State University System

Florida Board of Governors

2020-2021 Legislative Budget Request Instructions

Forms I and II

The main objective of Form I and Form II is to align budget issues and dollar values with the goals and objectives of the strategic priorities and the 2019 University Accountability Plan established by each university.

For FY 2020-2021, each university should submit one Form I and Form II for each university-unique budget issue and/or any system-wide issue identified as a critical system-wide need. Any issues unique to a branch campus or a special unit (e.g., IFAS Workload Initiative) should not be rolled into the main campus request, but reflected separately by use of the forms provided.

For system-wide issues, consideration will be given to issues that allow for greater efficiencies through shared system resources or identified as a system-wide need. If requesting funds as such, please list all university participants of the initiative and check the box "Shared Services/System-Wide Issue".

For unique issues identified by a university, please check the box "Unique Issue for FY 2020-2021".

Please keep in mind that all issues submitted for consideration by the Board should align with the goals and objectives of the strategic priorities and accountability plan established by each university.

State University System

Education and General
2020-2021 Legislative Budget Request
Form I

University(s):	**University of Central Florida**
Issue Title:	**UCF University of Distinction in Engineering & Computer Science**
Recurring Funds Requested:	**$18,422,400**
Non-Recurring Funds Requested:	**$3,000,000**
Total Funds Requested:	**$21,422,400**
Please check the issue type below:	
Shared Services/System-Wide Issue for Fiscal Year 2020-2021	☐
Unique Issue for Fiscal Year 2020-2021	☒

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 2018 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 past June, Governor Ron DeSantis announced that the Orlando area continues to lead the state in job growth for *51 consecutive months*. Moreover, Orlando also remained the second-highest metro area in demand for high-skill, high-wage STEM occupations with 16,111 openings.

And, according to the Institute for Economic Forecasting, the Orlando area employment growth is forecasted to average 2.4 percent each year — the highest in Florida.

However, according to the Florida Council of 100's Project Sunrise report, "Florida currently has lower talent availability due to an underdeveloped pipeline of workers with Science, Technology, Engineering and Math (STEM) skills. Each month, an average of 80,000 high-skilled and 30,000 middle-skilled jobs are left unfilled."

The numbers paint a clear picture for Florida: With ever greater urgency, local industry will require a highly educated, high-quality talent pool ready to join a rapidly expanding STEM sector in and around Orlando and the state. UCF has an obligation to our community and state to help meet this need; failure to do so would represent a major missed opportunity.

With an impressive history of achievement, the University of Central Florida's College of Engineering and Computer Science is uniquely positioned to fulfill this urgent need.

In a September 2019 report, the Orlando Economic Partnership expressed support for the College of Engineering and Computer Science and how it "demonstrates significant contributions to state and regional competitive advantage in high-wage job creation … [and] supports regional goals to be driven by key enabling technologies and corresponding use cases associated with extended reality (i.e., simulation and training), autonomous vehicles, and smart cities (internet of things), among others."

A. Evidence of core competency and national, state excellence

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 and related fields. Through its commitment to partnering with industry to meet the increasing workforce needs of one of the hottest job markets in the country, CECS has become the talent pipeline of choice for 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 2016-17, **64 percent of engineering bachelor's graduates were employed in Florida** and earned average first-year salaries ranging from $54,080 to $65,420.
- *Aviation Week* magazine has named **UCF the No. 1 supplier of graduates** to the U.S. aerospace and defense industries for four consecutive years.
- A longstanding partnership with Lockheed Martin includes **600 students per year who intern** at the company. UCF graduates represent 27 percent of the Lockheed-Martin Orlando workforce (70 percent in STEM-related positions).
- NASA's Kennedy Space Center executives have said that **30 percent of its employees** hold UCF degrees, mostly from CECS.

B. Strong national engineering reputation

In the 2020 *U.S. News & World Report* rankings, UCF achieved Top 50 public university rankings for its undergraduate and graduate engineering programs.

2020 U.S. News & World Report	Public Ranking	Overall Ranking	SUS Ranking
Graduate Engineering	45	75	2
Undergraduate Engineering	49	85	2

And UCF CECS' growing national reputation shows no signs of slowing. In the past 10 years of *U.S. News* Graduate Engineering rankings among the top 50 public institutions, UCF is one of only six institutions to have moved up 11 spots or more.

In fact, *U.S. News & World Report* ranked **every UCF graduate engineering program in the Top 50** among public institutions.

2020 U.S. News & World Report	Public Ranking
Optical Sciences & Engineering	5
Industrial Engineering	26
Electrical Engineering	30
Computer Engineering	30
Materials Engineering	37
Mechanical Engineering	40
Environmental Engineering	40
Civil Engineering	45

C. Strong national computer science reputation

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

2020 U.S. News & World Report	Public Ranking	Overall Ranking	SUS Ranking
Computer Science	51	82	2

Additionally, the UCF student quality in these fields is evident by the national performance of the UCF Cyber Defense team, including **winning the Raytheon National Collegiate Cyber Defense championships in 2014, 2015, and 2016,** earning 2nd place in the same competition in 2019, and winning the 2018 U.S. Department of Energy's CyberForce National Competition.

