May 17, 2018

TO: William Karpus, Dean, Graduate School
Sarah Mangelsdorf, Provost

FROM: James P. Blanchard, Executive Associate Dean

RE: 10-year Review of the Graduate Program in Civil and Environmental Engineering

At its May 16, 2018 meeting, the College of Engineering Academic Planning Council (APC) unanimously recommended for approval the attached program review for the Civil and Environmental Graduate Program.

The review committee noted the strong relationships between faculty, staff and graduate students in the department. The committee also commented on the long-standing interaction with industry and suggest that these activities could be beneficial to other departments in the College. The review also points out areas for improvement including lab renovations, improving graduate student recruitment and better communication between the six research areas.

In view of the positive report from the review committee and on behalf of the College of Engineering, I accept the APC’s recommendation to approve this certificate review.

We now ask for approval from the Graduate Faculty Executive Committee.

cc: Jocelyn Milner, APIR
Emily Reynolds, APIR
Sarah Kuba, APIR
David Noyce, Chair, Dept. of Civil and Environmental Engineering
Laura Albert, Assistant Dean for Graduate Affairs, College of Engineering
April 20, 2018

To: Ian Robinson, Dean of the College of Engineering  
    Laura Albert, Assistant Dean for Graduate Affairs, College of Engineering

From: Bernard Lesieutre, Professor, Electrical and Computer Engineering, Chair of CEE Graduate Program Review Committee

RE: Program Review for the Civil and Environmental Graduate Program

On behalf of the Program Review Committee, I would like to submit our report for the program review of the Civil and Environmental Engineering Graduate Program. In our report we explain the process we used to conduct our study, and we list program strengths, concerns and challenges, and make recommendations that are intended to be helpful for continuing improvement.

The committee would like to draw your attention to a few particular features of the Civil and Environmental Engineering program that we found impressive, and that could be adopted by other departments in the college to their benefit. These features include:

- A formal structure of adjunct professors from related industries serving as professors of practice, bringing extensive practical experience to the classroom, and expanding the teaching capacity of the department.
- A committee of student representatives that meets with the chair monthly.
- Long-term practices that have resulted in particularly strong alumni relations.

Attachment: Report of the Program Review Committee

Copies:  
Riccardo Bonnaza, Professor, Engineering Physics  
John Lee, Professor, Industrial and Systems Engineering  
John Pfotenhauer, Professor, Mechanical Engineering  
David Noyce, Professor and Chair, Civil and Environmental Engineering  
Gustavo Parra-Montesinos, Professor, Civil and Environmental Engineering
Report for the 10-Year Review of the Civil and Environmental Engineering Graduate Program

Review Committee Members:
- Riccardo Bonazza, Professor, Engineering Physics
- John Lee, Professor, Industrial and Systems Engineering
- Bernard Lesieutre, Professor, Electrical and Computer Engineering (Chair)
- John Pfotenhauer, Professor, Mechanical Engineering (Graduate Faculty Executive Committee Representative)

Review Process
The committee met in person on January 19 for an initial discussion of the Civil and Environmental Engineering (CEE) Graduate Program Self-Study. The committee decided to gather more information by:
- Performing one-on-one interviews with all faculty in the department (distributed among committee members).
- Visiting the CEE laboratories,
- Meeting as a committee with Administrative Staff,
- Meeting as a committee with CEE students,
- Meeting as a committee with CEE Chair, Prof. David Noyce,
- Meeting as a committee with CEE Graduate Program Chair, Prof. Gustavo Parra-Montesinos, and
- Reviewing program statistics collected and retained by the graduate school.

The committee prepared a set of questions to guide the one-on-one faculty interviews.

The one-on-one faculty interviews were conducted over the course of the review period based on the schedules of the committee members and the CEE faculty. In total the committee secured interviews with 23 faculty members.

Professors Bonazza and Lesieutre toured the CEE laboratory facilities in Engineering Hall on Monday, March 5th, guided by CEE Chair Professor David Noyce. These facilities included the Environmental Engineering Laboratories, Environmental Fluid Mechanics Laboratories, Geoengineering Laboratories including the Rock Mechanics Lab, and Structures and Materials Testing Laboratories. Professor Lesieutre toured the Water Science and Engineering Laboratory, guided by Christopher Worley.

