THE UNIVERSITY OF UTAH

January 10, 2017

Ruth V. Watkins
Senior Vice President for Academic Affairs
205 Park Bldg.
Campus

RE: Graduate Council Review
Department of Electrical and Computer Engineering

R Watkins 1-11-17
David W. Pershing 1-11-17

Dear Vice President Watkins:

Enclosed is the Graduate Council's review of the Department of Electrical and Computer Engineering. Included in this review packet are the report prepared by the Graduate Council, the Department Profile, and the Memorandum of Understanding resulting from the review wrap-up meeting.

After your approval, please forward this packet to President David Pershing for his review. It will then be sent to the Academic Senate to be placed on the information calendar for the next Senate meeting.

Sincerely,

David B. Kieda
Dean, The Graduate School

Encl.

XC: Gianluca Lazzi, Chair, Department of Electrical and Computer Engineering
Richard B. Brown, Dean, College of Engineering

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**The Graduate School - The University of Utah**

# GRADUATE COUNCIL REPORT TO THE SENIOR VICE PRESIDENT FOR ACADEMIC AFFAIRS AND THE ACADEMIC SENATE

*September 26, 2016*

The Graduate Council has completed its review of the **Department of Electrical and Computer Engineering**. The External Review Committee included:

John Booske, PhD
Duane H. and Dorothy M. Bluemke Professor
Vilas Distinguished Achievement Professor
Department of Electrical and Computer Engineering
University of Wisconsin, Madison

Sarah A. Rajala, PhD
Dean
James and Katherine Melsa Professor in Engineering
College of Engineering
Iowa State University

T.E. Schlesinger, PhD
Benjamin T. Rome Dean
Professor of Electrical and Computer Engineering
Whiting School of Engineering
Johns Hopkins University

The Internal Review Committee of the University of Utah included:

Wendy W. Chapman, PhD
Professor and Chair
Department of Biomedical Informatics

Henryk Hecht, PhD
Professor
Department of Mathematics

Robert E. Marc, PhD
Calvin and JaNeal Hatch Presidential Endowed Chair
Department of Ophthalmology and Visual Science

This report of the Graduate Council is based on the self-study submitted by the Department of Electrical and Computer Engineering, the reports of the external and internal review committees, and the Department Chair's response to the external and internal committee reports. The Dean of the College of Engineering indicated his support of the Chair's response.

## DEPARTMENT PROFILE

### Program Overview

The Department of Electrical Engineering first conferred Bachelor of Science in Electrical Engineering degrees in 1932. A degree in Computer Engineering was first offered in 1990, and in 2001 the department changed its name to Electrical and Computer Engineering (ECE). The department's core educational program is to provide training leading to undergraduate BS degrees in Electrical Engineering and Computer Engineering, a range of MS degrees, BS/MS degrees, MS /MBE degrees with the School of Business, and a PhD program. The mission is *"excellence in teaching and in research, with a focus on activities to address educational technological grand challenges of our society."*

The ECE program has four main areas of research expertise: Microwave and Optics, Electronics and Semiconductor Devices, Signals and Systems, and Computer and Digital Design. A few USTAR faculty are housed in the new Sorenson Molecular Biotechnology Building where there is a substantial nanotechnology training and research component led by the Utah Nanofab facility.

The Department has high overall morale and maintains a strong emphasis on a collegial atmosphere. The leadership of department chair Dr. Gianluca Lazzi is highly regarded for having overseen rapid growth of tenure-line faculty, enhancing the undergraduate program through improved training resources and recruitment, growing the graduate program through recruitment of research oriented faculty, maintaining key faculty, increasing attention to diversity issues, and enhancing opportunities for technology commercialization.

The program is nationally ranked for undergraduate teaching. According to *US News & World Report*, the national rankings have shown a slow but steady improvement since 2008, currently lying between 40$^{th}$ and 50$^{th}$. In 2013, it was 25$^{th}$ among public institutions. The internal review noted the subjective nature of these rankings but offered commendations to Dr. Lazzi for having guided a significant rise since the last department review.

