

***2017-2022***

***College of Engineering &  
Computer Science***

***Strategic Plan***

***August 13, 2018***

# CECS Strategic Plan (2017-2022)

## Executive Summary

In the fall of 2015, university and community leaders launched a strategic planning process to set UCF's trajectory for the next 20 years. This process, aptly named Collective Impact, resulted in [UCF's Strategic Plan](#).

The plan embraces the belief that education is entering a new phase that focuses on a combination of excellence and scale to meet society's growing demands. These values have guided us to this point and help us embark on the next twenty years. This combination of quantity and quality allows us to have the largest impact on our students and the community we serve. UCF expresses this relationship as: **Impact = Scale x Excellence**

UCF's College of Engineering and Computer Science (CECS) fully embraces this philosophy in our 5-year Strategic Plan. Our major goals are:

- **Create a Bigger and Better Research Enterprise**
- **Grow and Develop Faculty & Staff**
- **Increase Graduate Education and Research**
- **Enhance the Undergraduate Experience**
- **Become the Nation's Technology Partnership Leader**

Within the context of UCF's strategic plan, we expect CECS to thrive and prosper. As our numbers show, our teaching mission is big and continues to get bigger (scale). As our efforts demonstrate, there are better ways to provide personalized attention to our students, by emphasizing smaller learning communities and through technology that enhances individualized learning and proficiency. The growth in research demonstrates that both individuals and teams of faculty can achieve research recognition at the national and international levels (excellence and scale). As our partnerships expand, CECS and its University, Industry and Government collaborators will demonstrate that scale and excellence provide the desired multiplier effect. As our student successes showcase, excellence fuels growth and amplifies impact. The Hack@UCF club, starting from a group of 5, has attained national prominence by becoming 3-peat National Cyber Defense Champions and the Limbitless Solutions team, starting from a group of 3, creating bionic arms for children, free of cost, has attained global attention for their efforts. The UCF Programming Team has been the best team in the Southeast Region since 1983 and is one of the best in the USA. In 2018, the UCF Programming Team competed in the 42<sup>nd</sup> Annual World Finals of the ACM International Collegiate Programming Contest and finished officially 10<sup>th</sup> in the world beating all other teams in North America (US and Canada) that advanced to the World Finals.

The CECS strategic plan has been constructed as a *joint strategic and action plan*, identifying both strategies and implementation actions that will lead to greater achievements. It will be *dynamically evolving* to reflect and adapt to the latest progress, challenges and dynamics. Lastly, it will be *data-driven* to measure our successes, illustrate issues and guide our path forward.

## Vision, Mission, Goals

The College of Engineering and Computer Science (CECS) has a specific vision, mission and goals, outlined below. CECS's goals are identical with the goals established by President Hitt when he joined UCF 25 years ago. The five key goals are to offer the best undergraduate education available in Florida; achieve international prominence in key programs of graduate study and research; provide international focus to

our curricula and research programs; become more inclusive and diverse; and to be America's leading Partnership University.

## Our Vision

Our vision is to be among the nation's top producers of engineering and computer science workforce talent in terms of scale and excellence, and to lead the next generation of engineers and computer scientists in advancing research and education that impacts the global society.

## Our Mission

The mission of the College of Engineering and Computer Science is to

- Provide high-quality, broad-based education, and experiential learning in engineering and computer science
- Create knowledge through pioneering scholarship and impactful research
- Enrich our students' development and leadership skills
- Aggressively leverage technology to enhance educational efficiency and quality
- Nurture the inherent innovation and leadership of our students
- Address pressing local, state, national, and international issues in support of the global community.

## Our Focus

For any strategy, it is important to assess current status and how we arrived here to inform how to move forward. The [State of CECS<sup>1</sup>](#) provides this background along with the rationale that drives our strategic focus. CECS's strategy focuses on the growth and improvement of our research, faculty and educational program. This translates into the five objectives shown in Figure 1 – **Create a Bigger, Better Research Enterprise; Increase the Quality and Quantity of Graduate Studies and Research; Grow and Develop Our Faculty and Staff; and Enhance the Undergraduate Experience.** These efforts are indelibly intertwined and require close collaboration to ensure success. Partnerships underlie all these efforts as we strive to become **the Nation's Technology Partnership Leader** in Engineering and Computer Science.



Figure 1: CECS Focus.

### **Objective 1 - Create a Bigger and Better Research Enterprise**

The goal of CECS is to reach new funding research productivity to \$50M by 2022. CECS has established a reputation for high quality research and innovation, and new awards and research expenditures have increased by 58% and 49%, respectively, in the last two years. Since CECS has hired 63 T/TE new faculty from Fall 2013 to Fall 2017, further growth in research can be anticipated. Our goal is to reach *\$250k of new research awards annually, per faculty, by 2022, which will help us attain the \$50M a year of new awards.*

|              | FY 14   | FY 15    | FY 16    | FY 17    | FY 14-17 Diff | FY 14-FY 17 Diff. |
|--------------|---------|----------|----------|----------|---------------|-------------------|
| New Awards   | \$22.5M | \$28.19M | \$35.64M | \$37.29M | +14.79M       | +65.7%            |
| Expenditures | \$18.7M | \$24.21M | \$27.91M | \$30.28M | +11.58M       | +61.9%            |

Accomplishing this requires an integrated strategy that combines size and excellence to achieve maximum research impact. Size is driven by faculty and graduate program growth (Objectives 1 and 2). Excellence will be enhanced by implementing actions to **increase faculty research productivity; pursuing a broader range of research areas and programs** that is more tuned to selectively pursue “big grant” funding efforts; **incubating new technology areas; and expanding Clusters of Excellence.** The research growth strategy is closely aligned to the faculty and graduate education growth objectives.

### **Objective 1A - Increase Faculty Research Productivity**

**Responsible Parties:** CECS Faculty, CECS Chairs, CECS Dean’s Office, Faculty Excellence, Office of Research, Graduate College, UCF’s Applied Institute, BRIDG, CECS Staff.

Research funding within CECS has traditionally been composed of a large number of small research grants spread across all faculty, with few faculty pursuing larger research programs. However, in 2016-17, faculty pursued twice as many large-award proposals (>\$1M) as in the previous year. We will focus on implementing processes and rewards to maintain these “high performers” and nurture new ones. Additionally, CECS is undergoing tremendous faculty growth. More than 60 new T/TE faculty have been hired in the last five years and more hires (more than 30) are expected in the next 2-3 years. This provides tremendous research growth opportunity, but requires resources and support to help balance a larger research portfolio with already demanding teaching and advising duties.

