this request will help enhance UCF's existing research strengths and industry partnerships in these key areas for the state. These new faculty lines will help the College of Engineering and Computer Science reach its goal of $115 million in research funding by 2023-2024, as well as enhance the quantity and quality of the talent pipeline needed by Florida's economy. The requested $3M million in laboratory equipment upgrades and additional 16 research support lines will provide the necessary infrastructure to propel UCF's research to greater levels. The additional funds requested for the EXCEL program and bridge programs and the student assistants' support will enhance the academic credentials of the student pipeline, entering UCF, so that they are successful in their pursuit of STEM degrees that Florida's economy needs.

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.*

UCF's Powering Up Florida's High-Tech Economy aligns with regional economic needs, the university's strategic plan and the Board of Governors strategic plan.

In its September 2019 report, the Orlando Economic Partnership[8] highlights the importance of "the alignments of UCF's focus on engineering and computing with the Partnership's Three-Year Mission." The report confirms that UCF's plan aligns with regional efforts, including "the expansion of initiatives designed to enhance our talent ecosystem. These broad sector categories will be driven by the diffusion of key enabling technologies – ranging from 5G and distributed ledger technologies to co-biotics and extended reality – each clearly supported by UCF's enhanced E/C (Engineering and Computer Science) focus."

Powering Up Florida's High-Tech Economy serves to strengthen both regional economic development alignment as well as the alignment between UCF's areas of strength and the Board of Governors 2025 Strategic Plan goals for the State University System. Excellence is included through increased reputation of the academic programs and improved student success. Productivity is supported by research expenditures and student pipeline and diversity. The third core area, Strategic Priorities for a Knowledge Economy, is demonstrated by the selection of engineering and computer science as the area of expansion and enhancement.

The return on investment for the requested funds will be measured by progress toward the objectives and key performance targets set forth in the university's Collective Impact Strategic Plan[9] (https://www.ucf.edu/strategic-plan/).

Through UCF's annual Accountability Plan and the institutional strategic plan implemented in 2016, the university already has a robust tracking system on progress toward its goals, using institutional data alongside statewide and national benchmarks.

This investment will result in further improvements to UCF's Accountability Plan priority metrics of increasing student success, strengthening our faculty and staff and increasing our research impact by 2025.

Attain higher research excellence and economic prosperity (Impact 1)

Faculty hires related to research of strategic statewide importance will benefit key measures of success, including research expenditures and the number of post-doctoral appointees. Benchmarks for these metrics are included in the university's Accountability Plan and additional investments will result in improved outcomes.

Metric	History	Current	Trend	Trend with Investment
CECS Research Expenditures (in millions)	$47.4 2013-14	$92.1 2018-19	$105.0 2023-24	*$115.0* *2023-24*
NSF Engineering Research Expenditure Rank (among publics)	66 2013-14	37 2018-19	33 2023-24	*Top 30* *2023-24*
NSF Computer Science Research Expenditure Rank (among publics)	25* 2013-14	9 2018-19	7 2023-24	*Top 6* *2023-24*

* Note: Ranking was Math and Computer Science combined in 2013-14

Table 6: UCF Powering-Up Florida's High-Tech Economy Metrics (Set 1)

Enhance Successful Student Outcomes (Impact 2)

UCF has developed college-based Accountability Plan metrics and targets. Hiring additional academic advisors and faculty will allow CECS to exceed the positive trajectory already planned for student success metrics including 4-year graduation rate, academic progress rate and excess hours rate. In turn, this will also have a positive impact on the average cost to the student, ensuring UCF's continued affordability and high-quality education.

Metric	History	Current	Trend	Trend with Investment
CECS First-year Retention	85.5% 2013-14	93.2% 2019-20	91.7% 2023-24	*93.5%* *2023-24*
CECS Four-year Graduation Rate	21.0% 2010-14	30.0% 2016-20	35.0% 2020-24	*37.0%* *2020-24*
CECS Six-year Graduation Rate	63.8% 2008-14	68.4% 2014-20	69.5% 2018-24	*70.5%* *2018-24*
CECS Average Time to Degree	4.71 2014-15	4.58 2019-20	4.40 2023-24	*4.32* *2023-24*
CECS Percent of Students Graduating Without Excess Hours	54.2% 2014-15	67.6% 2019-20	69.0% 2023-24	*71.5%* *2023-24*

Table 7: UCF Powering-Up Florida's High-Tech Economy Metrics (Set 2)

Improve the talent pipeline (Impact 2)

The focus on bridge programs and diverse alumni will benefit the metrics associated with diverse graduates and alumni success, including median wages of bachelor's graduates employed full-time.

Metric	History	Current	Trend	Trend with Investment
CECS Bachelor's Degrees Awarded	1,301 2014-15	1,688 2019-20	1,800 2023-24	*1,900* *2023-24*
CECS Bachelor's Degree Diversity	34.3% 2014-15	48.5% 2019-20	50.5% 2023-24	*51.5%* *2023-24*
CECS Bachelor's First-Year Salaries	$58,645 2014-15	$62,574 2018-19	$63,000 2023-24	*$64,000* *2023-24*

Table 8: UCF Powering-Up Florida's High-Tech Economy Metrics (Set 3)

III. Personnel – *Describe personnel hiring and retention plans, making sure to connect both plans to initiative(s) and goal(s) described in section I. State the amount of faculty FTE and staff FTE and estimated funding amounts used for retention and new hires in each category. In describing faculty hires, provide overall hiring goals, including academic area(s) of expertise and anticipated hiring level (e.g. assistant professor, associate professor, full professor. Please describe how funds used for faculty or staff retention will help the institution achieve its stated goals. University of Distinction proposals should clearly note how anticipated hires or retained individuals will help the institution elevate a program or area to national or state excellence.*

The ***UCF Powering Up Florida's High Tech Economy*** initiative will enhance the enabling technologies [AI-ML, Cyber, AR-VR-MR, Modeling and Simulation, others] to serve industrial needs in aviation, space and energy by hiring 64 FTE faculty in the ranks of Assistant, Associate and Full Professors, with a larger number of hires targeting assistant professor rank. The academic areas of expertise of these faculty hires will be in line with the enabling technologies mentioned above. In addition, we plan to hire 16 FTE support staff to assist these faculty in their educational and research efforts. These anticipated hires will help the College elevate its ranking to amongst top 40 publics and is in line with UCF's 2021 Accountability Plan. The projected impacts to: 1) attain higher research excellence and economic prosperity and 2) enhance success in student outcomes and improve talent pipeline to address industry needs, as articulated in Section 1.4, will help the College of Engineering and Computer Science attain higher levels of national recognition and ranking for excellence.

IV. 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.				

No expansion or construction of a facility is requested through this LBR.