In 2013, the department developed a strategic plan for the 2013-2018 period. Primary goals included a) Improve educational, financial and administrative support for undergraduates, b) Increase graduate opportunities and research output and visibility, c) Attract and support top faculty, d) Enhance department diversity, and e) Facilitate the technology transfer and commercialization.

### Faculty

The department is comprised of 33 tenure-line faculty (24 tenured and 9 tenure-track), of whom 7 are USTAR faculty; 2 career-line research faculty; 3 career-line lecturer faculty; and 11 staff members. Of the tenure-line faculty, 15 are full professors, 11 are associate professors and 7 are assistant professors, consistent with a mature department. Since 2008 the department has grown rapidly with 16 faculty hires in 6 years and a 78% expansion of tenure-line positions since 2008.

The teaching loads are well balanced among faculty. While the faculty has the usual challenges of balancing teaching and research demands, a strong effort has been made to improve TA training and resources through a recent hire of a staff member, Jon Davies, dedicated to TAs and lab training. The internal review committee noted that "the faculty are exceptionally pro-student, sensitive to student needs, generating a very attractive and welcoming environment in a discipline not traditionally viewed as student-friendly." The external review committee noted "the department has strong academic programs at all levels" with positive reviews from a recent ABET evaluation.

The faculty is unusually productive as measured by publications and conference proceedings, with $7.7M in research expenditures in 2015 (averaging $230K per faculty), 15 faculty-led startups, and 40 corporate collaborations. The number of research papers and conference proceedings published since 2010 approaches 200. Although the number of PhD students has steadily risen, research expenditures are down from a peak near $11M in 2011. The department strategic plan notes a goal of increasing research productivity, but that it may be unrealistic to attain this without increasing the department size.

The department has created a Diversity Council to devise strategies to increase the diversity among faculty. While only four of current faculty are women, of recent faculty hires in the past six years, two are women and two are Hispanics.

**Students**

The most recent records indicate 491 BS degree students including pre-majors, divided between 310 BSEE and 181 BSCE students. This is 7% lower than peak enrollment in 2012-2013. Graduation rates have been stable and most graduates go into industry. The graduate program consists of 142 MS students and 128 PhD candidates, double the amount of one decade ago.

Areas of concern noted by the undergraduate students who were interviewed include a need for greater flexibility and ease of class and lab scheduling, few available electives in free timeslots, disproportionate effort compared to grade value for laboratory classes, concerns about the quality of teaching, a lack of interaction with department administration, and relatively difficult access to food and refreshment. There exists an ECE lounge for students. Nonetheless, graduate students felt a lack of community.

In its self-study report, the department has recognized the need for increased diversity in a department that currently has low representation of women and minorities. While ECE has established a Diversity Council whose mission is to "propose and assess initiatives to increase diversity in ECE," it is not evident from the self-study report what exact actions the Diversity Council has taken to improve student diversity. Current efforts that should be commended include a summer camp offered only to high-school-aged girls. There has been an increase in the percentage of female undergraduate students between 2008 and 2014, from 7% to 11%. Among female graduate students, the percentage over the same period has increased from 10% to 15%.

## Curriculum

The 2013 strategic plan states the department mission is to have an undergraduate curriculum that produces not just "a technically skilled individual, but a future technical innovator and leader." The undergraduate ECE curriculum requires courses in the humanities, basic and applied sciences, mathematics, applied laboratory work, communications and programming, Faculty are encouraged to develop, among other possibilities, online materials such as videos, screen captures, audio, and online quizzes and tests for their classes. The goal is to "flip" the class by shifting instructional time to outside the classroom, allowing for use of classroom time to work on problems, etc.

A concern raised by the Internal Review Committee was frustration by undergraduates with TA teaching qualifications and a lack of consistency between coursework and laboratory studies. It was noted, however, that faculty and staff are aware of the issues and are making efforts to recalibrate classes and labs and improve TA training. A related concern that arose in the exit meeting with the External Review Committee was an impression that course work may have an over-emphasis on "fundamentals" where there could be greater emphasis on technical electives or exploratory laboratory studies. The External Review Committee also noted that scheduling concerns, combined with a limited selection of technical electives, often left students with only one elective option.