In 2018, UCF's Programming Team finished **No. 1 in North America and 10th worldwide** in the Association of Computing Machinery's International Collegiate Programming Contest. In 2017, the team rated No. 1 in the U.S. and 13th worldwide.

A partnership with Microsoft has provided UCF with graduate fellowships that have allowed students to be on the cutting edge of work in cloud computing. UCF's emerging focus on artificial intelligence, deep learning, and machine learning — supported, in part, by our Microsoft partnership — is consistent with employment trends suggesting that expertise in these topics will be essential for a majority of computer science graduates.

D. Expanding student opportunity

The students who graduate with CECS degrees are well prepared and diverse. Of the more than 2,000 degrees awarded in 2018-19, 41 percent went to underrepresented graduates and 18 percent to female graduates.

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

National Public University Rankings			
	Total Degrees	**Degrees to African American students**	**Degrees to Hispanic students**
Engineering	13	4	4
Computer Science or Information Technology	5	8	2

Rankings from 2015-16 IPEDS data based on fields offered by UCF

UCF has demonstrated outstanding success with previous additional state investments to improve outcomes. In 2014, UCF was awarded a Targeted Educational Attainment (TEAm) Grant by the Board of Governors. UCF serves as the lead institution in partnership with the University of South Florida and Florida International University to help close the gap 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.

E. Research excellence

In terms of research success, within UCF's school-record $192.1 million in new grants during 2019, engineering and related disciplines represented $76.2 million (40 percent) of overall grant funding.

Based on the National Science Foundation's 2017 Higher Education R&D survey, **UCF ranked 33rd nationally for public universities**, and second in the SUS, for engineering research expenditures. The same survey **ranked UCF 11th nationally for public universities, and first in the SUS**, for computer science research expenditures.

UCF is a national leader in space research, and has researchers tied to major space missions exploring Pluto, Saturn, the Kuiper Belt, Mars, the moon, comets, asteroids, Jupiter, and exoplanets. UCF also leads the management of one of the world's largest active radio telescopes, the iconic Arecibo Observatory in Puerto Rico.

UCF Power Up

Quality, impact, diversity, workforce, and research success demonstrate why the university proposes an investment in engineering and related disciplines, designed to meet the unmet need of Central Florida's quickly growing STEM-based economy while accelerating the university's pursuit of excellence and statewide impact.

Our plan is to power the UCF College of Engineering and Computer Science into the Top 40 of the *U.S. News & World Report* undergraduate and graduate public university rankings by 2025, with an aspirational goal of the Top 25 by 2035.

Called UCF Power Up, the plan will enhance our distinctive areas of engineering and computer science excellence by addressing: 1) successful student outcomes, 2) talent pipeline for industry, and 3) research and economic prosperity.

UCF Power Up	
64 faculty members	$13.1 million recurring
16 support positions	$1.3 million recurring
Bridge Program Investments	$2 million recurring
OPS Student Funds	$2 million recurring
Laboratory Equipment Upgrades	$3 million non-recurring
Total	**$21,422,400**

Specifically, UCF requests $21.4 million in recurring and non-recurring resources to:

1) **Improve quality and success:** Hire more faculty to increase retention and graduation rates and shorten average time to degree. These improvements will lead to a higher-quality experience for students with more efficiency toward degree completion and reduced costs for students. Hire support positions (at a 1:4 ratio with faculty) to ensure the laboratory managers and personnel infrastructure are in place to support the faculty hires.

2) **Enhance the talent pipeline for a 21st-century economy:** Increase programs that recruit, sustain, and graduate STEM students at high rates by enhancing and expanding bridge programs, STEM-focused learning communities, and programs designed to encourage early engagement in undergraduate research experiences. These programs ensure our students are successful within their degree programs and are best prepared for high-paying jobs upon graduation.

3) **Grow research and economic prosperity:** Enhance UCF's existing research and industry partnerships in key areas for the state, including engineering, computer science, aerospace, modeling and simulation, optics and photonics, data analytics, and space sciences through hiring more faculty, providing faculty startup packages, upgrading laboratory equipment, and hiring research support positions.

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.

1. **Improve quality and success**

Hiring 64 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.

As is true nationally, UCF's College of Engineering and Computer Science four-year graduation rate lags the rest of the university. While only 26 percent of CECS students graduate in four years (an improvement of 22 percent over the past decade), our data show that another 13 percent graduate in just one extra semester. If those students graduated *one semester earlier*, the overall four-year graduation rate for UCF would immediately rise by 3 percentage points based on CECS improvements.