REFERENCES

1. https://www.usnews.com/news/stem-solutions/articles/2018-03-27/commentary-the-need-to-focus-on-advanced-manufacturing
2. https://www.bls.gov/ooh/computer-and-information-technology/home.htm#:~:text=Employment%20of%20computer%20and%20information,add%20about%20546%2C200%20new%20jobs.
3. https://www.gartner.com/en/newsroom/press-releases/2019-01-21-gartner-survey-shows-37-percent-of-organizations-have
4. Global Attractions Attendance Report, Themed Entertainment Association/AECOM), 2019. www.tripinfo.com/itm/articles/the-2019-global-attractions-attendance-report
5. www.twi-global.com/technical-knowledge/faqs/what-is-digital-twin
6. https://www.nam.org/state-manufacturing-data/2019-florida-manufacturing-facts/
7. Mapping a Trajectory for STEM Readiness in Space Technology, NASA Report, UCF, 2021.
8. Q3 2019 Orlando Economic Update | Orlando Economic Partnership
9. UCF Strategic Plan | Creating Our Collective Impact

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

University: **University of Central Florida**

Issue Title: **UCF University of Distinction in Engineering and Computer Science**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	64.00	0.00	64.00
Other (A&P/USPS)	16.00	0.00	16.00
Total	80.00	0.00	80.00
Salary Rate (for all positions noted above)			
Faculty	$10,240,000	$0	$10,240,000
Other (A&P/USPS)	$960,000	$0	$960,000
Total	$11,200,000	$0	$11,200,000
Salaries and Benefits	$14,811,200	$0	$14,811,200
Student Assistants	$2,000,000	$0	$2,000,000
EXCEL/BRIDGE/Labs	$2,000,000	$3,000,000	$5,000,000
Operating Capital Outlay	$0	$0	$0
Electronic Data Processing	$0	$0	$0
Special Category (Specific)	$0	$0	$0
_____	$0	$0	$0
_____	$0	$0	$0
_____	$0	$0	$0
Total All Categories	$18,811,200	$3,000,000	$21,811,200

State University System
Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	**University of North Florida**
Request Title:	**UNF MedNexus Expansion**
Date Request Approved by University Board of Trustees:	**Pending July 15, 2021**
Recurring Funds Requested:	**1,005,000**
Non-Recurring Funds Requested:	**1,800,000**
Total Funds Requested:	**2,805,000**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	**X**

I. Purpose – *1. Describe the overall purpose of the plan, specific goal(s) and metrics, specific activities that will help achieve the goal(s), and how these goals and initiatives align with strategic priorities and the 2021 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.*

The UNF plan is a direct response to Florida's critical healthcare staffing shortage as well as Florida's critical new talent and new medical technology needs. The plan is developed in consideration of several essential factors: (1) healthcare has been and remains a strategic priority of the Florida State University System (SUS); (2) there exists a severe shortage of trained, healthcare professionals in Florida; (3) the shortage of trained, healthcare professionals in Florida is expected to become more acute in future years; (4) the global COVID pandemic has placed significant strain on healthcare staffing; (5) NE Florida remains an area of healthcare distinction for our state; (6) UNF remains an SUS institution of distinction both in NE Florida and nationally for healthcare education, training, and research collaboration; and (7) UNF possesses the crucial education and research infrastructure through the creation of the UNF MedNexus to serve as the innovation hub for healthcare talent creation and medical technology advancement in NE Florida. In 2020, the Florida Legislature allocated $6 million in funding to establish the UNF MedNexus with a tripartite focus on talent creation (with an initial focus on nursing), thought leadership, and innovation in medical technology.

As the nation's first comprehensive, university-based medical nexus, the UNF MedNexus has achieved the following milestones since receipt of state funding on July 1, 2020:

- Awarded more than $2,000,000 in nursing scholarships;
- Added seven (7) critically needed UNF faculty hires in nursing, including four (4) assistant professors of nursing (one of whom also serves as the nursing director in Palm Coast, FL), two (2) adjunct professors of nursing, and one (1) nursing instructor;
- Signed academic partnership agreements for 2+2 (ASN to BSN degree programs) and 4+1 (BSN to MSN) pathway programs in nursing with key institutions in the Florida College System (FCS), including Daytona State College, Florida State College-Jacksonville (FSCJ), and St. Johns River College;
- Created the "Health Honors Direct" program (undergraduate to graduate degrees to jobs) to attract, retain, and graduate future nurses through the establishment of cohorts of UNF MedNexus Scholars at the undergraduate level and UNF MedNexus Fellows at the graduate level;
- Signed an intercollegiate facility agreement with FSCJ to provide expanded instructional and simulation space to train the next generation of healthcare providers;
- Began renovations at the FSCJ facility for the creation of the UNF MedNexus Healthcare Simulation Center which will expand the current number of simulation labs at UNF from one (1) simulation lab to eight (8) simulation labs and to further create UNF's first home health lab;
- Partnered with the City of Palm Coast, Florida and AdventHealth to create a nursing facility and simulation lab to train nurses in Palm Coast;
- Admitted the first, undergraduate nursing cohort in Palm Coast that will begin selected in-person classes in August 2021;
- Doubled the initial, projected size of the Palm Coast nursing cohort from 25 to 50 students to meet the increased demand for trained nurses in that region;
- Procured and installed the Maldi Mass Spectrometer for early human tissue diagnostics into the MedTech Innovation Lab that was created through the UNF MedNexus; and
- Partnered with the Flagler County School System and the UNF Center for Entrepreneurship and Innovation to promote careers and innovation in healthcare among high school students via the Flagler County High School Medical Innovation Challenge scheduled for November 2021.

Situation Analysis – Staffing

The Florida Center for Nursing predicts that by 2025 the state of Florida will face a shortage of registered nurses that could reduce patient access to care and adversely impact the healthcare system in Florida. As the general population is aging, so are our nurses. The Florida Center for Nursing estimates that more than 40% of nurses are within the baby boomer demographic and will be retiring in the next 10 years. These data plus the fact that Florida ranks at just #24 among states for number of nurses per 1,000 population (*Nurse Journal* 2021) indicate that Florida is facing and will continue to experience an acute shortage of and heightened demand for nurses in the years to come. The American Nursing Association estimates, for example, that one (1) million nurses will retire nationwide between now and 2030. The U.S. Bureau of Labor Statistics, in turn, estimates that employment opportunities for registered nurses will grow seven (7)

percent from 2019 to 2029, faster than the average for all other occupations. The growing demand for nurses has been argued as being the direct result of:

- Increased demand for healthcare personnel to care for an aging population;
- More nurses needed to educate and care for patients with chronic conditions;
- Growing needs and responsibilities among nurses to attend to patients in long-term care facilities and home healthcare; and
- Greater reliance in healthcare on outpatient care centers and ambulatory care settings for same-day chemotherapy, rehabilitation, and other surgeries, treatments, and procedures that previously were relegated to only hospitals.