#### **Strategies:**

Establish new initiatives and grow existing ones to attract and maintain “high performing” research faculty – UCF and CECS have existing initiatives that reward research productive faculty, including Administrative Discretionary Increases (ADI’s), Research Initiative Awards (RIA’s), Dean’s Advisory Board Faculty Fellows, Reach for the Stars, Pegasus and Trustee Awards. Additional reward initiatives are under consideration, the most effective of which will be adopted as needed and opportunities arise. For instance, The Office of Research and Commercialization (ORC) is supporting a few new initiatives for research productive faculty, such as: ReACT (support for large multi-disciplinary proposals), Researcher Experience Development Initiative (REDi), P3 (Post-Doc Preeminent Program), others.

Enhance current processes for new faculty – to increase their ability to successfully pursue new research programs. Current processes will be reviewed, enhanced and/or streamlined to improve mentoring, research formulation, proposal quality and project execution to accelerate the research growth for incoming junior faculty. It is worth noting that the Office of Research and Commercialization (ORC) is

supporting a good number of new initiatives to support new faculty, such as ORC Research Mentoring Program (pairing of junior and senior faculty), group visits to NSF, NIH bootcamp, seed funding (Mayo Clinic, Florida Hospital, VPR Advancement of Early Career Researchers (AECR) awards, others).

Selectively grow Research (non-tenure earning) Faculty – CECS will grow its research faculty, through existing initiatives such as the P3 (Post Doc Program) supported by the College of Graduate Studies, UCF's Applied Research Institute and BRIDG, supported by UCF, to enhance its ability to pursue larger, more applied research efforts.

### **Objective 1B - Develop a larger, more diversified Research portfolio**

**Responsible Parties:** CECS Faculty, CECS Chairs, CECS Dean's Office, Office of Research, Applied Research Institute, CECS Staff.

CECS's research portfolio is currently dominated by basic research programs funded by the National Science Foundation and other agencies. Doubling research funding dictates cultivating a broader portfolio of programs, customers, and technologies.

#### **Strategies:**

Selectively pursue larger programs – The strategic plan focuses on repositioning the portfolio to incorporate a broader mix of programs that includes larger, applied research (prototyping) programs, serving a broader customer base (including DoE, DoD, NIH, etc.) with new, multidisciplinary technology focus areas. Key to this approach will be working closely with other Colleges, Centers and Institutes within UCF, as well as with select partners (Universities, National labs and Industry) outside UCF. Close collaboration with the Applied Research Institute (ARI), and BRIDG is important, as they can provide needed infrastructure and facilities for larger pursuits. Large program pursuit requires special investment to adequately resource winning pursuits.

Expand Our Funding base – Government funding presents the largest opportunities for research growth, with anticipated growth at NSF through improved win rate and customer interaction; increased NIH funding via grant and partnering opportunities with the College of Medicine and the VA Hospital; and pursuit of larger DoD funded programs at DARPA, IARPA, etc. with emphasis on University tract programs and Industry partnering. Emphasis will also be placed on pursuing larger technology center and institute programs, such as MURIs and Government Labs funded research Centers of Excellence, in both lead and partnership roles.

Leverage Strategic Collaborations – Many anticipated R&D growth areas require multidisciplinary skills to tackle challenges in cyber security, bioengineering, autonomous systems, etc. The ability to pursue larger programs such as DoD R&D centers, MURIs, and technology development also require collaborative teams composed of Universities, Industry, and Government. CECS will build on its proven track record in partnerships to move to the next level of collaboration a) within UCF, taking a leadership position in driving multi-discipline, cross-organizational research thrusts across CECS, CREOL, the College of Medicine and other UCF Institutes; b) with other universities by forming partnerships for each strategic growth area to accelerate establishing our pedigree and pursue collaborative research opportunities (MURIs and Centers); and c) with Industry and the Government, positioning CECS as a vital research and technology provider.

CECS is implementing a more strategic approach to industry partnering that encompasses all levels of

interaction from philanthropy (naming opportunities, funded chairs and scholarships) through research (contracts, grants, sabbaticals) to the talent pipeline (student projects, internships, focused recruiting). These strategic relationships will result in growth in grants and enable partnering on larger externally funded program pursuits. The plan also calls for expanding our successful regional collaborations to national and international partners.

Promote Innovation and Entrepreneurship – CECS faculty and students generate a wealth of new technology ideas, but only a small percentage successfully escape the research lab to become new products, spinoffs, or licensed IP. CECS is evaluating strategies to improve this success rate. At the student level, CECS has established successful educational programs in leadership and innovation (a prominent example is the Engineering Leadership and Innovation Institute (eli<sup>2</sup>)), and its effectiveness is largely attributed to a few faculty (e.g., faculty leading the Professional Engineering Management Program (PEMP)) and industry experts (aka professors of practice), who create, teach, mentor and guide the classes. The mission of eli<sup>2</sup> that is impacting undergraduate students in CECS is to help students discover their burning desire and confidence to deliver world-changing solutions. Elements of the eli<sup>2</sup> effort, applied to undergraduate students, can be of great value to faculty as well, augmenting their technical knowledge with innovation practices, business leadership and entrepreneurship. How this effort can be expanded to faculty needs more discussion and resources.

### **Objective 1C - Refine Our Technology Focus**

**Responsible Parties:** CECS Faculty, CECS Chairs, CECS Dean's Office, Office of Research

CECS will leverage its areas of traditional strength, adapting the focus to further embrace emerging technology and market trends. These include mature markets such as Modeling and Simulation, Transportation Engineering and Infrastructure; and emerging markets, which include Energy Systems, Advanced Manufacturing, Sustainability, and Power Generation, Water Resources and Quality, Computer Vision, Materials and Smart Sensors.

Incubate new Technology Areas - Megatrends are defined as important shifts in the progress of a society or of any other particular field or activity. These are often drivers for academic research in its quest to maximize societal impact. This is witnessed in UCF's Faculty Cluster Initiative (FCI), which leverages our strengths and focuses strong, interdisciplinary teams on solving today's toughest scientific and societal challenges through teaching and research. CECS is leading/participating in FCI's in the areas of Cyber Security and Privacy; Resilient, Intelligent, Smart Energy Systems; Rational Design and Propulsion; Smart Prosthetics; Coastal Research; Genomics and Bioinformatics; Learning Science; and Disability, Aging and Technology. These efforts provide a focus that will fuel research growth over the strategic plan period. CECS will ensure these clusters are successful and will establish new FCIs over the strategic plan period to further facilitate research growth.

