Item: AS: A-1

COMMITTEE ON ACADEMIC AND STUDENT AFFAIRS
Tuesday, November 13, 2018

SUBJECT: REQUEST FOR APPROVAL OF PROGRAM REVIEW – COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

PROPOSED COMMITTEE ACTION
Request approval of program review for programs in the College of Engineering and Computer Science.

BACKGROUND INFORMATION
Under Florida Board of Governors Regulation 6C-8.015 adopted March 29, 2007, all academic degree programs in State universities must be reviewed at least every seven years. Program reviews ensure that academic programs are administered and delivered effectively, efficiently, and consistent with FAU's mission and the Board of Governors' strategic priorities. The results of program reviews are expected to inform strategic planning, program development, and budgeting decisions at the university level, and, when appropriate, at the state level.

Academic Program Review at FAU includes a few additional steps:
- The self-study prepared by the program's department will be submitted to an independent review committee comprised of 2-5 individuals. The committee will include at least one external reviewer who will serve as a content expert in the discipline. Other members will include nominees of the head of the academic unit in consultation with the unit's faculty.
- The external reviewer will conduct a day and a half site-visit. A written report of the reviewer's findings will be submitted to the program's review committee.
- In addition to self-studies and external reviewer reports, action plans will be submitted to the Board of Trustees for approval.

Academic degree programs in the following departments were reviewed this year:
College of Engineering and Computer Science
   a) Civil, Environmental and Geomatics Engineering
   b) Computer and Electrical Engineering and Computer Science
   c) Ocean and Mechanical Engineering

IMPLEMENTATION PLAN/DATE

Academic Program Review summaries will be submitted to the BOG in November 2018 pending full Board approval.

FISCAL IMPLICATIONS

N/A

Supporting Documentation:2018 Academic Program Reviews

Presented by: Dr. Stella N. Batalama, Dean of College of Engineering and Computer Science

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REPORT: EXTERNAL EVALUATION OF ACADEMIC DEPARTMENTS

Stella N. Batalama, Dean

Board of Trustees Meeting

November 13, 2018

DEPARTMENT OF CIVIL, ENVIRONMENTAL AND GEOMATICS ENGINEERING
PROGRAM REVIEW EXECUTIVE SUMMARY

Program Review Self-Study Highlights

The vision of the Department of Civil, Environmental and Geomatics Engineering (CEGE) is to be nationally recognized as an eminent engineering program with excellence in education, research and community engagement. CEGE produces 55-60 BS graduates and 10-12 MS graduates each year with a mission to provide our engineering students with a high-quality education on fundamental theories and engineering design, and to conduct cutting-edge research in urban mobility/infrastructure and water resources/environmental sustainability to benefit communities in Florida and beyond.

Headcount Statistics 2016-2017
- Undergraduate Students: 418
- MS Students: 50
- Ph.D. Students: 9
- Faculty: 15.5 FTE

Degree Programs
- BS in Civil Engineering (ABET accredited)
- BS in Geomatics Engineering (ABET accredited)
- BS in Environmental Engineering (pending accreditation)
- MS in Civil Engineering
- Ph.D. in Sustainable Infrastructure in OME

Period in Review Highlights

- BSCV and BSGE each received full ABET accreditation in 2015
- BSEV was created in Fall 2016 and is expecting its first 3 graduates in December 2018
- A Ph.D. option of Sustainable Infrastructure in Ocean Mechanical Engineering was created in Fall 2015
- CEGE sponsored research reached a milestone of $1.1 million in 2014-2015 fiscal year. It was $2.0 million for 2016-2017.
- CEGE was awarded a University Transportation Center with $10.5 million for five years by the US Department of Transportation
- CEGE underwent a reorganization of the Department Advisory Board with new bylaws and membership fees in 2017
- An Alumni Advisory Board was created in Fall 2014 to engage alumni in Department activities

Undergraduate Programs
First Year Retention Rate:
- FTIC: BSCV 100% for 2015 cohort, the same as the previous year
- Transfer: BSCV 77.8% for 2015 cohort, down from the previous year 83.3%

Graduation Rate:
- FTIC: BSCV 4-year graduation rate 7.7% for 2015 cohort, down from the previous year (25%)
- Transfer: 4-year graduation rate 40.7%, down from the previous year (54.1%)
- FTIC: BSCV 6-year graduation rate 7.7% for 2015 cohort, down from the previous year (25%)
- Transfer: 6-year graduation rate 63.3%, down from the previous year (69.2%)

Placement Rate:
- 90.6% in 2015-2016, up from the previous year (89.5%) with 6 months of graduation

Graduate Programs
- 2016-2017 MSCV thesis option 30 credits, while MSCV non-thesis option 33 credits
- 2016-2017 MSCV enrollment = 50, up from the previous year (47)
- 2016-2017 MSCV degrees awarded = 13, up from the previous year (9)