## Program Effectiveness and Outcomes Assessment

The department provided limited information on program effectiveness and outcomes in its self-study report. In principle, the department has established a flowchart for self-assessment of its degree program that is fully completed every two to three years that is led by the Undergraduate Committee. Assessment is done by requesting that instructors complete a five-point form. Students are assigned a task for evaluation, the percentage of students with satisfactory grades is tallied, and points are identified for improvement of student performance. Unfortunately, no information was provided on the nature of the task, what counts as "satisfactory," the participation rate, or the impact of this exercise. The program effectiveness assessment noted that the number of undergraduate students who elect to work in industry ranges between 50 and 75%, with the rest primarily going to graduate school and a few pursuing a military career. No information was provided on attrition rates for undergraduates, although it is clear that in the graduate program they are very low.

## Facilities and Resources

The department budget of $5.1 million is derived 71% from base funding, augmented primarily by productivity funds, differential tuition, and the USTAR initiative. Financial constraints were not highlighted in the self-study or in the internal and external reviews. The most pressing financial concerns appear to be establishment of fellowships and endowments.

Challenges with space resources have been alleviated with construction of the Floyd and Jeri Meldrum Civil Engineering Building (14,500 square-foot-addition, completed in the Fall of 2010); the Sorenson Molecular Biotechnology Building (USTAR) (200,000-square-foot facility completed in 2012); and the Rio Tinto Kennecott Mechanical Engineering Building (39,000-square-foot facility, completed in

May 2015). The Utah Nanofab facility in particular was noted by the external and internal reviewers as being an exceptional facility, both in resources and staffing.

All the projects above, especially of the Utah NanoFab facility, have allowed for recent faculty expansion from the Merrill Engineering Building into new space in the Kennecott Building and the USTAR Building. The Department of Electrical and Computer Engineering occupies approximately 48,819 square feet, including 12,400 sq. ft. of classroom space, and 1,400 sq. ft. of space for teaching assistants, work/meeting areas for students, and areas for senior projects/clinics space. Despite expansion, the internal review noted that student laboratories appear fully subscribed with little room for expansion.

## COMMENDATIONS

1. The new chair, Prof. Gianluca Lazzi, is respected and his leadership along many fronts is commendable.

2. The department has a collegial atmosphere and high morale.

3. Recent hires have led to improvements in faculty diversity.

4. The faculty are unusually productive, both in securing grants and in publishing.

5. The department has access to excellent physical facilities, specifically in the Nanofab area, with growing partnerships with the health sciences.

6. Many of the goals outlined in the 2013 strategic plan appear to have been implemented, or significant efforts have been made towards their realization.

## RECOMMENDATIONS

1. Operations of the department will need to change to take into account changes due to growth. Addressing this includes updating the existing strategic plan to maintain and leverage existing strengths.

2. Competing for the best students with more highly ranked programs nationally would be aided by increased emphasis on uniquely strong programs within ECE, most notably the Utah NanoFab facility.

3. Some fairly modest adjustments should be considered to improve the undergraduate experience. For example: improving class scheduling and reducing core requirements so that there is greater choice available for technical electives could allow students to pursue a deeper focus in their interest areas.

4. Greater detail in the assessment of program effectiveness and outcomes is needed, including more detailed statistics of where graduates are obtaining employment or pursuing further studies.

5. The Diversity Committee needs to establish a clearer mission and program of action. While it is laudable that such a committee has been established and that attention has been paid to diversity in faculty hires, the specific goals and contributions of the Diversity Committee should be made explicit.