Situation Analysis – Innovation

Remote health, home health and digital monitoring and diagnostics are seeing rapid growth with the pace of growth accelerated as a result of the COVID pandemic. The increased implementation of technology can both improve healthcare delivery and ease workforce constraints through efficiencies in the delivery of healthcare services. A recent study by Russell Reynolds ("Embracing Change: The Healthcare Industry Focuses on New Growth Drivers and Leadership Requirements") highlights a broader industry convergence around key trends and growth drivers in healthcare that include medical innovation and healthcare management. The emphasis on innovation and cutting-edge technology highlights the more specific needs for not only embracing new talent but for (1) providing healthcare members with new talents around new technologies and (2) ensuring new talents are acquired at a pace commensurate with the increasingly rapid pace of innovation that now characterizes many medical fields. More specifically still, medtech, digital health, and especially medical 3D printing are rapidly evolving fields in healthcare. According to a study by SmarTech Analysis, the market for medical 3D printing is expected to increase more than five-fold from $1.25B in 2019 to $6.08B in 2027. This projected growth in medical 3D printing is being driven by the widespread and increasing application of 3D printing to regenerative medicine (e.g., bioprinting used to create living human cells, tissue, or organs); precision/personalized surgery and medicines (e.g., both patient-specific pharmaceuticals at a pharmacy and industrial scale and patient-specific models of organs and surgical tools); orthopedic implants (e.g., surgically replaced joints and bones); and surgical tool and device development.

Inarguably, the applications for medical 3D printing are growing in breadth of applications and relevance to medical professions. The talent necessary to capture the full benefits of medical 3D printing are too becoming increasingly broad if not diverse with multidisciplinary 3D teams at the Mayo Clinic, for example, comprised of radiologists, surgeons, biomedical engineers, technicians, and students that could also include nursing students. This greater breadth of application and its impact on the scope of needed talent point to the need for greater expertise, increased research, and new talent creation focused on medical 3D printing. In other words, as the number of medical 3D printing applications and providers continues to grow, key challenges to the field reside in supporting the technology's evolution and application. Primary research coupled with new talent development will be crucial to new medical approaches being developed, new forms of patient care being implemented, and new skill sets mandated to staff the healthcare team of the future. The legislatively funded UNF MedNexus, in turn, is appropriately positioned to respond to these challenges as demonstrated by (1) its

expertise in new talent development in collaboration with UNF colleges and (2) its capabilities to be at the forefront of medical 3D printing with the creation of the MedTech Innovation Lab and its collaboration with UNF's current on-campus facilities and partnerships with Johnson & Johnson Biomedical 3D Printing.

The purpose of this LBR is to request State funding to:

1. **Increase the number of nursing graduates**
   - Specifically, increase the number of UNF MedNexus nursing graduates from the UNF Brooks College of Health; and

2. **Increase research collaborations and UNF student training in medical 3D printing**
   - Specifically, expand the MedTech Innovation Lab and UNF's partnership with Johnson & Johnson Biomedical 3D Printing to further medical 3D printing research and train UNF healthcare students in medical 3D printing applications.

Regional Distinction—NE Florida is a Healthcare Hub:

NE Florida has become a mecca for outstanding healthcare. The healthcare industry in NE Florida—which encompasses the city of Jacksonville and Duval County where UNF is located plus municipalities located in Baker, Clay, Flagler, Nassau, Putnam, and St. Johns and surrounding counties—highlights the expansive nature of the quality and breadth of healthcare providers and healthcare-related entities in the region. They include in alphabetical order such renowned providers as AdventHealth, Ascension St. Vincent's Health Center, Baptist Health, Brooks Rehabilitation Hospital, Flagler Hospital, Mayo Clinic, MD Anderson, and Memorial Hospital, among others. In addition, an emphasis on attracting healthcare providers and growing healthcare services are priorities in the strategic plans of the respective cities in Northeast Florida.

UNF Core Strength in Healthcare Education:

UNF offers multiple, high quality programs across a wide array of health and health-related disciplines. UNF indicants of excellence and expertise in healthcare fields include the following: (1) UNF's DNP program is ranked #1 in the state of Florida, (2) UNF's school of nursing is recognized as one of six programs nationally for best practice in incorporating population health into the curriculum, (3) UNF's school of nursing graduates have a licensure (NCLEX) pass rate consistently above 95%, (4) UNF's online doctoral degree program is ranked #11 nationally as Most Popular Online Nursing Doctoral Degree by NursingDegreeSearch.com; and (5) UNF's nursing program is ranked #69 nationally as Best Value Nursing School by CollegeFactual.com. In addition, UNF's nursing program has existing collaborative research agreements with Florida Blue, Johnson & Johnson, and the Mayo Clinic; and UNF has been accelerating competency in medically associated STEM programs that include advanced

manufacturing, 3D biomedical printing, and the newly added Maldi Mass Spectrometry for early diagnostics research funded by the Florida Legislature in 2020.

The 3D printing expansion of the UNF MedNexus MedTech Innovation Lab was included in UNF's original LBR presented to and approved by the Board of Governors in 2019. The UNF MedNexus LBR was subsequently divided into multiple phases. Phase I received funding in the 2020 legislative session. This lab was shifted to Phase II. Universities of Distinction requests did not receive funding in the 2021 legislative session.

Fostering an Innovation Economy:

UNF Center for Entrepreneurship and Innovation: The 2020-21 cohort of entrepreneurial participants in the Center's new venture program were focused solely on healthcare-related endeavors, further integrating UNF MedNexus throughout UNF as well as the healthcare and business community. UNF MedNexus collaboration with the UNF Center for Entrepreneurship and Innovation and the Flagler County School System are critical to UNF's broader efforts to address future healthcare shortages by promoting interest in healthcare careers among Florida high school students.

I. 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.*

Nursing: The proposed recurring investment in nursing faculty and staff will result in the addition of at least 25 undergraduate BSN nursing students and 50 graduate MSN nursing students to begin courses Spring 2023. To maintain the renowned quality of nursing graduates from UNF's Brooks College of Health, the proposed recurring investment in financial aid will be used as scholarships to attract, retain, and graduate the next generation of talented healthcare professionals in nursing. No nonrecurring funds are requested for nursing.

Medical 3D Printing: Nonrecurring funds are requested for the expansion of the MedTech Innovation Lab and they will be used to equip the lab with medical grade 3D printers capable of printing both metal and plastic components. Students will be trained to use this latest technology and will have the opportunity to work with UNF MedNexus innovation partners in research projects, testing, process development, and skills training. Expansion of the lab will lead to pathways and jobs in medicine and will also bolster specialized biomedical coursework in UNF's advanced manufacturing, biology, electrical engineering, and mechanical engineering degree programs. One staff position for lab instruction and oversight will be added with proposed recurring funding.