Community Engagement
To provide students with opportunities to engage with communities and interact with industry professionals, the Department has hosted many events, such as:
- 2017 Southeast ASCE Student Conference (1,100 attendants)
- Annual Infrastructure Night (350 attendants)
- Annual Concrete Expo (200 attendants)
- CEGE 15-Year Annivesary Celebration (150 attendants)
- Academic service learning approved course work has increased from 2 to 12

Department Faculty
Tenured/tenure track faculty normally carry a 2+2 teaching load with assignment of 50% teaching, 25% research and 25% combined teaching, research and service
- Non-traditional faculty expertise such as Geomatics Engineering and Bioengineering
- Highly productive in terms of book publications
- High profile national awards such as NSF Presidential Young Investigator Award, Engineering Council's Education of the Year Awards and NCEES first prize award for capstone design

Department Needs
- An independent Ph.D. program
- Two more faculty members in the environmental engineering area
- Lab technicians specialized in civil and environmental engineering

Department Goals
- Broad faculty participation in sponsored research
- Research funding $200k per faculty per year;
- Peer-reviewed publications including 2 journal papers per year per faculty;
- Program ranking in the US News and World Report
- Improve student graduation rate and FE passing rate
- Improve lab conditions
- $450K fundraising

Program Assets

- The course offerings and credits required for the BSCV, BSGE, and BSEV programs are similar to programs offered by peer institutions listed in the self-study, as well as other programs nationwide.
- It is a mark of quality and strength that the all undergraduate programs require their students to take the FE/FS exam as a prerequisite for graduation.
- The MSCV has three concentration areas including structural/geotechnical engineering, transportation/geomatics engineering, and water resources/environmental engineering. The thesis option of program requires 30 credits and the non-thesis option requires 33 credits, similar to the credits required for programs at peer institutions.
- MSCV program appears to be in good health and serves an important role not only in producing MS graduates, but also in fostering research productivity.
- Current research strengths include transportation and mobility, as demonstrated by the recent award of a US Department of Transportation University Transportation Center (UTC) grant supporting the Freight Mobility Research Institute. Other stated research strengths include water resources and environmental engineering topics.

Review Team Key Observations and Recommendations for CEGE

- Approximately 56% of CEGE's undergrad students are full-time. The high fraction of part time students may contribute to the low 4-year graduation rate. Flexibility to the program could potentially decrease the average time to graduation.
- Additional efforts should be made to ensure that the pre-majors feel connected to the college and the engineering professions.
- Requiring all students just to take the FE/FS exam can lead to relative low pass rates, as not all students are available or motivated to adequately prepare for the exam. Conducting multiple study sessions and providing practice exams for the students prior to the test date may improve FE/FS pass rates.
- A BS in Engineering Technology (BSET) may improve program sustainability.
- Efforts should be made to distribute heavier teaching loads towards teaching-oriented faculty members – freeing up time for research oriented faculty members to write proposals and conduct the research.
- Focus research efforts upon a small number of areas – preferably areas that will allow most faculty members to pursue their interests to build research programs that will outlive the UTC grant.

Review Team Key Observations and Recommendations for College and University

- Pursue ABET accreditation for the BSEV program in 2020.
- CEGE requires a PhD program where students are able to focus their research as well as their coursework upon their specific area of expertise.
- FAU does not provide health insurance for graduate students, and the university has recently ceased to provide tuition waivers for research assistants.
- Hire a dedicated laboratory technician for CEGE to promote lab safety and more effective laboratory research activities.

- The renovation schedule for the Engineering West building should be developed and clearly communicated to faculty so that they can adequately plan their research and teaching activities.

PROGRAM REVIEW RESPONSE AND ACTION PLAN

As part of the response to the BOG reviewers' recommendations, the CEGE faculty has taken several initiatives to work towards making the Department recognized as an eminent engineering program nationally. Some of those initiatives are listed as follows with some detailed explanations:

- Securing office/lab space and seeking industry support for the Transportation Research and Education Hub at the FAU Davie campus (in progress)
- Forming two research focus groups to target large research grants (completed Spring 2018)
- Selecting Ph.D. program title and completing a survey of degree interests (in progress)
- Proposing minimum 72 credit hours (currently 80) for BS to Ph.D. (completed Spring 2018)
- Shifting focus of the graduate programs from MS to Ph.D. (in progress)
- Removing MS project option and reducing credit hours from 33 to 30 for non-thesis option (completed Spring 2018)
- Targeting non-thesis MS students from industry to increase program enrollment (in progress)
- Removing all prerequisites for graduate level courses (in progress)
- Changing BSCV and BSEV curricula by removing unnecessary prerequisites and increasing technical electives (completed Spring 2018)
- Replacing current BSGE with BSET to increase Geomatics student pipeline and to increase retention and graduation rates not only for CEGE but also for the College (in progress)
- Resuming industry outreach events such as annual Concrete Expo and Infrastructure Night (in progress)

Recommendation 1: Add more flexibility to the program through a higher number of technical electives and relax some of the unnecessary prerequisites. Successful implementation this strategy could potentially decrease the average time to graduation.
- BSCV: Increase technical elective credits from 6 to 9 and add four groups of technical cores as restricted electives. Remove the requirement of Calculus 3 and Physics 2 without jeopardizing ABET accreditation.
- BSGE: Remove the requirement of Calculus 3 and Physics 2 without jeopardizing ABET accreditation and State licensure requirements.
- Remove unnecessary prerequisites for all three BS programs.