Submitted by the Ad Hoc Committee of the Graduate Council:

Timothy J. Garrett (Chair)
Professor, Department of Atmospheric Sciences

Mingnan Chen
Assistant Professor, Department of Pharmaceutics and Pharmaceutical Chemistry

Valeria Molinero
Professor, Department of Chemistry

Rachel Hayes-Harb (Undergraduate Council)
Associate Professor, Department of Linguistics

College Name
College of Engineering

Department Name
Electrical & Computer Engineering

Program Name
All

## Faculty Headcount

| | | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 |
|---|---|---|---|---|---|---|---|---|
| With Doctoral Degrees Including MFA and Other Terminal Degrees | Full Time Tenured Faculty | 18 | 17 | 17 | 20 | 19 | 19 | 20 |
| | Full Time Tenure Track | 8 | 7 | 9 | 7 | 8 | 8 | 7 |
| | Full Time Career Line/Adjunct Faculty | 3 | 4 | 4 | 4 | 4 | 5 | 5 |
| | Part Time Tenure/Tenure Track | | 2 | 2 | 3 | 3 | 3 | 4 |
| | Part Time Career Line/Adjunct Faculty | 1 | 1 | 1 | 1 | 2 | 2 | 1 |
| | Total | 30 | 31 | 33 | 35 | 36 | 37 | 37 |
| With Masters Degrees | Full Time Tenured Faculty | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Full Time Tenure Track | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Full Time Career Line/Adjunct Faculty | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Part Time Tenure/Tenure Track | | 0 | 0 | 0 | 0 | 0 | |
| | Part Time Career Line/Adjunct Faculty | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Total | 0 | 0 | 0 | 0 | 0 | 0 | |
| With Bachelor Degrees | Full Time Tenured Faculty | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Full Time Tenure Track | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Full Time Career Line/Adjunct Faculty | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Part Time Tenure/Tenure Track | | 0 | 0 | 0 | 0 | 0 | |
| | Part Time Career Line/Adjunct Faculty | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Total | 0 | 0 | 0 | 0 | 0 | 0 | |
| Total Headcount Faculty | Full Time Tenured Faculty | 18 | 17 | 17 | 20 | 19 | 19 | 20 |
| | Full Time Tenure Track | 8 | 7 | 9 | 7 | 8 | 8 | 7 |
| | Full Time Career Line/Adjunct Faculty | 3 | 4 | 4 | 4 | 4 | 5 | 5 |
| | Part Time Tenure/Tenure Track | | 2 | 2 | 3 | 3 | 3 | 4 |
| | Part Time Career Line/Adjunct Faculty | 1 | 1 | 1 | 1 | 2 | 2 | 1 |
| | Total | 30 | 31 | 33 | 35 | 36 | 37 | 37 |

## Cost Study

| | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 |
|---|---|---|---|---|---|---|---|
| Direct Instructional Expenditures | 3,493,168 | 3,627,521 | 3,870,246 | 4,162,901 | 4,164,798 | 4,562,546 | 4,810,241 |
| Cost Per Student FTE | 15,113 | 13,623 | 13,585 | 13,383 | 12,906 | 13,998 | 14,816 |

## FTE from Cost Study

| | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 |
|---|---|---|---|---|---|---|---|
| Full-Time Salaried | 30 | 33 | 31 | 35 | 33 | 36 | 47 |
| Part-Time or Auxiliary Faculty | 2 | 1 | 2 | 2 | 3 | 3 | 5 |
| Teaching Assistants | | | | | 0 | 0 | 0 |

## Funding

| | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 |
|---|---|---|---|---|---|---|---|
| Total Grants | 5,823,683 | 9,854,875 | 7,796,932 | 5,917,804 | 5,205,898 | 6,850,927 | 6,320,085 |
| State Appropriated Funds | 3,038,072 | 3,316,154 | 3,496,488 | 3,551,789 | 3,637,548 | 3,942,178 | 4,101,368 |
| Teaching Grants | 181,833 | 314,889 | 249,548 | 296,849 | 237,439 | 229,714 | 128,907 |
| Special Legislative Appropriation* | | | | | | | |
| Differential Tuition* | | | | | | | |

* OBIA no longer tracks differential tuition, and USTAR funds are not reflected in this table, although they contribute to the department's budget.

