Florida Atlantic University
Department of Computer & Electrical Engineering & Computer Science
Program Review
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Review Team:
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Overview

Drs. Monson Hayes, Petar Djurić, and Lee Klinger participated in a program review in the Department of Computer and Electrical Engineering and Computer Science (CEECS) of Florida Atlantic University (FAU). The purpose of the review was to identify the strengths and challenges of the program and provide recommendations for its improvement. Before the visit, Dr. Russ Ivy, the Associate Provost of Programs and Assessment, provided the reviewers with a Self-Study Report of the department. During the visit, the reviewers had the opportunity to speak with a number of students, faculty, staff, administrators and alumni. In particular, they met with

- Stella Batalama, Dean of the College of Engineering and Computer Science
- Miriam Campo, Assistant Vice President for Research, Sponsored Programs
- Tamsyn Carey, Director, Division of Engineering Student Services & Advising
- Nurgun Erdol, Chair of the CEECS Department
- Russ Ivy, Associate Provost
- Hari Kalva, Associate Chair
- Mahesh Neelakanta, Director, Technical Services Group
- Edward Pratt, Dean of Undergraduate Studies
- Liana Smith, Assistant Dean, Degree Completion Services
- Perry Weinthal, Lab Manager
- Hanqi Zhuang, Associate Chair
- Ali Zilouchian, Associate Dean for Academic Affairs and Professor
- A group of non-tenured faculty
- A group of tenured faculty
- A group of CEECS alumni

1. Department Strengths

The department offers programs in computer engineering, electrical engineering, and computer science, and this is somewhat unusual in the US. The department was created in 2009 when the Department of Computer Science and Engineering and the Department of Electrical Engineering merged. Today, the department has 44 full-time faculty with expertise in a wide range of areas. This concentration of faculty should be viewed as an advantage over departments that do not have this bandwidth of disciplines. The faculty is highly qualified in their areas of expertise.

Having faculty with diverse expertise as at CEECS is a strength and provides many opportunities for building multidisciplinary research teams when writing large proposals. Further, FAU has invested significantly in creating four research pillars, Healthy Aging, the Brain Institute, Sensing and Smart Systems, and Harbor Branch. It can easily be argued that the faculty in the department can contribute in major ways to the core areas of each of these pillars. More specifically, the pillars can be springboards for putting together highly competitive research proposals for outside funding.

There are five focus research areas in the department: smart systems; signals communications and networks; data science; bioengineering; and computer and network security. All these areas are considered highly relevant nationwide and beyond.

The department offers degree programs at the bachelors, masters, and doctoral level in each of computer science, computer engineering, and electrical engineering, as well as a masters program in bioengineering. The assessment metrics of these programs are solid, and the department has in place a number of assessment tools that allow for continuous improvement of the programs. The number of enrolled students has been steady or increasing in each of the degree programs over the past few years, and the department has also 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.

Another positive set of activities are the department's involvement in innovative pedagogical projects through CAPTURE, and the HSI, eLearning, and ILHP Programs. Each of these programs, in its own way, contributes 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.

Many of the students provided positive feedback about the care that the faculty in the department show toward their education. The young faculty were, for the most part, satisfied with the help they get from their senior colleagues.

2. Challenges and Recommendations

During the visit, a number of issues were raised and observations made about the department, representing challenges that need to be addressed. Recommended changes and improvements are listed below.

2.1. Research

In order for CEECS to move to the next level, it is imperative to provide the environment and support necessary to grow its research. Given the research productivity measured by research award dollars per faculty, the research potential of the department has not been developed to its full strength.

It is not always easy to jumpstart research with large-scale projects. If FAU has resources, one relatively inexpensive way to move in the desired direction of wide recognition of the department, not only in Florida but in the US and internationally, is to hire a few excellent postdocs who would work with the faculty in the department in the existing focus areas and in assisting in the preparation of large-scale projects.

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.

The quality of the research of the faculty strongly correlates with the quality of their Ph.D. students. One can easily argue that one of the most important factors for having high-quality graduate and research programs is having excellent students. In the conversation with the students, faculty, and administrators, it appears that FAU provides student salaries and benefits that are not competitive in comparison with other universities. As a result, the faculty lose very promising prospects in the very early stages of their application process. FAU must help its

faculty in their recruitment of students by offering attractive financial packages. Some of the junior faculty felt that there was a lack of stability and a lot of uncertainty in regards to support for Ph.D. students.

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.

2.2 Teaching load of junior faculty

New faculty are the ones who must be provided an appropriate environment to start a research program, write proposals, and obtain funding. It was stated that new hires generally have only one course in the first year, but thereafter the teaching load is generally 2+2. Apparently, there are some exceptions, but faculty were not aware of how the exceptions were determined. There is a perception by some that there is an issue of favoritism.