Recommendation 2: Make additional efforts in the introductory engineering course (ENG 1002) to ensure that the pre-majors feel connected to the college and the engineering professions. The department should consider methods for motivating students to complete pre-major requirements and move on to the full program.
- EGN 1002 has been changed to give all engineering students the opportunity to explore civil, environmental and geomatics engineering
- Invite pre-professional students in civil, environmental and geomatics engineering concentrations to CEGE industry events
- Invite pre-professional students in civil, environmental and geomatics engineering concentrations to join and become active in CEGE-related student organizations

Recommendation 3: Work on improving the FE/FS pass rate by conducting multiple study sessions and providing practice exams for the students prior to the test date. Furthermore, the department should consider other incentives for students to take the FE exam seriously

- In including licensure information in all department courses, faculty will introduce the FE/FS manual on day 1
- Encourage the use of the FE/FS manual for reference materials in course exams and including FE/FS style questions for part of the grade in all upper level courses
- Increasing design content of design core classes (4000-level)
- Conduct annual review of course syllabi and topics taught in all courses to ensure FE/FS topics are being covered
- Coordinate with professional student clubs in the department to schedule faculty or industry-professional led FE/FS review classes
- CEGE Design 1 and 2 classes have added a mini-FE/FS exam as part of the course grade

Recommendation 4: Replacement of BSGE with BS in Engineering (BSET). Solicit industry support to help communicate the need for the new program to the Board of Governors.

- A two-step approach has been adopted. First, change the current BSGE curriculum such that it is flexible enough to attract qualified students to join the program. These changes have been initiated and in anticipation of adoption, some positive signs of an uptick in enrollment have been seen. It is anticipated that more areas of technologies (computing, mechanical, etc.) will be added to the program. If needed, the program will be replaced by BSET.

Recommendation 5: Develop a consistent algorithm that modifies the standard four courses per year faculty workload model. The algorithm should allocate more research time to those faculty members focused on research, and a higher course load to those faculty members focused on teaching.

- The Department Policy and Development Committee will review the first draft of annual assignment metrics draft by the Department Chair and make recommendation to the faculty.
- The spirit of the annual assignment metrics is to use previous year's performance to assign workload for the next year. The research performance can quantitatively be measured.

Recommendation 6: Focus efforts upon a small number of areas – preferably areas that will allow most faculty members to pursue their interests. Transportation research is one such area that can facilitate continued research funding from a diverse array of sources through the lens of transportation research.

- Two research focus groups have been established: 1) Urban Mobile Infrastructure (UMI) and 2) Water Resources and Environmental Sustainability (WRES).
- The two research focus groups had multiple meetings to assess their strengths, weaknesses and potential to combine group expertise to target large research opportunities.
- WRES faculty are working together with UMI faculty to secure its own research center, in particular, related to the environmental and water resources aspects of transportation infrastructure.

Recommendation 7: Pursue ABET accreditation for the BSEV program in 2020. This will likely require hiring or dedicating additional BSEV faculty members, as the FAU program currently lists only 2 faculty members compared to the 6-14 faculty members dedicated to peer programs.

- CEGE has been authorized to hire a tenure track faculty in the environmental engineering field with specialization in air pollution
- CEGE will assign two faculty in the water resources area to help the BSEV program through the 2020 ABET accreditation
- CEGE will pursue a technician to assist with managing the environmental engineering labs

Recommendation 8: CEGE requires a Ph.D. program if it seeks to become a nationally-recognized research leader. Students in that program must be able to focus their research as well as their coursework upon their specific area of expertise. Faculty members and administrators should closely consider the various options for getting there.

- Received strong support from the Provost and Dean
- Temporary degree title: Transportation, Infrastructure and Environmental Engineering
- CEGE is helping an independent research firm to get appropriate data for the market analysis

Recommendation 9: A quick resolution will be helpful for graduate tuition and health insurance.

- This is beyond CEGE's control

Recommendation 10: Hire lab technicians specialized in civil and environmental engineering for CEGE to promote lab safety and more effective laboratory research activities.

- Request of a dedicated CEGE laboratory technician has been made to Dean's office for several semesters.

Recommendation 11: The renovation schedule should be developed and clearly communicated to faculty so that they can adequately plan their research and teaching activities.

- The communication between Facilities and faculty has been routed through the newly hired Associate Dean for Laboratory and Engineering Technology.

DEPARTMENT OF COMPUTER AND ELECTRICAL ENGINEERING AND COMPUTER SCIENCE
PROGRAM REVIEW EXECUTIVE SUMMARY

Program Review Self-Study Highlights

The Department of Computer and Electrical Engineering and Computer Science (CEECS) aims to find a balance of adhering to the mathematical and scientific fundamentals of our disciplines while also following their evolution and reflecting them in our offered curriculum and student training. We emphasize critical thinking, problem solving and teamwork, and stress the significance of lifelong learning.