Looking forward, new initiatives will be formed to create additional focus on high impact "megatrend" technologies. Candidate growth areas include

- Bioengineering
- Next generation [nano]materials
- Robotics and autonomous systems
- Smart city technologies – infrastructure resilience, intelligent transportation, \*\*\* sensors and systems

- Smart sensors – Enabling IoT technologies and security
- Human/machine interaction, 5<sup>th</sup>/6<sup>th</sup> generation of computers (Artificial Intelligence)
- Big data and intelligent analytics

### **Objective 1D - Promote and Support Clusters of Excellence**

**Responsible Parties:** CECS Faculty, CECS Chairs, CECS Dean's Office, Office of Research, Other Units at UCF, CECS Provost's Office, CECS Staff, Other UCF Stakeholders

Attaining growth and national recognition requires strategic focus on areas where CECS can have unique impact. We will focus both on enhancing existing Clusters of Excellence and creating new ones in emerging research areas. The Clusters support three of the 5 key areas of UCF's strategy (graduate study/research, international growth, and partnerships). CECS supports clusters of excellence in the College (e.g., CATER (Center for Advanced Turbomachinery and Energy Research), ICE (Interactive Computing Experiences)), participates and supports Faculty Cluster Initiatives (FCI's), encourages and supports university centers (e.g., AMPAC (Advanced Materials Processing and Analysis Center), CRCV (Center for Research in Computer Vision)), and advocates faculty collaborations that span multiple institutions, industry, national labs (e.g., FEEDER, multiple UTC's, MIST, Florida Consortium of Metropolitan Institutions). Exciting opportunities within UCF exist for greater bioengineering collaboration between CECS and the College of Medicine and its partners in Medical City, and to provide technology (data analytics, etc.) to the social science research that will be located at the new UCF Downtown campus. Furthermore, the Smart City Initiative (4 faculty hires), initiated in Fall 2018, spanning multiple colleges (including CECS) and of overlapping interest to existing FCI's (e.g., RISES Cyber Security and Privacy), and of vital importance to UCF downtown, City of Orlando and many other stakeholders will offer multiple opportunities for P3 (public, private partnerships).

CECS fosters and supports these efforts under the verifiable belief that coalitions of faculty and other professionals create a whole that is bigger than the sum of its parts. Clusters of research excellence also provide the unique ability to attract and retain outstanding faculty and graduate students. They also provide an excellent focusing mechanism for key areas that are in line with regional and national interests.

### **Strategies:**

Support of Existing and New Clusters of Excellence – Cluster success requires sufficient resources for faculty to pursue their educational and research goals. In addition to the existing clusters, faculty compete annually for new clusters of excellence that are funded by federal or state resources or are internally funded (Faculty Cluster Initiatives). CECS provides support for these clusters, which can take many forms, including matching support for external research funding efforts, facilities and infrastructure support, administration support, or letters of recommendation for internal or external awards that recognize their outstanding performance.

Enhance Faculty Collaborations – CECS organizes and supports conferences that bring faculty from different units across UCF to create faculty groups with complementary expertise to work on challenging problems at the intersection of disparate disciplines. The purpose of these conferences is to educate faculty about the research conducted in our institution and to create faculty groups with common research interests to pursue funded collaborative efforts in emerging technologies.

CECS Outreach – Research efforts and efficiency can be improved by expanding our dialog with Industry and Government. This is accomplished by increasing the frequency of interaction, ensuring that we are targeting the right audience for specific research, and presenting our results in a compelling manner. We will grow our outreach to program managers from federal sponsoring agencies as well as industry stakeholders who have an interest in our faculty research, as well as in the education delivered in key focal areas of interest (e.g., data analytics, engineering management).

#### *Measures of Merit for Objective 1*

1. *Grow funded research to the targeted level of \$50M by 2022 (achieve \$250K/faculty by 2022)*
2. *Pursue 5 new large (>\$1M) programs per year, increase collaborative pursuits, establish new federally funded Research Centers and new FCI Clusters*
3. *Number of New Clusters Created/Research Productivity of Existing Clusters and Centers*
4. *Number and Type of Internal and External Awards and Recognitions of Faculty*
5. *Scholarly Productivity of CECS Graduated Ph.D.'s (Journals, Conferences Published or Accepted)*

## **Objective 2: Increase the Quality and Quantity of Graduate Studies and Research**

**Responsible Parties:** CECS Graduate Office, CECS Departmental Offices, Graduate College, CECS Faculty, other UCF Stakeholders

Emphasis on graduate student growth and quality is a critical element of the CECS strategy to grow and improve the research enterprise as well as enhance the College's national visibility. Over the next five years, CECS is expected to have an upper-class (Junior/Senior) undergraduate student population of about 5,500 – our goal is to have a graduate student population of 2,500, resulting in an upperclassmen undergraduate to graduate student ratio of approximately 2:1. Achieving this goal will be accomplished by a multipronged approach based on **enhanced recruiting, expanding the graduate portfolio, and increasing graduate funding and partnerships.**

### **Objective 2A - Enhanced Recruiting**

**Responsible Parties:** CECS Graduate Office, CECS Departmental Offices, Graduate College, CECS Faculty, other UCF Stakeholders

Our goals to grow graduate studies and research are bold. To attain this growth, CECS must aggressively recruit graduate students from UCF and other domestic universities, employees of companies, international students from select countries, etc. The effort will include the following **strategies**:

- CECS will implement a branding campaign for Graduate Programs via marketing collaterals such as Recruiting Brochures, Videos, Recruiting Presentations, Faculty Profiles, Web and Social Media, Grad School Virtual Fairs.
- Support CECS graduate programs in recruiting domestic UCF students including juniors and seniors, Honors students, Collegiate Work Experiences Program (CWEP) students, other internship students.
- Support CECS graduate programs in recruiting undergraduate students from other institutions by sponsoring campus visits to select student groups (e.g., McNair Scholars, students from prominent HBCU and HSI schools).



- Support CECS graduate programs in recruiting students working in companies located in the UCF's vicinity (e.g., Lockheed Martin, Harris Corporation, Siemens, Disney, others).
- Promote CECS special Master's programs: PEMP (Professional Engineering Master's Program), MS Data Analytics, and MS in Healthcare Systems Engineering, as well as emerging programs in cyber, bioengineering, computer vision, etc. Market these programs to select student groups.
- Promote CECS graduate programs nationwide to institutions without graduate/PhD programs. Establish partnerships with programs in UCF's vicinity (Florida Gulf Coast University, University of North Florida, Stetson University, etc.).
- Promote CECS graduate programs to select institutions overseas via MOUs. For example, Beijing Jiaotong University (BJTU) allows a student to pursue a dual Master's degree, where some courses are taken in BJTU and the remaining are taken at UCF.
- Leverage UCF's Global strategy to promote CECS graduate programs to select countries/regions (China, India, Middle East, Latin America).