The entire committee met with CEE Administrative Staff on March 14th, including Cheryl Loschko, and Elizabeth Funk-Smith, Department Administrator.

The entire committee met with the CEE Graduate Student Committee on March 14th. This committee of graduate students serves to advise the department, and they
meet monthly with the chair. The committee comprises a student representative from each of the six areas of the department.

The committee met in person on March 19th to review the information we had gathered to date, and to discuss questions for the remaining interviews with the department chair, and graduate program chair.

The entire committee met with CEE Chair, Prof. David Noyce, on April 4th.

The entire committee met with CEE Graduate Program Chair, Prof. Gustavo Parra-Montesinos on April 4th.

The committee met in person on April 12th to prepare this report.

Data and Interviews
The Civil and Environmental Engineering department’s graduate program offers Master’s and Ph.D. degrees. In addition to a traditional master’s degree, the department offers an on-line M.Eng degree in environmental engineering. The department started administering this degree in Fall 2015; previously it was offered through the COE Engineering and Professional Development program (EPD). Starting in Fall 2017, the department now offers accelerated M.S. degrees in each of the six areas of the department:
- Construction Engineering and Management
- Environmental Science and Engineering
- Geological Engineering
- Structural Engineering
- Transportation Engineering
- Water Resource Engineering
The first M.Eng degrees through the on-line program will be awarded in Spring 2018. The accelerated programs are new and have not awarded any degrees to date.

Enrollment in the M.S. programs has varied over the past ten years, from a low of 62 students (2014) to a high of 99 students (2011). The Ph.D. enrollment has been relatively constant in a range of 65 to 72 students. The number of students graduating with the M.S. degree mirrors the enrollment data, with a peak of 48 students in 2011, and declining to 29 students in 2015 and 2016. The Ph.D. degrees awarded per year range from 7 to 14 without an obvious trend. Over the past five years, applications have been decreasing for both programs. An examination of the data suggests that the time to completion for the M.S. degree is typically 2 years. The median time completion for the Ph.D. degree is approximately 5 years. The overall 10 year completion rate for Ph.D. students admitted in 2006-2007 is reported to be 60.5%. Post-graduation job placement appears strong. The self-study reports that 73% of MS graduates pursue positions in industry and 20% continue to
a Ph.D. program. (The remaining are unknown.) For the Ph.D. graduates, 72% are reported to take on academic/research positions as tenure track faculty or postdocs, and the remaining 28% take positions in industry.

As of the writing of the self study, the department had 29 faculty (24.8 FTE as some have partial appointments). The total FTE equivalent appears fairly steady over the past 5 years, however there is a notable change in distribution of rank. In 2013 the FTE distribution of Professor/Associate Professor/Assistant Professor was 17.3/5/3 respectively. In 2017 it was 11.5/4.3/9. The department is also planning to hire more new faculty this year. Although the graduate student population displays a relatively low diversity population (less than 4% targeted minorities), the department has made significant progress over the past 10 years increasing the diversity of the faculty, anticipating that the increased diversity of role models will have a positive influence on the graduate student diversity. The present faculty include 7 female and 3 Hispanic members.

Overall the CEE graduate programs have a strong reputation among peer institutions. It is appropriate to note that the commonly quoted US News and World Report rankings consistently place both the Civil Engineering and Environmental Engineering programs in the top 20 in the country. A review of faculty CVs including recent publications and awards shows productivity consistent with a vibrant research program.

A productive program spanning the six concentration areas listed above relies on adequate laboratory and office space. The department hosts numerous laboratories and, as noted in the self-study, all would benefit from maintenance, remodeling, and updating in various forms. A tour of the laboratory facilities confirmed that this is the case. What was not apparent in the self-study, but evident in the visit to the facilities, is the tremendous efforts the department has already made to maintain and upgrade the laboratories. Through some internal funds, and much externally raised funds, nearly every laboratory has been making improvements. It is a challenging task to upgrade these laboratories, and there is considerable planned work to be completed. The department appears dedicated to maintaining these facilities that are needed for graduate education and research. Concerning space, the faculty and staff we met during the tour indicated that the current space meets present needs, but they did express some concerns that space could become tight with an expansion of the graduate program.