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.

2.3 Teaching load of tenured faculty

Most, if not all, universities with a high level of research expenditures have teaching loads of at most 2+1 for faculty who have a high level of research activity, and generally have teaching loads of 2+1 for untenured faculty who are active in writing proposals.

For example, offer a base teaching load of 2+2, with a reduction of one course for "research active" as defined by some metrics that may include:
1. Research Expenditures
2. Proposals Written
3. Graduate Students Supported / Advised

Recommendation 4: Have a teaching load policy that is well-defined and transparent. It should be published and shared with all faculty.

Recommendation 5: 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.

Recommendation 6: Consider offering teaching load reduction for tenured faculty members to develop major research grants with other faculty.

2.4 Graduate student support

Providing teaching assistantships is a good way to attract new graduate students into the program and to provide support for graduate students doing research for a faculty member who does not have research funds to support the student. It was generally acknowledged that the assignment of TAs needs much improvement. Apparently, a relatively small number of faculty tend to be assigned most of the TAs, and there appears to be no well-defined policy or method for assigning TAs. What the current graduate students would like to see is:

1. No more than four years as a TA.
2. A commitment of at least one year when a TA is awarded. It was evident from both faculty and students that assignments were often for only one semester, and frequently students did not know if they would be supported for the next term. This creates problems for the faculty for whom these students do research as well as anxiety for the graduate students themselves.
3. Funds to support student travel by the Department.

It is important that the department adopts a clear policy on how TAs are assigned and make an effort to distribute the TAs based on faculty need, e.g., those who have the TAs working on a research project for a faculty member. One possibility for addressing this problem is to have faculty submit requests to a faculty committee set up to assign the TAs in a fair manner.

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

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

2.5 Faculty mentoring

This appears to be very informal, but It exists.

Recommendation 9: Institute a formal faculty mentoring program.

2.6 Faculty evaluations

There seems to be insufficient data available to faculty for them to benchmark their productivity with respect to others. The annual review by the Department Chair should be consistent with the expectations set by the Chair and the Department, and the Chair must be able to take a hard line with faculty. It is not clear that this is happening.

In the meeting with the senior faculty, some members showed dissatisfaction in that they felt that their salaries were not commensurate with their productivity.

Recommendation 10: Those 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.

2.7 Education

There were a number of concerns raised by undergraduate and graduate students, as well as student alumni, about the curriculum. There was a general consensus that:
1. There is a need for more courses on embedded systems; currently there is only one elective course.
2. FAU is good with teaching theory, but not very good at teaching students how to build things.
3. Students should have projects throughout the degree – other departments build a lot more things.
4. There are no focus areas**.** Just a list of courses, or a map. If one wants to specialize in a particular area, it is not clear what to take.

Some of the undergraduate students expressed dissatisfaction with the delivery of the course of Senior Design projects. It appears that there are many students who propose the project designs by themselves without much involvement of the faculty. If that is correct, this must be changed.

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.

In the department self-study, it was noted that the six-year graduation rate was only 48.5% (as of 2010). While this represents a more than 10% increase in a three-year period, the department should seek further improvements.

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.

2.8 Class sizes

The average undergraduate class size has grown from 35 in 2013 to 48 in 2017. This metric negatively affects the ranking of the department.

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

2.9 Transparency

FAU still does not have a system that provides information for credit splitting of research awards. When this system is in place, the Dean and the Chair will be in a much better position to evaluate productivity of the faculty in terms of research. How the dollar numbers affect teaching load should be clearly shared with the faculty. Transparency in how research productivity affects teaching load is very important. For example, the faculty should know that research expenditure of X dollars reduces the teaching load by one course, and research expenditure of Y dollars reduces the load by one more course.

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

2.10 Alumni

It appears that the Alumni Association at FAU is weak. The university must work to correct this situation and thereby increase the probability of bringing gifts to help fund scholarships for undergraduate and graduate students, endowed professorships, programs, and new facilities. Strong support from alumni will enable the department to recruit world-class faculty and to build labs with the most cutting-edge learning technologies. They will also enable many needy students to attend college, who otherwise would not be able to do so. In the meantime, the department can initiate its own efforts in keeping in contact with its former students.

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

3. Conclusions

The CEECS is a department of a healthy size and with the potential of making high impact on FAU's recognition, not only in Florida, but nationally and internationally. Throughout the meetings with the faculty, students, administrators and alumni, the review team learned quickly about the strengths of the department and took notice of the areas where improvements are needed. Recommendations for changes were made in several areas. In terms of priority, the area that needs the highest attention is the increase of research productivity of the faculty.