It is worth mentioning that by promoting the College's strengths to potential graduate students from our institution or other institutions and stakeholders, as indicated above, will not only increase the quantity of graduate applicants to our College but it will also give us the opportunity to increase the quality of graduate applicants as well.

## **Objective 2B - Expanding the Graduate Program Portfolio**

**Responsible Parties:** CECS Graduate Office, CECS Departmental Offices, Graduate College, CECS Faculty, other UCF Stakeholders

Expanding the CECS graduate program portfolio in several dimensions will create the ability to better recruit top talent and position students to learn and research the newest emerging technologies and engineering challenges.

### **Strategies:**

New Master Degrees in Emerging Multidisciplinary Technology Majors, New Ph.D. degrees in Areas that meet Regional and National needs – CECS has recently created two new professional master degrees: Master of Science in Data Analytics (MSDA) and Master of Science track in Healthcare Systems Engineering (MSHSE) in IEMS. CECS has recently created a new Master Degree in Biomedical Engineering (MSBME). The full proposal of the Ph.D. degree in Aerospace Engineering has been approved and the MAE Department is now progressing to offer this degree in Fall 2019. The PhD degree in Biomedical Engineering (PHBME) is second in line and preparation for the pre-proposal and full proposal for PHBME is underway. The pre-proposal for the Master Degree in Computer Vision has been approved (Center for Research in Computer Vision), through the CS Department, is progressing with the full proposal effort. New master's programs discussions are ongoing in areas such as cyber security, Travel Technology & Analytics, etc. New graduate degree program ideas will be reviewed annually and will be selectively added to the curriculum based on their impact to the strategic plan.

Accelerated BS to MS Degree programs - CECS offers accelerated MS programs in several majors by enabling students to take selected graduate classes during their undergraduate years that count as part of their graduate degree. Our goal is to extend this across the entire college, and to make it available to both UCF students and partner Colleges/Universities as an attractive alternative to reduce the time it takes to earn both the MS and PhD degrees.

Other Targeted Outreach programs – CECS has excellent graduate programs that it offers in both face-to-face and virtual formats. Nevertheless, there are niche programs that appeal to more experienced working professionals in industry. Examples include the Professional Engineering Management Program that is offered to cohorts of professional students in face-to-face format and the Data Analytics Program that is offered face-to-face to cohorts of professional students. We will evaluate the impact of offering more programs that are uniquely targeted to emerging industry demands. These unique programs can be offered on a national, and perhaps even international, basis through online education. The first example of such a program in CECS is the Healthcare Systems Engineering Program.

CECS offering unique Master's programs brings the attention of students to research and educational strengths that we have in our institution compared to other institutions around the nation. This is expected to increase not only the quantity but also the quality of the applicants applying to our graduate programs. Furthermore, CECS offering professional Master's programs gives the opportunity to faculty teaching the related courses to interact with professionals in the field that could help us support other CECS goals, such as the Goal of the Bigger, Better Research Enterprise, as well as the overarching Goal of Becoming America's leading Technology partner.

## **Objective 2C - Increase Graduate Funding and Partnerships**

**Responsible Parties:** CECS Graduate Office, CECS Departmental Offices, Graduate College, CECS Faculty, other UCF Stakeholders

### **Strategies:**

Increasing the number and enhancing the stipends of fellowships, scholarships and assistantships available to students guarantee positive impact on graduate enrollment. CECS will maximize utilization of existing institutional resources, such as the ORC Doctoral Fellowships, Dissertation Completion Fellowship, UCF Trustees and Presidential Doctoral Fellowships, UCF Multidisciplinary Doctoral Fellowship, and the Bridge Funding Pilot Program. We will also facilitate student access to externally funded grants, and continue to grow the number of Industry-funded fellowships within CECS.

CECS will leverage existing support from UCF Global and UCF College of Graduate Studies and focus on establishing partnerships with select countries and Universities (Saudi Arabia, China, India, and Latin America). Domestically, we will target students at universities that do not currently have graduate/PhD programs, and will strategically create joint programs where it is advantageous to both universities (UNF, Florida Gulf Coast University, BJTU, others). We will continue to leverage our strong Industry partnerships (Lockheed Martin, Siemens, Disney, Harris, etc.) to grow the graduate student pipeline by offering work-study programs tailored to their needs and engineering requirements. A focused campaign to target UCF's high performing juniors and seniors (Accelerated Masters, PhD), Honors College Students (Accelerated Masters, PhD), and underrepresented populations (McNair Program) will further increase graduate student enrollment.

### *Measures of Merit for Objective 2:*

- *Number of MS and Ph.D. students*
- *Number of MS and Ph.D. Degrees*
- *Number of Students supported by TAs, RAs, Fellowships*

- *Number of Journal and Conference Publications (published or accepted) of the Graduating Ph.D.'s*

## Objective 3: Faculty and Staff Growth and Development

The success of the College of Engineering and Computer Science depends largely on the energy, expertise and creativity of its faculty and staff. The Strategic Plan provides the means to clarify and unify the CECS vision and operating imperatives. This enables clearer understanding of objectives and criteria for faculty and staff to manage their careers while providing the best possible education and research outcomes. CECS will grow faculty size, while maximizing the potential of current faculty to realize our strategic education and research goals.

### **Objective 3A - Hire new T/TE Faculty in key areas of research focus**

**Responsible Parties:** CECS Faculty, CECS Chairs, CECS Dean's Office, Office of Research, Other Units at UCF, CECS Provost's Office, CECS Staff, Other UCF Stakeholders

CECS has experienced substantial student growth over the last 10 years and expects this trend to continue. CECS has hired 63 T/TE faculty over the last five years. To keep a strong research pace and maintain educational excellence, we need to increase the College's faculty in key areas. By 2022, the CECS faculty is expected to grow to approximately 200 T/TE faculty. The new faculty will increase the quality and quantity of the research produced by the College in partnership with other UCF Colleges and Centers/Institutes, as well as in partnership with other Universities, industry stakeholders and national labs. We will strategically hire new faculty in emerging and multidisciplinary technologies to better position CECS in attracting top graduate talent both domestically and internationally, while improving both the quality and quantity of research that they perform.

### **Strategies:**

Faculty Recruiting and Diversity Focus – The focus for faculty hiring will be driven by our undergraduate and graduate education and research growth strategies. Increased emphasis on effective recruiting, efficient selection, and competitive offers are critical to our success. This involves timeliness of the search effort, aggressive marketing of faculty openings at appropriate venues, leveraging key colleagues to spread the word about openings to students and colleagues, forming search committees that work diligently to select the best applicants, showcasing our unique faculty and strengths, and making sure that chosen candidates are provided with the right resources (competitive start-up funding and space) to succeed.