Hiring 16 support positions will ensure faculty and labs have the appropriate infrastructure to be successful.

2. **Enhance the talent pipeline for a 21st-century economy**

As identified previously, UCF is the engine that will propel Florida's innovation economy into the model of a 21st-century economic success story.

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 learning communities** that cohort students into math, introduction to engineering, and possible science, and;
- **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 by focusing on math skills in year one and providing early engagement with undergraduate research experiences in year two.

The program has achieved 92 percent first-year retention, a 52-percent increase in STEM graduation compared to the matched cohort, 750 students in research experiences, and more than 4,300 students who have resided in a living-learning community focused on STEM.

Math placement and success is a major driver among STEM time-to-degree. EXCEL has utilized a Math Bootcamp that includes a one-week intensive math session and an updated math placement exam. This program gives students an opportunity to start their STEM program on the appropriate math pathway. Once enrolled in Calculus I, EXCEL delivers specialized instructional models to create a strong mathematical foundation.

While the performance in Calculus I is similar to the control sections, those students continuing into Calculus II demonstrated a 30 percent increase in success when compared to the control sections.

3. Grow research and economic prosperity

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 only 94 public institutions in the nation designated as an "R1: Doctoral University: Very high research activity" among Carnegie classifications. UCF also ranks among the nation's top 50 public research universities in the Top American Research Universities Annual Report. This past year, UCF set a record with $192 million in awards.

UCF faculty drive Florida's research enterprise, both in their laboratories and through partnerships with industry, advancing economic development through translational research. And they play a critical role in our pursuit of excellence.

The additional 64 faculty lines included in this request will help enhance UCF's existing research strengths and industry partnerships in key areas for the state, including engineering, computer science, modeling and simulation, optics and photonics, and data analytics. These new faculty lines also will help UCF reach its institutional strategic plan's goal of $250 million in annual research funding by 2021.

The requested $2 million in laboratory equipment upgrades and additional 16 research support lines will provide the necessary infrastructure to propel UCF's research to greater levels.

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.*

In its September 2019 report, the Orlando Economic Partnership stated the importance of "the alignment of UCF's focus on engineering and computing with the OEP's Three-Year Mission."

The report further stated that UCF Power Up 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-botics and extended reality—each clearly supported by UCF's enhanced E/C focus."

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 $21.4 million request for additional faculty, bridge programs, support personnel, and laboratory upgrades will accelerate UCF's College of Engineering and Computer Science in its pursuit of excellence.

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 (https://www.ucf.edu/strategic-plan/).

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

1. **Improve quality and success**

UCF has developed Accountability Plan metrics within each college. Hiring additional academic advisors and faculty will allow CECS to exceed the positive trajectory already planned for student success metrics, including four-year graduation rate, academic progress rate, and excess hours rate.

In turn, this also will have a positive impact on the average cost to the student, ensuring UCF's continued affordability and high educational quality.

Metric	History	Current	Trend	Trend with Investment
CECS First-year Retention	85.5% 2013-14	91.3% 2017-18	91.9% 2021-22	*93.1%* *2021-22*
CECS Four-year Graduation Rate	21.0% 2010-14	26.0% 2014-18	31.0% 2018-22	*33.5%* *2018-22*
CECS Six-year Graduation Rate	63.8% 2008-14	68.3% 2012-18	70.3% 2017-23	*71.6%* *2017-23*
CECS Average Time to Degree	4.71 2014-15	4.51 2018-19	4.36 2022-23	*4.31* *2022-23*
CECS Percent of Students Graduating Without Excess Hours	54.2% 2014-15	62.4% 2017-18	64.9% 2022-23	*68.0%* *2022-23*

2. Enhance the talent pipeline for a 21st-century economy

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 Degrees Awarded	1,646 2014-15	2,030 2018-19	2,299 2021-22	*2,427* *2021-22*
CECS Graduate Diversity	34.3% 2014-15	40.8% 2018-19	42.4% 2021-22	*45.0%* *2021-22*
CECS Bachelor's First-year Salaries	$50,780 2012-13	$58,232 2016-17	$59,300 2020-21	*$60,500* *2020-21*

3. Grow research and economic prosperity

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 greater outcomes.

Metric	History	Current	Trend	Trend with Investment
CECS Research Expenditures (in millions)	$47.4 2013-14	$89.3 2017-18	$105 2021-22	*$121* *2021-22*
NSF Engineering Research Expenditure Rank (among publics)	66 2013-14	33 2017-18	28 2021-22	*Top 25* *2021-22*
NSF Computer Science Research Expenditure Rank (among publics)	25* 2013-14	11 2017-18	7 2021-22	*Top 5* *2021-22*

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

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

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

2020-2021 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	$14,422,400	$0	$14,422,400
Other Personal Services	$2,000,000	$0	$2,000,000
Expenses	$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	$18,422,400	$3,000,000	$21,422,400