The mission of the CEECS Department is in direct alignment with the mission and vision of Florida Atlantic University (FAU) which is recognized as a university of first choice for

- Excellence in undergraduate education and the student experience,
- Comprehensive graduate education,
- Visionary and globally relevant research, and
- Transformative engagement with its global communities.

Our overall educational objective is that our students are ready on graduation to contribute to the workforce of the profession, and to advance their knowledge and engage in continuous professional development.

The last BOG review of the CEECS Department was completed in 2011.

Headcount Statistics 2016-2017
- Undergraduate Students: 814
- Graduate Students: 239
- Full-time Faculty: 42

Degree Programs
- BS in Computer Engineering, Computer Science, and Electrical Engineering
- MS in Computer Engineering, Computer Science, Electrical Engineering, and Bioengineering
- MS in Information Technology & Management
- MS in Computer Engineering, Computer Science and Electrical Engineering with Business minor
- PhD in Computer Engineering, Computer Science, and Electrical Engineering
- Graduate Certificate Programs:
  - Big Data Analytics with Computer Science and Business Tracks
  - Bioengineering
  - Cyber Security with Computer Science and Math Tracks

Period in Review Highlights

- A successful ABET review was conducted in 2016.
- Graduate certificate programs in Big Data Analytics and Cyber Security were added.
- Twelve new faculty joined the Department faculty. The number includes Dean Batalama and Dr. Jason Hallstrom, Director of the I-Sense pillar.
- I-Sense Pillar was established in 2016. Five of our new faculty are joint hires.
- An all on-line Master's program in Computer Science has been launched.
- A Bioengineering wet lab has been established at the College level and is shared by three departments.
- Research expenditure has increased by a factor of 2.5 from $1M in 2012 to nearly $2.5M in 2016. Number of nationally competitive federal awards has increased from 0 in 2009 to 13 in 2016.
- Bidtellect named the Bidtellect Laboratory for Computational Advertising, Real Time Bidding and Data Mining in the CEECS Department.

Undergraduate Programs

First year retention rate:
- Pre-professional: 22% in 2014; 83% in 2015
- Last known department: 84% in 2014; 78% in 2015

Six-year graduation rates for FTIC:
- 35.4% in 2007; 37.6% in 2008; 48.4% in 2009; 48.5% in 2010. The university rate was 48.4% in 2009

Graduate Programs
- MS Degrees awarded: 41 AY 2015; 54 in AY 2016
- PhD Degrees awarded: 5 AY 2015; 7 in AY 2016

CEECS Advisory Board

Consisting mostly of members of the local industry, the Board meets at least once each semester to give input to the Chair about teaching and research direction of the CEECS programs and workforce readiness of the students. Board members interact with faculty and students on specific events, especially the Senior Design exhibit that takes place at the end of each term. Students present their projects and Board members help with their evaluation.

Program Assets

- The department offers programs in computer engineering, electrical engineering, and computer science, which is somewhat unusual in the US.
- Department faculty have expertise in a wide range of areas which should be viewed as an advantage over departments that do not have this bandwidth of disciplines. The faculty are highly qualified in their areas of expertise.
- Diversity of faculty expertise is a strength and provides opportunities for building multidisciplinary research teams.
- FAU's research pillars of Healthy Aging, the Brain Institute, Sensing and Smart Systems and Harbor Branch Institute can be spring boards for putting together highly competitive research proposals.
- The five focus research areas in the department (smart systems; signals communications and networks; data science; bioengineering; and computer and network security) are considered highly relevant nationwide and beyond.
- Assessment metrics of all the programs are solid and the tools in place enable continuous improvement.
- Enrollment has been steadily increasing in all the programs.
- Department has a good record of working with industry, e.g. via the University Cooperative Research Center and the Center for Advanced Knowledge Enablement.
- The laboratories for the undergraduate students are well-equipped and well-maintained.
- Innovative pedagogical projects through CAPTURE, the HIS grant, eLearning, and ILHP Programs contribute to providing educational opportunities to different cohorts of students.
- The department offers a fully-online undergraduate CS program, as well as many engineering courses for non-traditional students.
- Students provided positive feedback about the care shown by the faculty toward their education. The young faculty were, for the most part, satisfied with the help they get from their senior colleagues.

Review Team Key Observations and Recommendations for CEECS

- Teaching Loads: It is recommended that teaching loads be adjusted to encourage, enable and support research.
- Research Competitiveness: Take measures to become a department that is competitive nationwide in research by rewarding research faculty and supporting the infrastructure that enables and facilitates research.
- Undergraduate Education: It is recommended to utilize the best instructors to identify problems with the curriculum and revise the curriculum. Take measures to decrease class sizes and improve on graduation rates.
- Graduate Students: Establish a TA assignment policy; support student travel to conferences. Keep track of and stay in touch with alumni.

PROGRAM REVIEW RESPONSE AND ACTION PLAN

Recommendation 1: The department has faculty members with broad expertise. Concerted efforts must be made to build multidisciplinary research teams and apply for big research grants. Funding by the college of a few excellent postdocs in the department would help in this effort.