Metric	Current PBF 2021-22	With Additional 25 Nursing Grads & 50 MSN Grads	Needed for 10 pts
Pct. of bachelor's grads employed ($25K+) and/or cont ed 1 yr after grad	72.7%	72.9%	72.8%
Median wages of bachelor's graduates employed full time	$41,000	$41,200	$40,700
Net tuition and fees per 120 credit hours	$8,100	$8,090	$9,000
Four-year graduation rate (if additional students are in FT FTIC cohort)	48.3%	49.0%	50%
Academic progress rate (if additional students are in FT FTIC cohort)	81.3%	81.5%	90%
Bachelor's degrees awarded in areas of strategic emphasis	57.0%	57.3%	50%
Graduate degrees awarded in areas of strategic emphasis	51.9%	54.6%	60%

II. Personnel – *Describe personnel hiring and retention plans, making sure to connect both plans to initiative(s) and goal(s) described in section I. State the amount of faculty FTE and staff FTE and estimated funding amounts used for retention and new hires in each category. In describing faculty hires, provide overall hiring goals, including academic area(s) of expertise and anticipated hiring level (e.g. assistant professor, associate professor, full professor. Please describe how funds used for faculty or staff retention will help the institution achieve its stated goals. University of Distinction proposals should clearly note how anticipated hires or retained individuals will help the institution elevate a program or area to national or state excellence.*

In support of nursing education, UNF is requesting the following lines in general nursing:

Full-time faculty	3
Part-time adjunct clinical faculty	9
Administrative	1

The full-time faculty positions will be for Assistant Professors teaching Pharmacology, Fundamentals, Medical-Surgical Nursing and Community. The requirement is a terminal degree in nursing, PhD, EdD or DNP. The part-time faculty positions will be critical for adjunct clinical faculty instruction in the hospitals. These faculty will also support UNF's 4+1 BSN to MSN degree program partnerships with Florida College System institutions. The final administrative position will perform duties associated with coordinating admissions, clinical sites, and office duties. Both the full-time and part-time faculty hires will conduct classes at the undergraduate and graduate levels to serve the additional student in the respective programs. The faculty will also instruct prelicensure students in the clinical area. The goal is to retain this staff through the upcoming years for UNF to continue to grow its nursing programs and provide more nurses to the community. In addition, we will retain the assistant professor positions through tenure opportunities and salary increases.

Additionally, UNF is requesting a staff position to oversee 3D printing operations:

Full-time instructor/lab manager 1

Total proposed hires 14

IV. 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 Universities of Distinction
Spending Plan
Position and Fiscal Summary
Operating Budget Form II
(to be completed for each issue)

University: **University of North Florida**
Issue Title: **MedNexus**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	6.00	0.00	6.00
Other (A&P/USPS)	4.50	0.00	4.50
Total	10.50	0.00	10.50
Salaries and Benefits	$775,500	$0	$775,500
Other Personal Services	$124,500	$0	$124,500
Expenses	$1,100,000	$250,000	$1,350,000
Operating Capital Outlay	$0	$500,000	$500,000
Electronic Data Processing	$0	$0	$0
Financial Aid	$1,000,000	$0	$1,000,000
Special Category (Specific)	$0	$0	$0
Fixed Capital Outlay	$0	$2,700,000	$2,700,000
	$0	$0	$0
	$0	$0	$0
Total All Categories	$3,000,000	$3,450,000	$6,450,000

State University System
Education and General
2022-2023 Legislative Budget Request
Form I

University(s):	University of West Florida
Request Title:	**A Cyber Coast for Florida's Future**
Date Request Approved by University Board of Trustees:	**June 17, 2021**
Recurring Funds Requested:	**$15,260,921**
Non-Recurring Funds Requested:	
Total Funds Requested:	**$15,260,921**
Please check the request type below:	
Shared Services/System-Wide Request	☐
Unique Request	☒

I. Purpose – *1. Describe the overall purpose of the plan, specific goal(s) and metrics, specific activities that will help achieve the goal(s), and how these goals and initiatives align with strategic priorities and the 2021 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.*

The University of West Florida has received national recognition for taking on a critical challenge facing Florida and our nation – cybersecurity workforce readiness.

In 2014, the University established the UWF Center for Cybersecurity. In short order, the Center guided the University in becoming a National Center of Academic Excellence in Cybersecurity (CAE-C), as designated by the National Security Agency and Department of Homeland Security in 2016, and received the unique designation as the CAE-C Regional Resource Center for the Southeast U.S. in 2017. In this role, UWF provides leadership to advance cybersecurity education and workforce development across the Southeast, supporting colleges and universities in Florida, Alabama, Georgia, South Carolina, Mississippi and Puerto Rico. UWF's mission and role as the Southeast CAE-C Regional Hub expanded to include Kentucky, Mississippi, Tennessee, North Carolina and the U.S. Virgin Islands, and to enhance collaborations among academia, industry

and government partners. UWF serves as one of five NSA CAE-C Regional Hubs across the country.

UWF's Center for Cybersecurity has moved quickly to establish programs of excellence and has been recognized by the NSA as a model for how universities should structure their cybersecurity programs. Noteworthy achievements include the following:

- Collaborating with the Hal Marcus College of Science and Engineering to establish Florida's first stand-alone B.S. degree in Cybersecurity and the first to be designated by the NSA as a National Center of Academic Excellence in Cyber Defense program.
- The Cybersecurity for All® (uwf.edu/cyberforall) program enhances cybersecurity workforce development. Through this program, UWF has enhanced cybersecurity workforce readiness for State of Florida personnel through partnerships with the Florida Digital Services, Florida Department of Management Services and the Florida Department of State.
- The Florida Cyber Range®, launched to enhance competency-focused, hands-on skills development via education, training and competitions.

Additional recognitions include:

- UWF was selected to lead the National Cybersecurity Workforce Development Program, a nationally scalable and sustainable cybersecurity workforce program to rapidly expand the number of qualified cybersecurity professionals. UWF is leading a coalition of 10 CAE-C designated institutions across the country in this initiative, including USF – Cyber Florida and FIU (cyberskills2work.org).
- The Cybersecurity for All® program was recognized among the 2020 Innovations in Cybersecurity Education by National CyberWatch Center.
- UWF received the NSF CyberCorps® Scholarship for Service grant to prepare undergraduate and graduate UWF students for cybersecurity work roles in executive federal agencies (uwf.edu/aces).
- The UWF Center for Cybersecurity Director, Dr. Eman El-Sheikh, was appointed as the higher education representative on the Florida Cybersecurity Task Force established by Governor Ron DeSantis.
- UWF recently highlighted its partnership with the National Security Agency to advance cybersecurity education at the 2021 RSA Conference, the premier security conference attended by more than 20,000 people across the globe (NSA press release, UWF press release).

The Opportunity

"Pensacola, Escambia County, and the Gulf Coast region have the unique opportunity to create the world's best public and private sector cyber partnership, making the 'Cyber Coast' a recognized world leader in

Cybersecurity." --Brig. Gen. Gregory J. Touhill USAF (ret), First U.S. Chief Information Security Officer 2016-2017

The recession-resilient cybersecurity industry is exploding in Northwest Florida. Growth is limited only by availability of talent. The cybersecurity skills gap and shortage of skilled workforce are well-known problems. A cybersecurity jobs heat map, Cyber Seek, currently indicates more than 464,420 unfilled cybersecurity jobs across the country, with more than 21,893 unfilled jobs in Florida.

Northwest Florida is ahead of the curve as an emerging area of strength in cybersecurity with a job market that is outpacing the national average. In Pensacola, Corry Station houses the Navy's Center for Information Warfare Training, a classified school for NSA military personnel, an expanding DHS Cybersecurity and Infrastructure Security Agency (CISA), which includes the National Cybersecurity and Communications Integration Center and supports state and federal government and critical infrastructure sectors. In Fort Walton Beach, Hurlburt Field has an education and training complex for Air Force Special Operations including cybersecurity. Many industry leaders in cybersecurity have offices and major contracts in Northwest Florida including Raytheon, Northrop Grumman, General Dynamics IT, Booz Allen Hamilton and Boeing Global.