As the UCF student population continues to become more diverse, we need to ensure that our faculty body reflects these changing demographics. Our first priority is always to increase the quality of our candidate pool(s). We will place increased emphasis sourcing our candidate pools from a broader range of applicants (*such as female applicants and applicants that are underrepresented minorities*) to ensure we are attracting the best and most diverse group of talent for each position.

Leverage Cluster Initiatives – One of the major areas of growth is in multidisciplinary emerging areas. UCF's Faculty Cluster Initiatives (FCIs), has as its focus to bring together the collective intelligence of both existing and new faculty from different disciplines, to collaboratively strengthen existing research areas and establish new ones. CECS is currently participating in faculty cluster initiatives spanning Cyber Security and Privacy; Resilient, Intelligent Sustainable Energy Systems, Smart Prosthetics; Rational Design and

Propulsion; Genomics and Bioinformatics; Learning Science; and Disability, Aging and Technology. These initiatives are providing a unique opportunity to augment current faculty with new top-notch academic talent. We will ensure that these cluster initiatives have successful impact on both education and research, and we plan to participate aggressively in all the cluster initiatives solicited by the Provost's Office in the future.

Communicate Our Story Nationwide – CECS remains a well-kept secret at the national level. Better communication of our story and ongoing successes directly affects our ability to attract the best faculty. Beyond enhancing our reputation as a top-tier university, it helps garner the resources required to aggressively attract world-class talent. The College of Engineering and Computer Science communicates regularly to the Central Administration, UCF and College's stakeholders (Dean's Advisory Board, other deans, and chairs) about the College successes. A campaign to better communicate the accomplishments of faculty and students at the national level will be implemented, targeting peer universities and key research partners. Furthermore a more coordinated effort, amongst all CECS units, to showcase CECS's successes to select visitors (chairs, PM's, National Academy members, others) will be pursued.

### **Objective 3B – Faculty and Staff Development**

**Responsible Parties:** CECS Faculty, CECS Chairs, CECS Dean's Office, Office of Research, Faculty Excellence, Other UCF Stakeholders, Faculty Center for Teaching and Learning

It is imperative to note that of the 200 T/TE faculty projected by 2022, *approximately 100 will be hires that have been recruited to UCF in the last five years, with the majority being junior faculty*. Increased emphasis on faculty and staff development will be a key to their success.

#### **Strategies:**

Mentoring – Aggressively and effectively mentoring new faculty to establish a research enterprise that meets their professional aspirations is a daunting task. This effort relies on the expertise and support from faculty, chairs of departments, CECS's Research Office, CECS's Graduate Affairs Office, Departmental Graduate Affairs Offices, Faculty Excellence Office, Office of Research and Commercialization, FCTL (Faculty Center of Teaching and Learning) and iSTEM (Initiatives in STEM).

Support will include both coaches at the college level and mentors within the department. The coaches are the Dean and Associate Dean of Research, Department Chair, and Research Staff that through meetings with the faculty discuss their research plans and how CECS and Departments can help them achieve their goals. All junior faculty will be mentored by senior CECS faculty on navigating "the system", identifying opportunities for collaboration, recruiting graduate students, better preparing for courses, and creating a five-year vision for their research, teaching and service duties that is in line with the mission of CECS. Mentoring of faculty is also enhanced by initiatives and efforts of supporting UCF units, such as Faculty Excellence (e.g., group visits by junior faculty to NSF), the Office of Research (e.g., review of proposals, Early Career awards mentoring), and the Faculty Center for Teaching and Learning (e.g., enhance faculty teaching skills).

Facilitated Collaboration – Collaboration will be facilitated by Group Meetings involving industry stakeholders and select CECS faculty to determine opportunities for collaboration of industry and CECS faculty; multi-disciplinary conferences to bring faculty together from multiple units at UCF to discuss opportunities for collaborative research; and faculty workshops organized by CECS offices.

Support for research, grant pursuit and proposal writing – To enhance success in research pursuits, the Office of Research, in collaboration with CECS, will provide grant pursuit seminars; group visits of junior faculty to NSF; mentoring and peer review support for grant proposals; and mentoring of junior faculty for CAREER awards.

Staff development – The growth of CECS continues to place increasing demands on the staff, reinforcing the need to ensure they have the training, tools and resources to successfully address the growing challenges. Review of current processes to optimize efficiency and impact is a top priority. These processes will be formalized and training provided to both cross-train teams and inform/guide new employees. Staff will develop a personal, annually updated, training and development plans to support their career planning and development.

*Measures of Merit for Objective 3:*

1. *Number of new positions filled and diversity of hires*
2. *Research, teaching and service productivity of new Hires (last five years)*
3. *Number of important CECS education and research stories in UCF, regional, national and international communications outlets*

## **Objective 4: Enhance the Undergraduate Experience**

**Responsible Parties:** CECS Undergraduate Office, CECS Departmental Offices, College of Undergraduate Studies, CECS Faculty, CECS Dean's Office, other UCF Stakeholders

The College of Engineering and Computer Science strives to ensure that the educational experiences span academics, engineering practice, innovation, leadership, and societal responsibility. Initiatives that enhance academic and classroom effectiveness; increase experiential learning, professional practice, and service learning opportunities; and expand timely offerings of contemporary graduate programs will improve the quality and job readiness of CECS Graduates. All academic programs must continually serve the evolving needs of employers and must reinforce the high technical and non-technical expectations that employers have of engineering and computing graduates.

### **Objective 4A - Improving academic and classroom effectiveness**

**Responsible Parties:** CECS Undergraduate Office, CECS Departmental Offices, College of Undergraduate Studies, CECS Faculty, CECS Dean's Office, other UCF Stakeholders

To improve the undergraduate academic and classroom experience, CECS will undertake Initiatives in curricula improvement and modernization, teaching efficiency, and student retention. Ultimately, CECS seeks to graduate more engineers and computing professionals who are well prepared for the demanding, well-paid jobs of today. With the strategies listed below, higher proportions of CECS students will be retained until graduation, and their time to degree will be reduced by an average of one semester.

#### **Strategies:**

Enhance and Optimize Curricula – A review of the current CECS curricula will be performed across all programs. This review will lead to opportunities for enhancement and/or streamlining offerings within

and across departments to optimize efficiency and update content to improve the impact of our courses on student learning. New electives and majors in emerging technology areas will be created to enhance student preparedness and employability. One example is the planned BS in Materials Science Engineering.