- As the number of multi-year research funding awarded to CEECS faculty increases, our ability to hire postdocs will also increase. The CEECS department already has hired a Research Assistant Professor (Dr. George Sklivanitis) and hosts several self-funded international scholars on an average of 1-year visits.
- We encourage faculty to budget for postdocs in their proposals. For example, Dr. Feng-Hao Liu budgeted for a postdoctoral researcher in his CRII: SaTC: Practical Cryptographic Coding against Memory Attacks grant award and is expecting a postdoc to join him in January 2019.

Recommendation 2: FAU must become competitive with other major universities in attracting new Ph.D. students by improving the students' salaries and benefits. The department should then make every effort to recruit the best Ph.D. students.

- Our current scale allows for Research Assistants to be paid at a rate higher than Teaching Assistants.
- We require faculty to budget for graduate student stipends in their proposals and we encourage them to keep the rates at nationally competitive levels.
- Whenever possible we incentivize proposal submissions by matching RA requests with TA funds, thus also aiding our proposals to become competitive.

Recommendation 3: Reduce the teaching load for new faculty to at most 1+1 for the first three years, and at most 2+1 until they obtain tenure.

- This recommendation has been implemented immediately. As of AY 2018-19, all untenured assistant professors are assigned 2 courses per year.

Recommendations 4-6: Have a teaching load policy that is well-defined and transparent. It should be published and shared with all faculty. Consider increasing the teaching load for tenured faculty members who only teach and have no research activity, who do not publish and are not engaged in submission of research proposals. Consider offering teaching load reduction for tenured faculty members to develop major research grants with other faculty.

- In the CEECS Department meeting of August 27, 2018, the new course load policy giving reduced teaching loads to research active faculty has been announced.
- The College's Department Chairs have been working on a fair differential teaching load policy that will be implemented in AY2019. It contains increased teaching loads for faculty with no or low research activity. It is currently being fine-tuned and will be announced this semester to give faculty time to prepare. The draft policy is given in Table 1 below.
- Other activities that are proposed to incur significant teaching reductions are:
  - 12.5%: Leading one large grant proposal with other colleagues in the current year. The proposer must have had prior success with competitive grant funding.
  - 12.5%: Teach ED1 or ED2 in the current year.
  - 12.5%: Take active leadership of a committee in the current year

	Research Expenditures	Proposal	Journal Papers	Ph.D.		RA Support	Service	Note	Teaching		Research %	Service %	
				Guidance	Completion				Load	%			
CY 2017 Performance									3-4	87.5	2.5	10	**Next Year Assignment**
	10K*	1* (PI or co-PI)	1*	1*	1*		Major	*Meet One	3-3	75	15	10	
	$25K*	2* (PI or co-PI)	1*				Major	*Meet Two	2-3	62.5	27.5	10	
	$50k	2* (Pi or Co-PI)	2*	1*	1*	40 hr*-1 FTE	Major	*Meet Two	2-2	50	40	10	
	$75k	4* (PI)	3*	3*	1*	80 hr*-2 FTE		*Meet Four	1-2	37.5	52.5	10	
	$100K								1-2	37.5	52.5	10	
	>$150k	4* (PI)	4*	4*	4(over the past three years)*	200 hr*-5FTE		*Meet Four	1-1	25	65	10	

Table 1. DRAFT TEACHING LOAD POLICY

Recommendation 7: Have a well-defined policy in place on how TAs are assigned and strive to distribute the TAs based on faculty need.

- TA selection and the assignment of TAs to courses is decoupled. TAs will be selected and advised by research active faculty. Their course assignment will be based on course needs, and will be independent of the TA advisor. For example, a TA may be advised by Faculty A and may be assisting the teaching of Faculty B. This principle serves our dual mission: excellence in research and excellence in education.
- During the time a student serves as a TA s/he will be advised/prepared by the Advisor which, in turn, will help the transition process to an RA position in the future within the advisor's research group (after the TA is completed).
- At an appropriate time, before the beginning of the Fall semester, the Departmental Graduate Programs Committee will distribute the available number of TAs to faculty according to their research productivity. A clear and transparent method will be developed for this purpose.
- Faculty who are given the opportunity to advise a specific number of TAs will be able to either personally recruit them or select them from the applicant pool.
- It is expected that any graduate student applicant is able to assist with any UG course in a Department Program (CE, CS, EE), since these are lower level courses.
- The Graduate Programs Committee will assign the selected TAs to courses according to course needs. Course needs depend on a number of factors including class size, course content (with or without lab), faculty load, etc. Again, a transparent process will be developed.

Recommendation 8: Use some department funds to support student travel to conferences to present papers.

- We provide partial funding to support student travel to conferences. We recommend dissertation supervisors of graduate students to budget for conference travel in their proposals.

Recommendation 9: Institute a formal faculty mentoring program.