With a significant increase in resources for cybersecurity talent development, UWF can be a catalyst for expanding the cybersecurity industry, attracting more high-wage jobs to the state, and winning national and global recognition for Florida's Cyber Coast.

The Plan

Building on UWF's established strengths and accomplishments, the University aims to advance Florida as the world's premier leader in cybersecurity workforce readiness and resiliency.

This will be accomplished through innovative and scalable academic and workforce development objectives as follows:

1. Create a UWF Department of Cybersecurity, the first such department in a Florida university, to expand multidisciplinary cybersecurity curricula and research.
2. Expand the UWF Center for Cybersecurity capabilities for education, workforce development, research and outreach.
3. Develop competency-focused and high-impact learning programs to prepare students for cybersecurity careers.

4. Target and incentivize diverse populations for cybersecurity careers and workforce development, including veterans and underrepresented groups.
5. Implement programming for cybersecurity career readiness, student success and timely completion.
6. Facilitate a cybersecurity community of practice and partnerships to expand career readiness and pipelines.

The Specifics

1. Create a UWF Department of Cybersecurity to expand multidisciplinary cybersecurity curricula and research

In order to build and support the needed multidisciplinary curricula and research, the university requires cybersecurity faculty and staff who not only understand industry needs, but are flexible and resilient to the fast-paced changing nature of Cybersecurity. A multidisciplinary Cybersecurity program means that faculty should be recruited outside of Computer Science and Information Technology, where Cybersecurity programs are typically housed. Thus, a Department of Cybersecurity can provide the means to better build multidisciplinary curricula and better recruit multidisciplinary faculty, which are necessary to meet the state's cyber workforce needs.

The college currently has a B.S. degree program in Cybersecurity and a M.S. degree program in Cybersecurity, both of which are BOG programs of strategic emphasis. With a Department of Cybersecurity, UWF will have the capability to expand the degree programs to include security management, critical infrastructure security, homeland security, and other non-technical areas of Cybersecurity.

The multidisciplinary curricula will also include high impact practices. Therefore, we propose updating and expanding the UWF Battle Lab. The Battle Lab is a high-tech computing lab that supports student engagement, research, and outreach in network and system security.

We additionally propose creating a Cyber-Physical Systems lab and a Cyber Forensics lab for the curriculum. The Cyber-Physical Systems lab will introduce students to the Internet of Things devices, critical infrastructure, and sensor and communication systems which all interface the digital and physical domains. The Cyber Forensics lab is an environment where students investigate advanced cyber-crimes and the analysis and prevention of next-generation malware attacks.

The Department of Cybersecurity will support a Cybersecurity Honors program. High-impact practices such as undergraduate research experiences will also be

required of honors Cybersecurity students. This program will produce honors Cyber graduates who are in high demand by employers and graduate schools.

To meet overall cybersecurity workforce needs, we propose to increase Cybersecurity and Cyber-related program enrollment – from approximately 900 students to over 1,600 students during a 5-year period. The resources needed to dramatically increase program enrollment, to support student success, and for UWF to become the premiere institution for Cybersecurity education are:

- Faculty and staff for a Department of Cybersecurity.
- Faculty to support an increase in sections of lower division courses and other courses impacted by Cybersecurity.
- Staff to support college infrastructure impacted by Cybersecurity.
- Success initiatives aimed at cybersecurity and cybersecurity-related students (see section 3).

2. Expand the UWF Center for Cybersecurity capabilities for education, workforce development, research and outreach

To address the demand for a well-qualified cybersecurity workforce for our region and state, UWF launched several workforce development programs, including the Cybersecurity for All® Program. This program significantly expands the cybersecurity workforce across the state and nation, and increases the number of qualified cybersecurity professionals, including among under-served and under-represented populations. The Program's innovative approach emphasizes:

- Development and delivery of core cybersecurity courses that align with the NIST National Initiative for Cybersecurity Education (NICE) Cybersecurity Workforce Framework.
- Development of additional courses and modules to customize the program for various audiences, including K12 students and teachers, businesses, government agencies, military and veterans, and for emerging needs, including critical infrastructure security, cloud security, Internet of Things security, industrial control systems security, threat intelligence and hunting, and AI and machine learning for cybersecurity.
- Online delivery of these education and training programs and courses that includes virtual, hands-on learning experiences using the Florida Cyber Range®.
- Development of pathways for students who complete these courses to cybersecurity careers and degree programs.
- Expansion of the Cybersecurity Ambassadors program to increase cybersecurity awareness, interest and skills among diverse populations and build a strong, diverse talent pipeline.

The Florida Cyber Range® provides cutting-edge competency-focused hands-on training and operations to detect and defend against cyber threats and attacks.

The Florida Cyber Range provides a state-of-the-art, powerful, realistic training environment to support cyber exercises, operations and competitions for government, military and academia, and facilitate the development and testing of innovative cyber threat detection, defense and response solutions.

Through the Cybersecurity for All® Program, the UWF Center for Cybersecurity partnered with the Florida Digital Services and Department of Management Services to provide cybersecurity training for state personnel and enhance cybersecurity skills and resiliency across state agencies. The Center also partnered with the Florida Department of State to provide training for elections supervisors and IT personnel and enhance elections security, providing training in four major Florida cities to elections personnel from all counties ahead of the 2018 elections.

Continued investment in this program will allow us to continue to enhance cybersecurity preparedness, expand the cybersecurity workforce across the region, state and nation, and increase the number of qualified cybersecurity professionals.

Our region is also home to expanding NSA, DHS/CISA, Air Force and cybersecurity operations. UWF is seeking to expand UWF Center for Cybersecurity programs to support growing cybersecurity defense operations in Northwest Florida and increase program and certification offerings to diverse populations, including transitioning military members, veterans, women and under-represented minorities seeking to get into or improve their skills in the cybersecurity industry.

The UWF Center for Cybersecurity will establish a national best-practice model for workforce development by designing and delivering high impact learning practices through competency-focused, learner-centered, modular curricula. Educating and training existing and future workforce will involve:

- Designing and delivering competency-focused modular courses and scenario-based learning activities through Cybersecurity for All.
- Cutting-edge research incorporated into these courses.
- Using the Florida Cyber Range to integrate real-world, cyber attack and defense scenarios into learning experiences.
- Designing, developing, and offering competition-based activities to develop and enhance competencies for cybersecurity jobs.
- Designing and delivering courses for veterans and other under-represented groups to provide opportunities for them to enter, advance and prosper in cybersecurity work roles.
- Creating cybersecurity courses and competitions using the Florida Cyber Range for state and local government and small and medium businesses to assess their cyber readiness.

- Establishing an educational Security Operations Center with cutting edge software and hardware solutions that will attract local and regional businesses, government contractors and defense agencies to collaborate with UWF Center for Cybersecurity.

