Section One: Introduction

The Graduate Program in Electrical Engineering was established in 1997 within the Bourns College of Engineering. As of Fall 2016, there were 31 faculty and 168 graduate students associated with the program. It is one of the largest graduate programs on campus. The program was reviewed on Dec 8, 9 2016 by a Graduate Program Review Committee (GPRC) including the following external reviewers: Professors Petros Ioannou from University of Southern California, Charles Tu from University of California San Diego, and Sharon Hu from University of Notre Dame. These reviewers met with faculty participating in the program, administrators, current graduate students, Graduate Council members, and Chairs from related departments. A self-study from the program and responses to confidential questionnaires for faculty and students were also part of the review. The program was previously reviewed in June 2008. The Graduate Council members preparing these findings and recommendations are Ryan Julian (Professor, Chemistry) and Byron Ford (Professor, Biomedical Science).

Section Two: Strengths, Achievements, and Challenges

Strengths
Many strengths were noted during the review process. The quality of participating faculty is high. The degree of financial support provided by Graduate Division for both attracting high-quality students to campus and enabling them to succeed in the program is excellent. As a result, the overall quality of graduate students in the program is excellent and comparable to highly ranked departments. Riverside and the Inland Empire, in general, continue to offer affordable housing relative to many of the well-known electrical engineering departments. This strength should be leveraged and advertised for attracting both faculty and students.

Achievements
The previous review in 2008 listed several specific items that have seen significant progress. It was recommended that the department increase the faculty size to 30. With 31 current faculty, the department has exceeded this expectation. Given searches currently underway or approved, it is likely the faculty size will grow further. Retention of faculty was listed as another concern. Although it is outside the scope of the review to consider individual actions taken in this regard, given that the number of faculty has increased in the intervening period, it would appear that appropriate measures were taken to ensure faculty retention. It was further suggested in the previous review that the level of collegiality could be increased. Reviewers mentioned high moral and good citizenship as strengths of the department, suggesting significant improvement in this area as well.

In addition, the department should be commended for achieving a high level of external funding. The productivity of the faculty in terms of publications and other forms of research dissemination are excellent. The reviewers were particularly impressed with the quality of recent faculty hires. Also, the program is expected to take on more MS students due to changes in the budget model.

Challenges
The number one challenge repeated oft times and in various contexts was space. There is a current lack of research space to carry out funded projects or accommodate new hires. There is a lack of office space for faculty and staff. There is also inadequate space for graduate student desks, with a dozen or more students often packed into a single room. Unfortunately, there is also inadequate classroom space, restricting the size of classes and preventing students from
being able to register for needed classes. This issue also limits the total number of classes, meaning that some classes are not offered at all. Given that this is a campus-wide problem and not caused by mismanagement at the department or college level, solutions are not easily forthcoming.

The cluster hiring program was the second largest problem identified by the program. The reviewers were also confused and concerned by the way cluster hiring was implemented on campus. In particular, the usurpation of traditional hiring by the cluster mechanism invalidated the department hiring plan and neglected instructional needs. The issue of cluster hiring has been the subject of significant discussion on campus between faculty campus-wide and the upper administration, and it is anticipated that significant movement on the subject is forthcoming.

The lack of domestic students is also a concern, not exclusive to UCR, but a problem for the entire field in general. The reviewers suggest several means for increasing domestic student recruitment, including holding an open house in February or March to which domestic students are invited and their costs reimbursed. If the number of students is too small for an open house, invite smaller groups and tailor in more individual attention. (The areas of specialization should be optimized). The reviewers suggest including robotics, power and energy systems, and nanomaterials. Although gains have been made in terms of the number of faculty, the department still lags behind top programs, and further growth is needed.

There are also issues with student advising. The current system lacks flexibility regarding students locating suitable advisors. It is also perceived by students that there is no robust mechanism for resolving conflicts between students/advisors. These issues are exacerbated by the fact that degree requirements have been changed several times in the last few years.

Section Three: Goals and Plans

The Self-Study provided by the program indicated a vision that included (1) becoming one of the top 50 EE programs in the US; (2) maintaining and increasing external funding, with particular focus on multidisciplinary grants and (3) recruiting at least one member of the National Academies. While the goals in the vision were viewed to be attainable, the GPRC stated in the summary and the exit interview that a strategic plan was not apparent. The vision/goals presented in the Self-Study were not completely consistent with some of the challenges and recommendations provided by the GPRC. These include issues with space, domestic student recruitment and efforts to increase diversity in the program. As recommended below, a clearly defined strategic plan should be developed with measurable metrics. During the exit interview, the GPRC suggested that the program could benefit from a strategic planning retreat.

Section Four: Recommendations

1. **Simplify/stabilize graduate student degree requirements.** Students reported difficulty understanding/determining program requirements for exams and selection of advisors. It was reported that degree requirement had changed several times in a piecewise manner in recent years. Many of these issues can likely be solved by increased communication with graduate students, including distribution of specific instructions outlining degree requirements, expectations for exams, etc. In the future, changes to degree
requirements should be evaluated programmatically and implemented synchronously and preferably, infrequently.

2. Develop a strategic plan with measurable metrics. Although the program has a vision for the future and lofty goals, they have not outlined a clear path for achieving them. While uncertainty for implementing the department's vision may have derived from issues related to cluster hires, the program should set specific goals and metrics for achieving their vision.

3. Increase course offerings and add other areas (e.g. robotics, bioengineering). The program should ensure that required courses are offered and available for all graduate students. The program should also consider expanding areas of specialization.

4. Improve space management. Some of the space problems are outside the immediate control of the program and reflect a campus-wide concern. However, a walk-through with external reviewers did identify space available, but not being utilized. A thorough evaluation of current resources and utilization is recommended, and an analysis of immediate and future needs should be communicated to the Dean.