- We have identified five focal research areas in the department, depicted by the image below, and appointed leaders for each focus group. The focus group leaders and others in the group who have been successful in attracting research funding and establishing a research program will advise and mentor others.
- In general, the group leaders are asked to meet with the group at least once a semester to determine research related activity and strengths, facilitate complementing work around a theme that is a little better defined than just by the label of the focus group, and, ultimately, determine appropriate funding opportunities to which a subgroup may submit a proposal.
- Membership to the group was determined by faculty self-identification. A faculty member may belong to more than one focus group.
- The five focus groups in the CEECS Department and their coordinators are:
    - Smart Systems: Dr. Jason Hallstrom
    - Signals, Communication and Networks: Dr. Dimitris Pados
    - Computer and Network Security: Dr. Reza Azarderakhsh
    - Data Science: Dr. Xingquan (Hill) Zhu
    - BioEngineering: Dr. Waseem Asghar
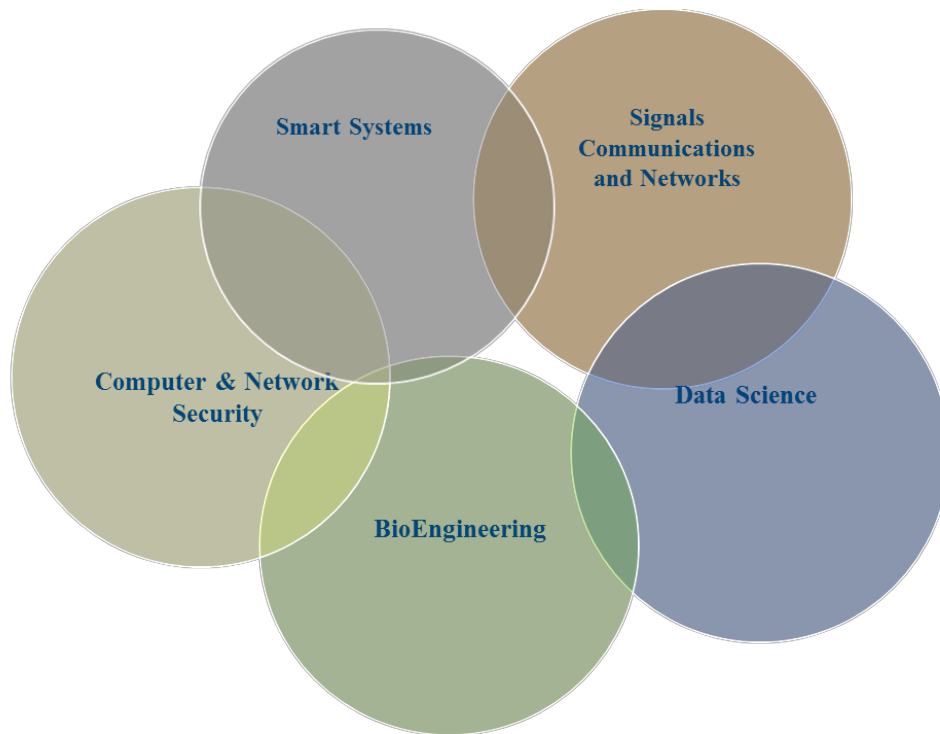
Recommendation 10: Faculty who excel in research, publication, teaching, or service should be rewarded for their efforts with an increase of their base salaries. The system of rewarding should be transparent.

- Dean Batalama has already established a college-wide research incentive policy. It has been distributed to college faculty. Associate Dean of Research has agreed to explain the policy at the second Department meeting of the term Fall18.

Recommendation 11: A committee composed of some of the best instructors in the department should be formed to identify problems in the curriculum and its implementation. This committee should make recommendations for changes, which upon approval by the faculty of the department and relevant college/university committees, should be implemented.

- The Department has the following committees in place:
    - Undergraduate EE Programs Committee
    - Undergraduate CE Programs Committee
    - Undergraduate CS Programs Committee
- CEECS Undergraduate Programs Committee consisting of the Chairs of the three Undergraduate Programs Committees have been charged with:
    - Producing an overall curriculum where students have the freedom, to the extent allowed by ABET regulations, to take courses from any program.
    - Revising the content and prerequisites of each undergraduate course to enable students the freedom to take courses across fields.
    - Developing new programs and concentrations.

Recommendation 12: A study should be carried out to understand the reasons for this low graduation rate, and plans for correcting the problem should be put into effect.

- This study has been conducted in conjunction with the CAPTURE[1] and the HSI[2] grants. Chair Nurgun Erdol and Associate Chair Hanqi Zhuang are Co-PIs of these grants. They will review and update the supporting data before and after the proposed grant programs have been established.
- A preliminary reply to this concern is that many of our students are commuters and come from low income families. We think a major change would be obtained through scholarships that see these students through their education so that they don't have to take on part or full time jobs to put themselves through school. The CEECS Advisory Board has been aware of the issue and have started by endowing the first full scholarship to a needy CEECS student for 2018-19.

Recommendation 13: The reasons why the undergraduate class size has risen should be understood, and plans for correcting the problem should be implemented.