We propose the development of an immersive learning lab that will utilize virtual environments and artificial intelligence to enhance learning outcomes through adaptive student-centered educational experiences. A research lab will be established to enhance collaborations among UWF, SUS and other faculty that emphasize current, emerging and future cybersecurity technologies such as critical infrastructure protection, artificial intelligence, machine learning, quantum computing, grid infrastructure, autonomous surface and aerial vehicles, block chain technology, healthcare devices, IP protection and renewable energy security.

We will develop a national-level resource for scientific inquiry into cyber adversary tactics, techniques and procedures. The proposed architecture will allow multi-disciplinary study of cyber adversaries without requiring everyone have highly technical cyber expertise. This resource will attract cybersecurity researchers to UWF and Florida SUS institutions, encourage them to join or collaborate with UWF, enhance our position within the cybersecurity community and establish UWF as a national hub for cyber adversary research. This in turn will attract graduate and undergraduate students to the area who will, upon graduation, fill highly sought after cyber workforce roles.

3. Develop competency-focused and high-impact learning programs to prepare students for cybersecurity careers

The Cybersecurity for All program will leverage UWF's strong track record and national recognition in high-impact practices (HIPs) to enhance cybersecurity career readiness. Students will work on research projects with UWF faculty and industry mentors, and will engage in other HIPs, including internships, professional conferences, cyber competitions and competency-based skills development activities. UWF was one of the institutions selected to participate in the National Centers of Academic Excellence Pilot Program for developing and assessing competency-focused activities.

UWF offers several programs to encourage and support undergraduate and graduate research, including research support for students and faculty. UWF has strong research activities in a variety of cybersecurity research topics. Students will develop essential competencies and skills through hands-on activities using the UWF Battle Lab and the Florida Cyber Range. Students will participate in range-based exercises and cybersecurity competitions, which are critically important for cybersecurity career readiness. The activities will be mapped to

competencies that align with the NICE Cybersecurity Workforce Framework work roles and CAE Knowledge Units.

4. **Target and incentivize diverse populations for cybersecurity careers and workforce development including veterans, women and underrepresented groups**

In order to reach a total enrollment of over 1,600 students in cybersecurity or related programs, UWF proposes the following:

- Offer multi-year scholarships to FTIC students to attend UWF to major in Cybersecurity or a Cyber-related field.
- Establish 2+2 articulation agreements within Cybersecurity and Cybersecurity-related areas with Florida and Alabama community and state colleges.
- Establish 2+2 articulation agreements with the military.
- Offer transfer students majoring in Cyber or Cyber-related programs 2-year scholarships.
- Provide students in Cyber or Cyber-related programs an opportunity to either complete an industry certification, an internship, an undergraduate research project in areas of Cybersecurity, or another high-impact activity.
- Express admit each student in the program with a 3.0 GPA or better to their UWF online graduate program of choice.

The UWF Center for Cybersecurity developed the Cybersecurity for All program to provide training and workforce development opportunities to individuals and organizations, including military, veterans, industry and public sector. The Center will recruit veterans, women and underrepresented minorities from the area to participate in the Cybersecurity Fundamentals course offered through the Cybersecurity for All program and host events to provide awareness of the growing cybersecurity career opportunities in the area and attract them to UWF undergraduate and graduate cybersecurity programs. Veterans are very highly employable by the government, especially by DHS, CISA, DoD, NSA, FBI and CIA, as many of them have active, or can readily obtain, clearance. Attracting this population to UWF and providing them with foundational cybersecurity knowledge, skills, abilities and competencies will create a growing pipeline of future cybersecurity workforce. UWF is well suited to serve this population as we are ranked fifth in the nation as a military-friendly university and have a robust Military and Veterans Resource Center for military, dependents and veteran students.

5. **Implement programming for cybersecurity career readiness, student success, and timely completion.**

Northwest Florida's lagging economy, high poverty and low educational attainment rate translate to many regional students who are highly capable, but severely financially disadvantaged, ethnically underrepresented and often first-generation in college. Financial assistance alone is not enough. Students must be engaged early and often to increase persistence, particularly during their first year. Thus, building a talent pipeline to the cybersecurity workforce requires coordinated, multipronged efforts to mentor, teach, prepare and engage specific student populations. Student engagement programs at UWF are founded on nationally-recognized model programs incorporating four key components:

- Academic and social integration,
- Knowledge and skill development,
- Support and motivation, and
- Monitoring and advising.

Faculty and staff resources are crucial to build programs that engage students early and often. Engagement and mentorship must occur inside and outside of the classroom. Thus, a low faculty to student ratio is critical. The requested positions will support UWF's scope of expansion, which includes:

- Increasing the STEM LLC to include a multidisciplinary Cyber LLC
- Hosting annual boot camps to prepare students for their general education
- Building skills courses within Cyber and Cyber-related programs
- Offering a two-semester sequence STEM for Life Seminar for all STEM FTIC students to ensure FTIC students (including each cyber student) are engaged throughout their first year, which includes a common read and semester themes of College Survival Skills and Maximizing/Getting Involved in College
- Redesigning other key STEM gateway courses, that impact Cybersecurity and Cybersecurity-related programs, to improve pass rates, and
- Engaging more students in undergraduate research

6. Facilitate a cybersecurity community of practice and partnerships to expand career readiness and pipelines

The program aims to develop a superior cybersecurity workforce through the creation of a scalable and sustainable community of practice. UWF will establish a Cybersecurity Alliance that brings together academia, government and industry to expand the cybersecurity workforce across the state and nation by disseminating best practices and engaging employers. Students will be encouraged to participate in the community of practice events to enhance professional and leadership development and career readiness. UWF will develop and expand the Cybersecurity Alliance, disseminate best practices, and

engage additional employers across the state to build a scalable and sustainable community of practice and expanding cybersecurity workforce.

The program aims to increase the participation of women and underrepresented students through mentoring by cybersecurity faculty and professionals, K12 outreach and community engagement. UWF launched and coordinates the Women in Cybersecurity (WiCyS) Florida Affiliate. Women cybersecurity professionals and WiCyS Florida members will be recruited to serve as career mentors for female students in the program. These mentors will provide guidance on career readiness and success and professional development and host regular networking and mentoring events. Existing K12 and community outreach initiatives, including the UWF Cybersecurity Ambassadors program, will be leveraged. The Ambassadors visit local area schools to enhance and promote cybersecurity awareness and UWF cybersecurity programs.

The program will involve several outreach activities to enhance cybersecurity workforce development across the state, which are outlined below:

- Annual Cybersecurity Career Fair to promote interest in cybersecurity careers, connect with employers, and learn about job and internship opportunities.
- K12 school visits and events to promote interest in cybersecurity programs and careers.
- Annual Florida Cyber Defense Competition.
- Florida Women in Cybersecurity Affiliate events across the state and annual Florida Women in Cybersecurity Conference.