## Student Credit Hours and FTE

| | | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 |
|---|---|---|---|---|---|---|---|---|
| SCH | Lower Division | 1,562 | 1,609 | 1,693 | 1,899 | 2,179 | 1,948 | 1,974 |
| | Upper Division | 2,442 | 3,096 | 3,506 | 3,587 | 3,355 | 3,525 | 3,163 |
| | Basic Graduate | 1,080 | 1,242 | 1,118 | 1,411 | 1,424 | 1,566 | 1,650 |
| | Advanced Graduate | 874 | 947 | 1,114 | 1,153 | 1,341 | 1,305 | 1,419 |
| FTE | Lower Division | 52 | 54 | 56 | 63 | 73 | 65 | 66 |
| | Upper Division | 81 | 103 | 117 | 120 | 112 | 117 | 105 |
| | Basic Graduate | 54 | 62 | 56 | 71 | 71 | 78 | 83 |
| | Advanced Graduate | 44 | 47 | 56 | 58 | 67 | 65 | 71 |
| FTE/FTE | LD FTE per Total Faculty FTE | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| | UD FTE per Total Faculty FTE | 3 | 3 | 4 | 3 | 3 | 3 | 2 |
| | BG FTE per Total Faculty FTE | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | AG FTE per Total Faculty FTE | 1 | 1 | 2 | 2 | 2 | 2 | 1 |

## Enrolled Majors

| | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 |
|---|---|---|---|---|---|---|---|
| Undergraduate Pre-Majors | 95 | 126 | 137 | 172 | 146 | 218 | 231 |
| Undergraduate Majors | 166 | 183 | 192 | 184 | 176 | 193 | 190 |
| Enrolled in Masters Program | 78 | 64 | 59 | 73 | 87 | 98 | 94 |
| Enrolled in Doctoral Program | 56 | 55 | 72 | 78 | 90 | 101 | 106 |
| Enrolled in First Professional Program | | | | | | | |

## Degrees Awarded

| | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 |
|---|---|---|---|---|---|---|---|
| Undergraduate Certificate | | | | | | | |
| Graduate Certificate | | | | | | | |
| Bachelors | 44 | 49 | 53 | 66 | 47 | 57 | 52 |
| Masters | 35 | 44 | 31 | 36 | 34 | 66 | 45 |
| Doctorate | 12 | 12 | 14 | 7 | 10 | 15 | 8 |
| First-Professional | | | | | | | |

THE UNIVERSITY OF UTAH

# Memorandum of Understanding
# Department of Electrical and Computer Engineering
# Graduate Council Review 2015-16

This memorandum of understanding is a summary of decisions reached at a wrap-up meeting on November 29, 2016, and concludes the Graduate Council Review of the Department of Electrical and Computer Engineering. Ruth V. Watkins, Senior Vice President for Academic Affairs; Richard B. Brown, Dean of the College of Engineering; Gianluca Lazzi, Chair of the Department of Electrical and Computer Engineering; David B. Kieda, Dean of the Graduate School; and Katharine S. Ullman, Associate Dean of the Graduate School, were present.

The discussion centered on but was not limited to the recommendations contained in the review summary report presented to the Graduate Council on September 26, 2016. At the wrap-up meeting, Senior Vice President Watkins lauded Chair Lazzi as well as Dean Brown for the excellence of this department. The working group agreed to endorse the following actions:

**Recommendation 1: Operations of the department will need to change to take into account changes due to growth. Addressing this includes updating the existing strategic plan to maintain and leverage existing strengths.**

The Chair has anticipated changes that may be necessary as the Department adapts to its increased size. As a result, the departmental administrative structure has evolved, with increasing numbers of faculty members helping to manage various domains. Further, the Department intends to revisit their carefully-formulated strategic plan every 3 years. They anticipate starting a process of revision in Spring 2017. This will be an excellent opportunity to reflect on the full range of content from the review teams and self-study, and the Graduate School looks forward to the update. Dean Brown mentioned other changes taking place College-wide, such as a streamlining of RPT evaluation procedures to reduce the time burden per faculty. Finally, there was some discussion of a point brought up in the external review regarding a chair vs. head (longer-term) model. University of Utah policy clearly restricts department chairs to 3-year appointments. On the other hand, chairs at the U are empowered to implement their visions for the department and have stability through re-appointment. These features may not have been apparent to the external reviewers, but work well in terms of providing continuity to successfully-run programs.