- The Chair will meet with a select group of faculty members to discuss the class size increase in many of the entry level undergraduate Computer Science courses.
- Two possible models will be compared in light of our new TA and teaching load policies: large class size for 2/3 of the lectures plus small group recitation sessions versus small classes.
- Consideration will be given to student needs and faculty strengths.

Recommendation 14: Establish clear rules how research expenditure can reduce teaching load.

- This has been answered in response to Recommendations 4-6 in the proposed teaching load policy drafted in Table 1.

Recommendation 15: Track where graduating students go, and stay in touch with them.

- We have established our own tracking system of following CEECS alumni through a combination of faculty input, social networks such as LinkedIn and other alumni.
- We have a database of their names, current positions and contact information.
- We are planning a Back to School event inviting them to campus for a day.

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[1] CAPTURE (Computer Accelerated Pipeline to Unlock Regional Excellence) was a program funded by the Florida Board of Governors in an effort to increase graduation rates by directing CEECS bound State College students.
[2] HSI is a grant funded by the US Department of Education to continue the work started by the CAPTURE grant while targeting Hispanic and underprivileged students.

DEPARTMENT OF OCEAN AND MECHANICAL ENGINEERING
PROGRAM REVIEW EXECUTIVE SUMMARY

Program Review Self-Study Highlights

The overall mission of the Department of Ocean and Mechanical Engineering (OME) is to provide students of diverse backgrounds with the foundation necessary for an active career in ocean and mechanical engineering fields; to encourage pursuit of post-graduate studies; to conduct basic and applied research; and to provide service to the engineering profession and to the community.

The department is in a "race to excellence" and defines excellence as follows:
- Creating an outstanding and diverse engineering force with deep and hands-on knowledge
- Promote diversity, quality, creativity, work ethics and character in our graduates
- Engage in the type of research that competes with the best institutions in the nation
- Recruit and retain diverse and high caliber faculty to engage in top flite scholarly activities

Headcount Statistics - Spring 2017
- Undergraduate Enrollment: 726 students, experiencing significant growth since 2012
- MS Enrollment: 51 students
- PhD Enrollment: 49 students
- Full-time Faculty: 25

Degree Programs
- BS, MS, and PhD in Mechanical Engineering
- BS, MS, and PhD in Ocean Engineering
- Civil Engineering PhD Track under the OE program

Period in Review Highlights

Undergraduate Programs
- ABET accreditation of both programs with no weaknesses and no concerns
- Major review and overhaul of both curricula
- Overall departmental growth in undergraduate student enrollment
- Significant growth in undergraduate degrees awarded (74 in 2012 to 109 in 2016)
- Improved FTIC first year retention rates (mid 70% in 2007 cohort to over 90% in 2012)
- Improved FTIC second year retention rates (mid 50% in 2007 cohort to over 90% in 2012)
- Improved FTIC 6-yr graduation rates (high 40% in 2007 cohort to high 60% in 2011 cohort)

OURI
- Many faculty members in the department are engaged in undergraduate research

Student Club Activities
- Owls Racing Formula Race Car club (SAE) reached the top 25 among over 100 competitors
- Human Powered Submarine (HPS), took second place at Carderock
- Technology and Aerospace Club (TAC) took third place in NASA sponsored competition

Graduate Programs
- Significant overall departmental growth in PhD degree enrollment (19 in 2012 to 49 in 2017)
- Significant growth in PhD degrees awarded (3 in 2013 to 10 in 2017)

Research
- Sponsored research has grown over the past few years (Max of $4.2M in 2016)
- Funding received from ONR, NIH, DOE, and NSF
- Established two new research laboratories including Biorobotics and Biotechnology labs

New Faculty Recruitment and Hires
- The department has hired 6 new faculty members during the period since our last review
- These faculty members have been hired in key areas of growth in Florida and the Nation

Community Engagement
- The department is involved in creating displays for the museums, making presentations at various public gatherings, inviting the public to our senior design presentations

Departmental Needs
- The ME program needs additional faculty lines because of its growth in student enrollment
- The department also needs additional technical staff in the machine shop
- The department needs updated machine shop equipment to sustain its research and educational needs

Department Goals

Undergraduate Education:
- Recruit and retain nationally competitive students
- Become a model for diversity
- Provide academic support structure for timely student graduation
- Elevate the levels of student success beyond graduation by promoting lifelong learning and undergraduate research

Graduate Education and Research:
- Establish prominent areas of research in our department (for example, biomedical).
- Work effectively within the university model of pillars and platforms.
- Connect our researchers to those in sciences, medicine, and education.
- Perform state of the art research in state of the art facilities.

Community Engagement
- Engage local and state industry leaders in our curriculum planning and educational delivery through our Industrial Advisory Board
- Engage local industry in research and development efforts
- Engage in STEM promotion activities through joint activities with local schools, museums, and businesses

Program Assets

- The recently hired junior faculty are talented and research productive.
- The number of doctoral students has increased.
- SeaTech research facility is an asset for research.
- Resources have been dedicated to supporting bio-medical engineering research.
- The Department maintains an average of $2M in research expenditures annually.
- The ongoing efforts of the Department faculty in teaching are important and noteworthy.
- The undergraduate Engineering Design capstone courses provide a critical experience.
- There is a strong culture of collaboration among students in the Department.
- There are numerous student organizations and societies.
- Prominent examples include the Human Powered Submarine Club and Owls Racing Team.