Key Partners

The proposed initiatives will involve collaborations with key partners, including but not limited to:

AFCEA	AppRiver & Zix
BAE Systems	Booz Allen Hamilton
Corry Station	Defense Information Systems Agency
Department of Homeland Security / Cybersecurity and Infrastructure Security Agency	Department of Defense
Eglin Air Force Base & Air Force Research Labs	Florida Chamber of Commerce
Florida Department of Education	Florida Department of Law Enforcement
Florida Department of Management Services / Florida Digital Services	Florida Department of State
Florida Institute for Human & Machine Cognition	FuelTrust
FloridaWest Economic Development Alliance	Global Business Solutions Inc.

General Dynamics Information Technology	Hurlburt Field
Hixardt Technologies	IBM
IT Gulf Coast & ITEN WIRED	Jacobs
KPMG	KPMG
National Flight Academy	National Security Agency
Naval Air Station Pensacola	Naval Education and Training Command
NAVSEA and Naval Surface Warfare Center	Navy Center for Information Warfare Training & Command
Navy Federal Credit Union	Navy Information Operations Command
Networks of Florida	Northrop Grumman
Raytheon	Regions
Space Florida	Trend Micro

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.*

UWF's *A Cyber Coast for Florida's Future* proposal will significantly enhance cybersecurity workforce and economic development in Florida, and will establish Florida as a national leader in cybersecurity workforce development, resiliency and innovation. The Program will establish innovative, sustainable and scalable workforce development models and support the growth of qualified cybersecurity professionals.

The Program has many anticipated benefits, including:

- Increased number of qualified cybersecurity professionals across the region, state and nation
- Increased number of cybersecurity professionals with industry certifications needed for defense work roles
- Increased engagement in cybersecurity careers
- Increased number of students and professionals with core cybersecurity knowledge, skills and competencies in alignment with the NIST National Initiative for Cybersecurity Education (NICE) Cybersecurity Workforce Framework

- Increased number of students enrolled in cybersecurity courses and degree programs, including under-served and under-represented populations and minorities
- Increased number of pathways for students to pursue postsecondary cybersecurity education at UWF and other Florida institutions
- Increased cybersecurity awareness among K12 students and teachers
- Enhanced workforce development and economic development across the state
- Enhanced cybersecurity protection and resiliency
- Expanded multidisciplinary cybersecurity courses and programs that include innovative curricula and hands-on learning activities
- Enhanced visibility for Florida as a leader in cybersecurity workforce development and resiliency
- Expanded partnerships among business, government, military and educational partners

Key Metrics

- **Year-one accomplishment or success**
  - Establish Multidisciplinary Cybersecurity degree programs and Department of Cybersecurity
  - Increase enrollment to 300 B.S. cyber, 100 M.S. cyber and 690 cyber-related degree programs; award 50 B.S. cyber degrees, 35 M.S. cyber degrees, and 175 cyber-related degrees
  - Provide cybersecurity training courses for 240 industry and government personnel, industry certifications for 60 personnel, and an intensive cybersecurity workforce program for 60 veterans and under-represented minorities

- **Return on investment to the state**
  - Years 2 – 5: Enrollment in B.S. Cyber, M.S. Cyber, and Cyber-related degree programs increased to 1600; awarded degrees for Cyber and Cyber-related programs increased to 540
  - Years 2 - 5: Provide cybersecurity training courses for 240 industry and government personnel, industry certifications for 60 personnel, and an intensive cybersecurity workforce program for 60 veterans and under-represented minorities per year

- **Program improvement over time**
  - Increase number of degrees awarded in Cyber and Cyber-related programs to 540
  - 50 percent of graduates of Cyber and Cyber-related programs received industry certification

- Increase number of qualified cybersecurity professionals in years 1 – 2 to 230, and in years 3 – 5 to 285

- **Program elevation to excellence and prominence**
  - NSA Centers of Academic Excellence (CAE) Cyber Defense designation for B.S. in Cybersecurity program (maintain)
  - NSA CAE Regional Hub for the Southeast U.S. (maintain)
  - NSA CAE Cyber Defense designation for B.S. in IT program (achieve)
  - NSA CAE Cyber Defense designation for M.S. in Cybersecurity program (achieve)
  - ABET accreditation for B.S. in Cybersecurity and IT programs (achieve)
  - NSA CAE Cyber Operations designation for B.S. in Cybersecurity program (achieve)

Additional Metrics

1. Increase Enrollment in Cybersecurity and Related Programs

Program	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Cybersecurity, Bachelor's	221	300	365	410	450	500
Cybersecurity Master's	68	100	140	180	220	250
Other Cyber/IT programs	662	690	730	770	810	850

2. Increase Degrees Awarded in Cybersecurity and Related Programs

Program	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Cybersecurity, Bachelor's	50	66	88	105	130	160
Cybersecurity Master's	35	50	65	85	105	130
Other Cyber/IT programs	150	165	185	205	225	250

3. Increase the Number of Qualified Cybersecurity Professionals (certifications and trainings)

Program	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27
Cybersecurity for All training	240	240	240	240	240	240
Cybersecurity Industry Certifications	60	60	60	60	60	60
Cybersecurity Veterans Program	30	30	30	30	30	30
Total	330	330	330	330	330	330

The Program will also contribute to the following Performance-Based Funding Metrics in the 2020 UWF Accountability Plan:

- Percent of Bachelor's Graduates Enrolled or Employed ($25,000+)
    - The Program provides dynamic training options that meet state and national workforce needs and allow faster transition to the job market.
- Median Wages of Bachelor's Graduates Employed Full-time
    - Cybersecurity jobs command high salaries, averaging approximately $80,000 for entry-level positions.
- Percentage of Bachelor's Degrees Awarded within Programs of Strategic Emphasis
- Percentage of Graduate Degrees Awarded within Programs of Strategic Emphasis
- Percent of Baccalaureate Graduates Completing 2+ Types of High Impact Practices

III. Personnel – *Describe personnel hiring and retention plans, making sure to connect both plans to initiative(s) and goal(s) described in section I. State the amount of faculty FTE and staff FTE and estimated funding amounts used for retention and new hires in each category. In describing faculty hires, provide overall hiring goals, including academic area(s) of expertise and anticipated hiring level (e.g. assistant professor, associate professor, full professor. Please describe how funds used for faculty or staff retention will help the institution achieve its stated goals. University of Distinction proposals should clearly note how anticipated hires or retained individuals will help the institution elevate a program or area to national or state excellence.*

To establish a Department of Cybersecurity, we propose to hire one Department Chair at the full professor, two associate professors, six assistant professors, and two instructors. The goal for the Chair position is to hire a faculty who has (1) an established record teaching and research in concert with the multidisciplinary aspects of Cybersecurity, (2) implemented high-impact practices in the cybersecurity classroom and laboratories, (3) a record of student-involved and student-led research, and (4) has the vision and leadership skills to build degree programs that intersect with Engineering, Business, Health, Law, and Ethics. At the Associate level, our goal is to hire faculty who have an established record of multidisciplinary collaborations in teaching, research, and external funding. Our goal at the Assistant level is to hire faculty who have a cybersecurity background and show promise to work in multidisciplinary domains. Specifically, our goal is to hire a cybersecurity professional at the Assistant level in each of the following domains: Engineering, Business, Health, Law, and Ethics. Another overarching goal is to hire faculty with a background in Cyber-Physical Systems or Cyber Forensics in order to build the labs being proposed and to engage students in these activities.