#### Measures

- *Number of core courses revised.*
- *Number of courses consolidated across programs and across departments.*
- *Number of new elective courses developed.*

Improve Teaching Efficiency – UCF is one of the nation’s largest universities, and CECS is one of the largest colleges of its type in the country. CECS will experience continued growth, resulting in unique challenges to efficiently teach large-size classes. The Evaluation and Proficiency Center (EPC) has effectively applied innovative technology and processes to improve the efficiency and quality of learning in large classes. In addition, the EPC provides a more secure environment for evaluating students’ understanding of course material. We will expand this learning model across CECS, and will create a team of UCF and industry experts to identify more technologies and methods to better automate processes and to implement adaptive learning.

#### Measures

- *Number of CECS courses offered through the EPC and the resulting grade improvements.*
- *Number of CECS faculty employing innovative technologies and adaptive learning.*

Employ Innovative STEM programs - CECS has numerous ongoing STEM programs that positively impact student progress through the engineering and computer science curricula. CECS comprises more than 50% of the total STEM disciplines and students at UCF. The programs are created and supported by funding from agencies (such as NSF) or through philanthropic support. The programs provide extra resources, guidance, and support to maximize student success. They offer enhanced educational opportunities for students in their freshman and sophomore years (e.g., EXCEL), junior or senior years (e.g., YES, many REU programs), or throughout a student’s academic career at UCF (e.g., eli<sup>2</sup>). We will continue to improve the efficiency and grow the scope of these existing efforts, and will evaluate creating new ones as part of our core strategy.

### **Objective 4B – Increase Student Success**

**Responsible Parties:** CECS Undergraduate Office, CECS Departmental Offices, College of Undergraduate Studies, CECS Faculty, CECS Dean’s Office, other UCF Stakeholders

#### **Strategies:**

Increase early student retention – Engineering disciplines traditionally have significant attrition as engineering “pending” (freshmen/sophomore) students strive to complete calculus, physics and chemistry requirements. Additional attrition is also seen at the first upper-division engineering-science courses. This is particularly true for students from underrepresented groups. CECS will monitor the progress of all engineering pending students and all computer science majors who have not yet succeeded on the CS Foundation Exam; intrusive advising measures, possibly up to and including registration holds, will be used to facilitate continuing progress toward the students’ degree objectives. Current programs (e.g., EXCEL, LEARN) are successfully supporting retention efforts and there is an effort, under way, to expand the number of students that are impacted by EXCEL (double the targeted student population from

200 to 400). Furthermore, there are consistent efforts under way (within EXCEL) to better support women (GEMS, WISE programs) and underrepresented minorities in EXCEL. Finally, changes were implemented and additional changes are considered to increase retention of CS students at their freshmen and sophomore years (e.g., Foundation exam, entry programming courses, other).

Improve Degree Efficiency – Once students in CECS programs reach the junior classification (i.e. at least 60 college-level credits earned), a substantial majority complete their degree program at UCF. CECS intends to raise degree efficiency to higher than the current 25% degree efficiency. Intrusive advising, similar to procedures for engineering pending students and pre-Foundation Exam CS majors, will be used with students nearing completion of their degree requirements to facilitate timely graduation.

#### Measures

- *Percentage of first-year CECS students retained in a CECS major for the next year.*
- *Percentage of engineering pending students advancing to an engineering major within 3 semesters.*
- *Degree efficiency for juniors plus seniors.*

Increase Employability and Advanced Education of Graduates – CECS has a goal for all of its graduates to be employed full-time in a position related to their academic field of study or enrolled full-time in a graduate or professional program within six months of completing their degrees. The activities described in Objective 4 are all targeted to directly or indirectly improve student employability. We will better capture these results by *improving our senior survey to obtain data at graduation and at 6 months after graduation.*

#### Measures

- *Number and percentage of graduates employed full-time in a related field, or are enrolled in a graduate/professional within six months of graduation. This is information that OEAS will be providing for CECS graduates.*

### **Objective 4.C - Grow Experiential Learning**

**Responsible Parties:** CECS Dean's Office, Office of Experiential Learning (OEL), Office of Career Services, CECS Faculty, and other UCF Stakeholders

Effective undergraduate education does not begin and end in the classroom. Successful and well-prepared graduates also require experiential learning in engineering processes/practice, teamwork and leadership, project management, and design. Experiential learning can take alternative forms, including part-time major-related employment, project work with professional mentoring, research participation, being part of an entrepreneurial effort, and service learning opportunities. International educational experiences provide excellent preparation for students wishing to make an impact on the modern global economy.

#### **Strategies:**

Cultivate Pockets of Excellence – The achievements of our Cyber Defense and UCF Programming teams have received national and international recognition. The entrepreneurial efforts of the Limbitless Solutions team has transformed the field of prosthetics for children. These are examples of what we call STEM Pockets of Excellence – organically motivated, student-driven endeavors that fundamentally change

the university experience for its participants. CECS is seizing on this trend, and is creating initiatives focused on encouraging student creativity, innovation and excellence that serves as a constant reminder that student pockets of excellence not only influence the smaller number of students involved but have a positive effect on the larger student population. An umbrella entity that CECS supports to cultivate students' creativity, innovation and accountability is the Engineering, Leadership and Innovation Institute (eli<sup>2</sup>) that connects with students and impacts positively their academic and professional lives from freshmen (Intro to Engineering courses), to sophomore, junior (leadership courses, employability circles), to senior (boot camps in senior design courses). The Institute's ambassadors, eli<sup>2</sup> interns, serve as peer mentors for other CECS students and help a bigger student population understand the value of paying attention to their academic efforts and professional pursuits.

Increase Internship Opportunities and Participation – CECS has a robust set of internship programs (e.g., YES, CWEP, Office of Experiential Learning, CS's internship program for IT majors) with key industry partners. These programs will be grown to encompass a broader industrial base, with a special regional emphasis placed on the growing Space Coast needs in engineering and computing. Growth beyond our region to reach national and international industry partners for co-op and full-semester internship positions is a specific area of focus for CECS.

Measures

- *Number of students participating in the Employability Circles Initiative, coordinated by eli<sup>2</sup>*
- *Number and percentage of students participating in structured internship programs*

Increase Industry Participation and Support of Senior Design – CECS is currently piloting a new senior design program where student teams compete to solve an Industry-sponsored design challenge. This creates a more realistic learning experience with close industry interaction solving real world problems that span the design process. It exposes students to complex designs requiring team-based collaboration and multidisciplinary design practices. This pilot model is being rolled to all departments with a senior design requirement.