Review Team Key Observations and Recommendations for OME

Curriculum Related Topics
- From the review team's perspective, the curriculum is strong but too demanding.
- Fewer required credit hours for graduation is recommended, which would improve the time to graduation statistics. Many peer institutions require fewer credit hours as well.
- Creating tracks in the program structure and in a few areas of specialization (e.g., acoustics, instrumentation, autonomous vehicles) would provide greater choice of professional electives, allow for reduction in required course credits, and provide greater flexibility
- Review course offerings to remove scheduling conflicts for required courses, avoid redundancy across courses, and ensure appropriate class sequences
- Students would like to have an opportunity to learn technical writing
- Provide for more diverse internship opportunities for the students
- Provide Fundamentals of engineering exam preparation
- Ensure consistency in the way the same course is taught by multiple faculty

Faculty and Staff
- The faculty and technical staff are excellent
- The department should hire more faculty to reduce student to faculty ratio and meet or exceed the ABET requirements
- The degree awarded to faculty ratio in some programs is higher than the national average of 4.29
- The College must be ready for projected future growth in programs
- The Boca Raton Campus needs another machinist

Facilities
- The facilities at SeaTech are excellent
- The laboratory and office facilities at the Boca Raton Campus require improvement and upgrade
- The machine equipment in some labs are subpar
- Old equipment carries safety risks which are further increased by the lack of technical support
- Only one technical person provides support for heavy machine tools at the Boca Raton Campus

Strategic Planning
- Develop strategies to recruit more full time students
- The faculty needs to appreciate and buy-in to institutional pressures to meet metrics
- Improve research productivity or course load assignment to address growth
- Be more visible in terms high impact research and publications

As part of the response to the BOG reviewers' recommendations, the OME faculty has taken the following initiatives:

- We are investing most of our budget in TA support.
- We currently offer a graduate seminar required for the Ocean Engineering BS/MS students. The department is planning to expand the seminar series and propose a zero-credit seminar class that is required for all graduate students. We plan to discuss the efficacy of this course with the Dean of the College of Engineering and if agreeable implement it.
- Starting Fall of 2019, the department will assign course loads based on a new methodology. We will discuss teaching evaluation methodologies at the department and college level with the goal of implementing the methodology in our next faculty evaluation cycle

Recommendation 1: Reduce credit hours for graduation to improve the graduation rates. Many peer institutions also require fewer credit hours.
- Discuss the need to reduce curriculum credits with the faculty in a departmental meeting
  - Feasibility of track options in the program structure
  - Few areas of specialization (e.g., acoustics, instrumentation, autonomous vehicles) as tracks
  - Identify credits that can be deleted from the curriculum
  - If programmatically possible, implement the track option
- Develop a direct Master's program with 150 credits and 12 credits overlap with BS

Recommendation 2: Review course offerings to remove scheduling conflicts for required courses, avoid redundancy across courses, and ensure appropriate class sequences. Students would like to have an opportunity to learn technical writing.
- The course sequence problem has already been resolved.
- Request the college advisors to do a more efficient job of identifying and addressing issues with course electives offered by other departments
- Discuss with the Dean of Students the possibility of incorporating Technical Writing into general Ed requirements

Recommendation 3: Provide for more diverse internship opportunities for the students.
- Work with the Industrial Advisory Board to create more diverse internship opportunities.

Recommendation 4: Ensure consistency in the way the same course is taught by multiple faculty
- Make the exams for various sections of the same course common so all students in all sections take the same exam
- Require that the professors teaching different courses meet with each other and manage the contents of the course better
- If we cannot offer two sections for a course, we will offer an online section to alleviate the scheduling problem

Recommendation 5: Because there are many part time students in the program that work in engineering firms, an appropriate coordination mechanism should be adopted.

- Make use of software more consistent between university and industry
  - Current software tools (i.e. Matlab, Solidworks and ANSYS) have been selected based on industry needs and are being used by majority of the engineering programs in the nation
  - Perform an up to date analysis of our software utility across the curriculum
- Hire instructors or part time faculty from local companies

Recommendation 6: The department should hire more faculty to reduce student to faculty ratio and meet or exceed the ABET requirements. The quality of education in some programs suffer because of the high student to faculty ratio.

- Hire at least 3-6 additional faculty in the next 2-3 years
- Hire new faculty members in emerging areas of importance to enhance the currency of the program

Recommendation 7: Labs are essential not only for instructional purposes but also for research projects The laboratory and office facilities at the Boca Raton Campus require improvement and upgrade. The machine equipment in some labs are subpar.

- Equipment will be upgraded
- An appropriate number of lab technicians will be hired to support instructional activities
- A sustained source of funding will be identified to ensure ongoing replacement of needed equipment
- A new director of facilities has been hired to address equipment, laboratory, and staffing needs