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.
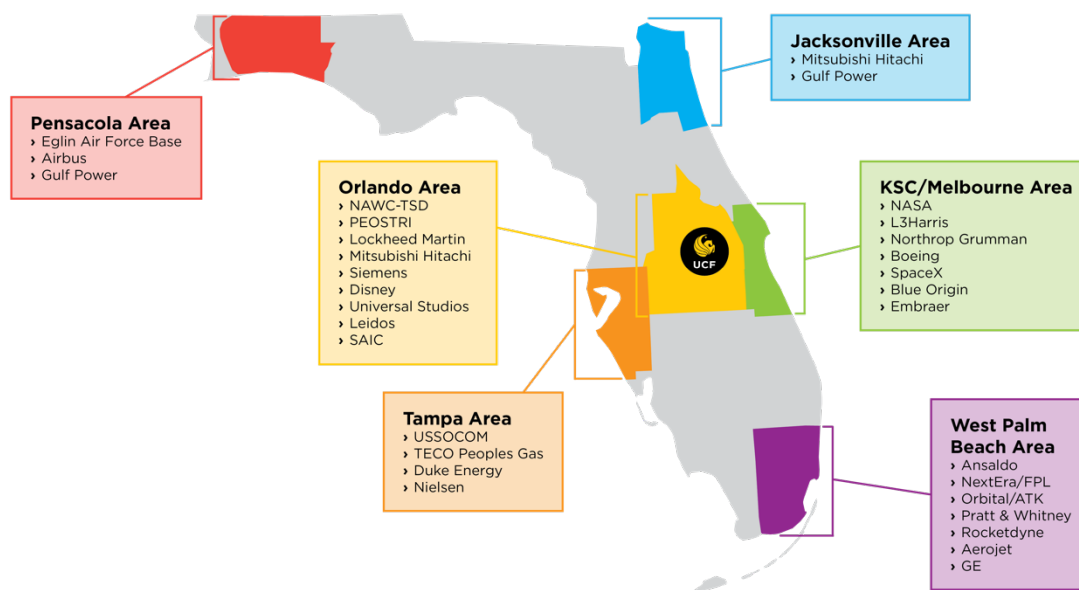

Figure 1: A diagram with Florida companies and their respective locations in the State of Florida. These companies have core businesses in the areas of Aviation, Space and Energy. UCF proposes to provide the enabling technologies such as Artificial Intelligence, Machine Learning, Augmented Reality, Virtual 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.
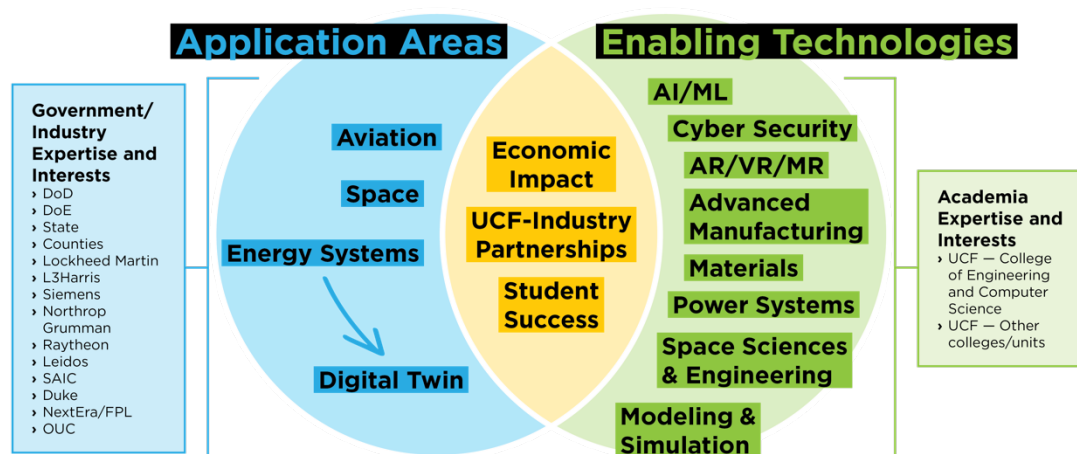

Figure 3: The graphic above illustrates the application areas of focus (aviation, space, energy), the industries that have core business units in these areas, UCF's strengths in enabling technologies (AI/ML, AR/VR/XR, cyber, aerospace science and engineering, power systems, modeling and simulation) that 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.

2022-2023 LBR

REFERENCES

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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
<u>Positions</u>			
Faculty	64.00	0.00	64.00
Other (A&P/USPS)	16.00	0.00	16.00
	-------------	-------------	-------------
Total	80.00	0.00	80.00
	=========	=========	=========
<u>Salary Rate (for all positions noted above)</u>			
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
	=========	=========	=========