We also propose to hire staff for the new Department of Cybersecurity. Our goal is to hire two Office Administrators, two ITS specialists to cover an increased demand on the college's IT infrastructure (Data Center, servers, Battle Lab, etc.), three academic advisors to accommodate enrollment growth, one coordinator to oversee student high-impact opportunities, and one Director for the STEM Living Learning Community to include Cybersecurity population. Another goal is to hire an Admissions coordinator and a Financial Aid coordinator to oversee the admissions process for increasing enrollment in Cybersecurity and Cyber-related areas and to oversee the distribution of scholarship aid for Cybersecurity and Cyber-related students respectively.

One of the goals of this proposal is to raise annual enrollment in Cybersecurity and Cybersecurity-related degree programs to 1600 in five years. These degree programs are supported by the Departments of Mathematics and Statistics, Physics, Computer Science, and Information Technology. To accommodate the enrollment growth in Cyber-related programs, our goal is to hire two Computer Science/Information Technology faculty at the Assistant level. To accommodate the enrollment growth in math and physics general education courses, our goal is to hire two Math faculty at the instructor level and two Physics faculty at the instructor level.

The positions outlined above will help the university build a Department of Cybersecurity and to increase enrollment to 1600 students. The positions will also help cover the demands placed on departments that support Cybersecurity.

In order to expand retention efforts for Cybersecurity and Cyber-related students as outlined in the proposal, our goal is to hire three academic advisors (stated above) and three academic support faculty, with all three faculty at the Assistant level. These positions, as well as the staff positions, are needed to keep students on track to graduate, increase participation in the STEM Living Learning Community, create boot camps, redesign key STEM gateway courses, and engage students in research, internships, certifications, and other high impact practices. These positions will allow the college to engage students early and often and are known in the literature to increase student retention.

In total, our goal is to hire 20 faculty FTE and11 staff FTE. We propose to hire according to the following plan:

Position	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Chair	1					1
Associate	2					2
Assistant	2	2	3	1		8
Instructors	2	2	1	1		6
Academic Support Faculty	1	2				3
Office Administrator	2					2
Advisor	1	1	1			3
ITS Specialist	1	1				2
Coordinator/Director	1	1				2
Admissions Coordinator	1					
Financial Aid Coordinator	1					

To expand the UWF Center for Cybersecurity capabilities for education, workforce development, research, and outreach, we propose to hire seven full professors, and two instructors. The goal is to hire three teaching faculty who have (1) established record teaching cutting-edge topics and multidisciplinary aspects of Cybersecurity, (2) implemented competency-focused, high-impact practices in cybersecurity courses, including cyber range exercises and competitions, (3) successful record of student engagement, (4) demonstrated experience in developing and delivering cybersecurity courses that align with the NIST National Initiative for Cybersecurity Education (NICE) Cybersecurity Workforce Framework, and (5) have vision to build unique competency-focused certificate programs that build pathways to career and/or degree programs. In addition, four research faculty will be hired who have (1) established record in cutting-edge and multidisciplinary Cybersecurity research, (2) demonstrated success in research external funding, grants, publications, and technology transfer, (3) record of student-engagement in research, (4) demonstrated success in leading research collaborations with academic, industry and government partners, and (5) have vision to develop innovative and collaborative solutions that advance the field and enhance state and national cybersecurity. Two instructors will also be hired to support the Cybersecurity for All Program and Immersive Learning Lab, and expand education, training and industry certification courses for broader audiences. Target areas of expertise include critical infrastructure security, cloud security, Internet of Things security, industrial control systems security, threat intelligence and hunting, and AI and machine learning for cybersecurity. The overall goal is to establish a strong faculty and instructor foundation to support the proposed programs and research, and develop best practice models and resources that could be shared with faculty at other SUS institutions.

We also propose to hire staff to support the proposed goals and expand the programs offered by the Center of Cybersecurity. To accomplish the proposed goals, one Business Developer, one Communications Director and one Marketing Specialist will be hired to support program recruitment of diverse populations, expand strategic collaborations with private and public sector partners, and enhance community impact, outreach and visibility. In addition, the expansion of the Center for Cybersecurity data center, Florida Cyber Range, immersive teaching lab and research, development and testing lab will

require the hiring of one Chief Technology Officer and one Server System Administrator to support the infrastructure, technology and tools needed for education, research and outreach activities. We propose to hire one Training Manager to plan, manage and evaluate online, hybrid and face-to-face education and training offerings, including training and workforce development courses, industry certification courses, range-based exercises and workshops, and cybersecurity competitions. Increases in course offerings, workforce and training programs, research activities, and community outreach will require additional support staff. We propose one Coordinator to assist with program coordination, delivery and evaluation, one Advisor II to support student success and enrollment growth for diverse participants, including transitioning military, veterans and under-represented minorities, and one Office Specialist to support the increased administrative support across all programs.

The Center for Cybersecurity proposes to provide education and workforce development opportunities for 330 learners annually, including training courses for 240 industry and government personnel, industry certifications for 60 personnel, and an intensive cybersecurity workforce program for 60 veterans and under-represented minorities, for a total of 1650 qualified cybersecurity professionals over a 5-year period.

Faculty and staff resources are crucial to build programs that engage students early and often. To expand the efforts of the Cybersecurity for All program in providing education and workforce development opportunities to individuals and organizations, including military, veterans, underserved and underrepresented communities, industry, and the public sector; the Center proposes to hire the positions listed above. Attracting this population to UWF and providing them with foundational cybersecurity knowledge, skills, abilities, and competencies will create a growing pipeline of future cybersecurity workforce for our state and nation.

In total, our goal is to hire 9 faculty FTE and 9 staff FTE according to the following plan:

Position	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professor/teaching	2					2
Professor/research	1	4				5
Instructor	1	1				2
Assoc Dir/Business Development	1					1
Chief Technology Officer	1					1
Training Manager	1					1
Communications Director	1					1
Marketing Specialist	1					1
Coordinator		1				1
Advisor II		1				1
Office Specialist		1				1
Server System Administrator		1				1

2022-2023 Legislative Budget Request
Education and General
Position and Fiscal Summary
Operating Budget Form II
(to be completed for each issue)

University: **University of West Florida**
Issue Title: **A Cyber Coast for Florida's Future**

	RECURRING	NON-RECURRING	TOTAL
Positions			
Faculty	29.00	0.00	29.00
Other (A&P/USPS)	20.00	0.00	20.00
Total	49.00	0.00	49.00
Salaries and Benefits	$6,435,235	$0	$6,435,235
Other Personal Services	$775,686	$0	$775,686
Expenses	$3,550,000	$0	$3,550,000
Operating Capital Outlay	$2,000,000	$0	$2,000,000
Electronic Data Processing	$0	$0	$0
Financial Aid	$2,500,000	$0	$2,500,000
Special Category (Specific)	$0	$0	$0
_____	$0	$0	$0
_____	$0	$0	$0
_____	$0	$0	$0
Total All Categories	$15,260,921	$0	$15,260,921