**Recommendation 2: Competing for the best students with more highly ranked programs nationally would be aided by increased emphasis on uniquely strong programs within ECE, most notably the Utah NanoFab facility.**

The Department of Electrical and Computer Engineering has many strengths and aims to build its reputation around comprehensive excellence. Certainly, though, access to premier resources, such as the Utah NanoFab facility, is attractive to prospective students and the Department plans to highlight this in websites and brochures aimed at student recruitment. More generally, it will be important to project the central nature of ECE, in engineering and beyond, and to bring attention to areas where there are excellent opportunities for students here, including the engineering entrepreneurship classes and certificate programs that are currently in the final stages of development. This entrepreneurial emphasis builds on a rich history that itself is a natural area to underscore in recruiting efforts.

**Recommendation 3: Some fairly modest adjustments should be considered to improve the undergraduate experience. For example: improving class scheduling and reducing core requirements so that there is greater choice available for technical electives could allow students to pursue a deeper focus in their interest areas.**

A main hurdle to modifications in scheduling is the constraint of space availability. Additionally, there can be unforeseen effects, such as creating a conflict with a course that is outside the Department but part of a student's program of study. It is important that the current advising structure is working well and rapidly identifies scheduling issues that arise. As possible within practical constraints, changes will be evaluated. To more broadly coordinate class offerings, the Department will stay up to date on the campus-wide strategic scheduling initiative. This recommendation also refers to the balance of required and elective courses, which has long been under consideration in the Department. The departmental undergraduate curriculum committee has been charged to investigate current trends in ECE curriculum at top peer schools. This measured approach to ensuring the curriculum is contemporary and has the right amount of flexibility should help alleviate tensions that arise when long-standing courses lose their required status. The faculty are encouraged to help promote these changes and, indeed, have taken steps in the direction of an overall model that includes avenues for deeper focus with their proposal for a Certificate in Engineering Entrepreneurship. The Department and College are also encouraged to develop a process to actively engage in discussion with the departments providing service courses to reduce scheduling conflicts.

**Recommendation 4: Greater detail in the assessment of program effectiveness and outcomes is needed, including more detailed statistics of where graduates are obtaining employment or pursuing further studies.**

There was general agreement that reviewers may not have fully appreciated the extent to which the ECE Department is already collecting extensive information related to program effectiveness and outcomes. As one example, the Dean pointed out that exit interviews are conducted College-wide at a 100% rate. Action items, therefore, centered on whether it would be useful to make any of this data (such as employment

and alumni satisfaction) more accessible to students as a way to showcase the success of the training programs and, potentially, to facilitate networking among students and alumni. Privacy of data collected is a consideration, however, with some options that could be anonymized and others that would require permission to make accessible. Posting links to outcomes in national databases was also discussed as an option. The Department will consider these options and report their decisions to the Graduate School, in addition to maintaining excellence in program effectiveness and outcome data collection.

**Recommendation 5: The Diversity Committee needs to establish a clearer mission and program of action. While it is laudable that such a committee has been established and that attention has been paid to diversity in faculty hires, the specific goals and contributions of the Diversity Committee should be made explicit.**

With the infrastructure in place, this is an excellent opportunity on which to capitalize, and the Diversity Committee will be directed to establish clear tasks that promote diversity in alignment with the Department's strategic plan. Specific actions discussed at this meeting were 1) dedicating an appropriate level of departmental funds for this effort to empower the committee and facilitate their initiatives; 2) leveraging institutional strategies (such as ACCESS U and the Women's Enrollment Initiative), especially in connection to building stronger pipelines to diverse transfer students at other institutions such as Salt Lake Community College; and 3) implementing knowledge and suggestions gained through the recent College-wide participation in the American Society for Engineering Education diversity pledge.

This memorandum of understanding is to be followed by regular letters of progress, upon request of the Graduate School, from the Chair of the Department of Electrical and Computer Engineering. Letters will be submitted until all of the actions described in the preceding paragraphs have been completed. In addition, a three-year follow-up meeting will be scheduled during AY 2018-19 to discuss progress made in addressing the review recommendations.

Ruth V. Watkins
Richard B. Brown
Gianluca Lazzi
David B. Kieda
Katharine S. Ullman

David B. Kieda
Dean, The Graduate School
January 10, 2017