Measures

- *Number and percentage of senior design students working on sponsored projects.*
- *Level of financial support for senior design projects*

Increase Curricular and Extracurricular Service Learning – There are many opportunities for academic student teams (e.g., senior design teams) and student clubs and organizations to extend their learning from the classroom to the community. These learning experiences result in the application of curricular material in a real-world not-for-profit setting. In addition to building on classroom learning, these experiences help students develop a better sense of their social responsibility.

Measures

- *Number and percentage of CECS students participating in a structured service-learning effort*
- *Number of community organizations providing structured service learning opportunities*

#### **Objective 4D - Increase Student Diversity**

**Responsible Parties:** CECS Undergraduate Office, CECS Departmental Offices, College of Undergraduate Studies, CECS Faculty, CECS Dean's Office, CECS Office of Diversity Initiative, iSTEM, other UCF Stakeholders



CECS recognizes the importance of a diverse and inclusive professional workforce. Traditionally, some demographic groups have been under-represented in the engineering and computing professions. CECS seeks to increase the percentages of African-American and female students and graduates to meet or exceed the national average by 2022. CECS also seeks to be among the top 10 public universities in the U.S. for Hispanic students and graduates. Targeted recruiting and retention efforts and expanded mentorship programs will be new initiatives undertaken to increase student diversity. Currently, some of these targeted (towards underrepresented in STEM groups) are happening in existing STEM programs (e.g., EXCEL, YES, McNair, IGNITE, RAMA, many others).

#### Measures

- *Percentage of African-American, Hispanic, and female students and degrees earned in CECS.*
- *Number of outreach/recruiting events, mentoring opportunities for under-represented groups.*

### **Objective 5: Become the Nation's Technology Partnership Leader**

**Responsible Parties:** CECS Dean's Office, CECS Chairs, CECS Faculty, and other UCF Stakeholders

UCF has a strong history of partnerships, and one of its five strategic goals is to become America's premier partnership university. Partnerships take on many forms, and CECS will focus on growing its alliances within UCF and across the globe to improve accessibility, education and research in Engineering and related fields. We will grow existing partnerships with other institutions (nationwide and overseas), national labs, and industry (within the region and nationally).

#### **Objective 5A – Grow UCF Partnerships**

The rapidly changing technological landscape demands that CECS curriculum and research become more agile to address emerging education and research challenges. These areas are largely multidisciplinary in nature and demand close partnering across departments and colleges. CECS will implement programs to improve efficiency and breadth of collaboration amongst multiple units within UCF.

- Implement greater technology exchange across faculty from different departments and colleges to stimulate awareness and identify new research partnering activities, along with seed funding to incubate promising new ideas.
- Faculty cluster initiatives (FCIs) provide a unique opportunity to drive multidisciplinary collaboration into all aspects of the college experience. CECS will work to ensure ongoing ones thrive, and to establish new ones in areas of high academic, economic and social impact.
- Increase the number of multidisciplinary research centers (e.g., CRCV), leveraging faculty clusters and research opportunities.
- The UCF strategic plan places increased emphasis on community outreach and impact. CECS will support these initiatives with an increased emphasis on service-based education for improved economic, and social impact across the Central Florida community.

#### **Objective 5B – Grow External Partnerships**

UCF's dramatic growth makes it an enticing University partner due to its size and influence – academically, economically, and politically. We have a unique opportunity to leverage existing partnerships and create new ones to accelerate our growth in research and graduate studies.

## Strategies:

University Partnerships – CECS will explore expanding our educational partnerships for accelerated Graduate programs, curriculum partnering in new areas of interest, and International partnering to increase CECS reach and impact. We will continue to pursue joining and/or creating new University Consortia in support of our research growth initiative. Examples include UCF's participation in the National Cyber Consortium, UTCs, FEEDER, and MIST. A unique opportunity exists to leverage the aggregate strength of the metropolitan Florida Universities (UCF, USF, and FIU) to create the critical mass to establish one or more nationally recognized research centers.

Industry/Government Partnerships – CECS has had long standing partnerships with many of the leading companies located in Central Florida (Siemens, Lockheed Martin, Disney, Harris, others). Recent economic growth in Florida, especially the Space Coast region, provides opportunities as new companies move into the region. We will both strengthen these and establish new ones by a) implementing a more disciplined partnering process that establishes a strategic plan with each partner that addresses all areas of interest (student pipeline, research, philanthropy, etc.); b) by expanding this industry model to include Government and Civil Research organizations; c) extending our regionally-dominated outreach to the national level; and d) by strengthening our connections to political representatives and advocates to champion the establishment and continued funding of research programs strategic to local, state, and national interests.

Philanthropic Partnerships – As a relatively young University, UCF does not have the long heritage of philanthropy enjoyed by many of its peer Universities. A critical element of the strategic plan is to leverage the University's (and CECS's) growing alumni population to dramatically grow funds via endowments, annual giving etc. This will be accomplished by a) relying on the strengths and connections provided by the members of the dean's advisory board, b) relying on CECS faculty members who have established long-term, sustained connections with industry, and their graduates c) relying on select alumni who have the capacity and interest to support philanthropically CECS efforts, d) relying on the quality of the pockets of excellence created at UCF by student teams or research teams.

## Measures

- *Number of new educational and research partnerships*
- *Number of new graduates, research funding resulting from partnerships*

## References

[1] The State of CECS, *CECS Report*, May 2017

## **CECS Strategic Plan Metrics**

### **Objective 1 - Create a Bigger and Better Research Enterprise**

*Measures of Merit for Objective 1:*

- *Grow funded research to the targeted level of \$50M by 2022 (achieve \$250K/faculty by 2022)*
- *Pursue 5 new large (>\$1M) programs per year, increase collaborative pursuits, establish new federally funded Research Centers and new FCI Clusters*
- *Number of New Clusters Created/Research Productivity of Existing Clusters and Centers*
- *Number and Type of Internal and External Awards and Recognitions of Faculty*

### **Objective 2: Increase the Quality and Quantity of Graduate Studies and Research**

*Measures of Merit for Objective 3:*

- *Number of MS and Ph.D. students*
- *Number of MS and Ph.D. Degrees*
- *Number of Students supported by TAs, RAs, Fellowships*
- *Number of published journals and conferences by CECS' graduating Ph.D.'s*

### **Objective 3: Faculty and Staff Growth and Development**

*Measures of Merit for Objective 3:*

- *Number of New Positions Filled and Number of Diversity of Hires*
- *Research, Teaching and Service Productivity of New Hires (last five years)*
- *Number of important CECS education and research stories in UCF, regional, national and international communications outlets*

### **Objective 4: Enhance the Undergraduate Experience**

*Measures of Merit for Objective 4:*

- *Number of core courses revised.*
- *Number of courses consolidated across programs and across departments.*
- *Number of new elective courses developed.*
- *Number of CECS courses offered through the EPC and resulting grade improvements*
- *Number of CECS faculty employing innovative technologies and adaptive learning.*

- *Percentage of first-year CECS students retained in a CECS major for the next year.*
- *Percentage of engineering pending students advancing to an engineering major within 3 semesters.*
- *Degree efficiency for juniors plus seniors.*
- *Number and percentage of graduates employed full-time in a related field, or are enrolled in a graduate/professional within six months of graduation.*
- *Number and percentage of students participating in structured internship programs*
- *Number and percentage of senior design students working on an industry-sponsored projects.*
- *Level of financial support for senior design projects*
- *Number and percentage of CECS students participating in a structured service-learning effort*
- *Number of community organizations providing structured service learning opportunities*
- *Percentage of African-American, Hispanic, and female students and degrees earned in CECS.*
- *Number of outreach/recruiting events, mentoring opportunities for under-represented groups.*

## Objective 5: Become the Nation's Technology Partnership Leader

*Measures of Merit for Objective 5:*

- *Number of new educational and research partnerships*
- *Number of new graduates, research funding resulting from partnerships*

## CECS Metrics (related to the 2020 (2021) UCF Strategic Plan)

- Doctoral Headcount: **750 (700)**
- Master's Headcount: **1,000 (839)**
- % Research Degrees: **35% (30%)**
- FTIC first-Year Retention: **90% (90.1%)**
- FTIC 6-Year Graduation: **72% (65.8%)**
- % of T/TE Faculty: **83.9% (79.6%)**
- New T/TE Diversity: **25% (13.3%)**
- Foundation Attainment: **\$10M (\$8.71M)**
- Research Awards: **\$40M (\$32.97M)**

**Key – Outside the Parenthesis: 2020 (2021) Goal; Inside the Parenthesis: 2017 Actual**

## APPENDIX A – METRICS and BENCHMARK Charts

CECS at UCF is going to use a number of benchmark metrics (provided by ASEE) to compare its performance with other peer institutions. A quick snapshot of some of the 2016 metrics for a number of peer institutions and how they compare with UCF is provided below.

| Institutions     | Rank | #<br>UG's | # MS | # Ph.D. | UG D | MS D | Ph.D. D | RE                    | # T/TE |
|------------------|------|-----------|------|---------|------|------|---------|-----------------------|--------|
| UCF              | 75   | 9467      | 839  | 700     | 1357 | 322  | 81      | \$38.985M*            | 159    |
| ASU              | 45   | 12995     | 2710 | 1096    | 1741 | 1203 | 160     | \$109.106M*           | 316    |
| UF               | 43   | 7047      | 1839 | 909     | 1239 | 865  | 184     | \$72.820M*            | 281    |
| Auburn           | 75   | 5282      | 503  | 468     | 750  | 184  | 71      | \$62.565M*            | 173    |
| Colorado State   | 56   | 2654      | 449  | 314     | 490  | 223  | 49      | \$51.146M/\$74.013M** | 118    |
| Syracuse         | 75   | 1505      | 913  | 237     | 351  | 409  | 47      | \$13.399M*            | 70     |
| U. of Houston    | 69   | 3267      | 781  | 506     | 598  | 403  | 70      | \$25.228M/\$25.425M** | 134    |
| UT Dallas        | 61   | 5128      | 1729 | 570     | 639  | 896  | 88      | \$53.169M*            | 166    |
| U. of Cincinnati | 91   | 4321      | 423  | 334     | 481  | 168  | 44      | \$17.843M*            | 126    |
| USF              | 91   | 5008      | 855  | 412     | 736  | 504  | 50      | \$15.238M/\$36.453M** | 123    |
| Northeastern     | 37   | 3803      | 3162 | 555     | 579  | 1014 | 96      | \$59.570M/\$62.707M** | 154    |
| NCSU             | 24   | 6986      | 2095 | 1264    | 1484 | 1027 | 182     | \$206.370M*           | 357    |
| U. Cal. Irvine   | 35   | 3793      | 401  | 560     | 807  | 284  | 87      | \$53.544M/\$75.087**  | 121    |

**Table A.1:** Performance Metrics for UCF and select peer institutions; Notation: Rank is the 2018 US News and World Report graduate ranking, # UG's is undergraduate enrollment, #G's is graduate enrollment, UG D is the number of undergraduate degrees, MS D is the number of MS degrees, Ph.D. D are the number of Ph.D. degrees, RE are the annual research expenditures, #T/TE are the number of T/TE faculty.

**Rank Source:** 2019 US News Graduate Engineering Schools rankings (published in 2018)

**Data source:** 2017 ASEE Profiles & Statistics of Engineering & Engineering Technology Colleges

<https://www.asee.org/documents/papers-and-publications/publications/college-profiles/2017-Engineering-by-Numbers-Engineering-Statistics.pdf> and <http://profiles.asee.org/>

### Research Expenditure (RE):

\*Total reported is expenditures within the engineering college; no expenditures reported for affiliated research centers or affiliated centers counted outside the engineering college

\*\* Total is expenditures reported within the engineering college/Total is expenditures reported within the engineering college + expenditures reported for affiliated research centers counted outside the engineering college

A more complete list of the metrics that may be used to compare UCF with its peer institutions are:

### Undergraduate Metrics:

- UG Admissions
  - Applied
  - Admitted
  - Enrolled
- Undergraduate Enrollment
  - Total
  - By Gender
  - By URM
  - By Other Ethnicities

- Bachelor's Degrees Awarded
  - Total
  - By Gender
  - By URM
  - By Other Ethnicities

#### Graduate Metrics:

- G Admissions
  - Applied
  - Admitted
  - Enrolled
- Master's Enrollment
  - Total
  - By Gender
  - By URM
  - By Other Ethnicities
- Master's Degrees Awarded
  - Total
  - By Gender
  - By URM
  - By Other Ethnicities
- Ph.D. Enrollment
  - Total
  - By Gender
  - By URM
  - By Other Ethnicities
- Ph.D.'s Degrees Awarded
  - Total
  - By Gender
  - By URM
  - By Other Ethnicities

#### Faculty:

- # T/E Faculty
  - Total
  - By Rank
  - By Gender
  - By URM
  - By Other Ethnicities
- Non-T/TE Faculty
  - Total
  - By FT, PT

#### Research Expenditures:

- Amount of Research Expenditures
  - Total
  - By Government Sponsor
  - By Private Sponsor