The one-on-faculty interviews, meetings with the student representatives, and meetings with the administrative staff were useful for gathering information and opinions beyond the data and assessment in the self-study. We note foremost that the collegial atmosphere in the department is very positive. All of the faculty expressed satisfaction with the department and its leadership. Several did offer opinions for improvement, but they were never presented as an immediate critical need to address a major flaw. Likewise the students expressed satisfaction with the program and all indicated that they would recommend the program to others. While
it is sometimes the nature of these reviews to highlight critical comments and opinions, in this case we would make clear that issues raised by interviewees that informed our examination of program concerns were expressed in the context of being happy with the department and departmental administration.

Program Strengths

• The department is in a period of growth with many new faculty hires. This recent push in hiring brings fresh ideas and energy to the department.

• The diversity among department faculty is improving. Twenty years ago there was a single female professor. Now there are 7 female professors and 3 Hispanic professors, with both groups represented in department leadership positions.

• The department has very strong relations with industry and alumi. The department even has industry members bringing their practical experience to the classroom through regular visiting lectures (professional practitioners) and adjunct faculty appointments. This highly successful arrangement has been ongoing for the past 20 years.

• The department has a strong record for student job placement.

• The relationships between grad students and faculty within each area are very strong.

• There are good relations between faculty and staff, and between faculty.

• David Noyce is doing a very good job as the department chair. This message was consistent in all the faculty interviews.

Program Concerns and Challenges

• As noted in the self-study, the laboratory facilities used for graduate education and research would benefit from upgrades. The department has been very active in pursuing these needs, with success. The on-going maintenance and continuing upgrades will likely remain a persistent challenge.

• The placement of the Graduate Student Coordinator, Cheryl Loschko, in the Mechanical Engineering building has reduced the ease and effectiveness of communications with students, staff, and faculty. This situation has given rise to ambiguities regarding various responsibilities.
• The department does not have graduate student fellowships to offer prospective students. This places the department at a disadvantage for recruiting stellar candidates compared to peer institutions.

• Graduate student recruitment is not organized at the departmental level. While travel support is available to bring prospective graduate students to visit the university, the recruitment is a one-on-one process with each faculty member seeking their own students. Nevertheless, this method appears to be working well. Students report favorably on these visits for helping them make their decision.

• The department self-study notes that the low number of students from targeted minorities is consistent with national statistics. However, we were not made aware of any specific efforts or plan to increase the grad student population in these areas.

• The department is acutely aware of and concerned about the recent steady decrease in grad student applications and is studying the possible steps to reverse the trend.

• The Teaching Assistant appointment process and subsequent workload is not uniform. The faculty member teaching a course determines the TA appointment and workload. The students report that inequity in TA workload is common and is a problem.

• A regular program addressing the mental health of graduate students would be welcome. Concern was expressed that the campus does not have enough Engineering counselors, and also that the students were generally unaware of the counseling options that are available to them.

• Failing the qualifying exam is reported as the primary reason for students not completing the Ph.D. degree. Some faculty members report that the exam serves its purpose, while some students are discouraged by the lack of clarity in expectations. The committee was unable to find a description of the qualifying exam procedures and expectations by area. The descriptions supplied by faculty and students were not entirely illuminating. Without knowledge of the procedures and evaluations, the committee is unable to comment specifically on the qualifying exam and how it relates to the CEE graduate program objectives. It is not clear that the department administration certifies or maintains accurate records of qualifying exam results.

• Some faculty felt the vision and strategic plan of the department needed updating. Previously this strategic plan focused on hiring, but the department might be well-served by expanding the focus beyond hiring plans when it next updates the its vision and strategic plan.

The six groups help accommodate the diversity of the department, but coordination across these groups might be useful to harmonize mentoring advice to young faculty, qualifying exams, and faculty hiring. Harmonization
across groups need not mean uniformity, but awareness of each group’s practices and perspectives might lead each to make positive adjustments.

**Recommendations**

1. We recognize the department has made substantial efforts to seek internal funds and raise external funds for necessary upgrades to the many department laboratories. These laboratories are essential to the department’s graduate program for both education and research. The department has realized the need for and has plans for continuing upgrades of these facilities, however significant financial support is required. We recommend that the department continue its earnest endeavors to procure funds for this essential activity, *advocating this as a priority for the department, college, and university.*

2. The Graduate Student Coordinator should maintain a presence at a location in or near the department headquarters. If her presence at the ME building location is also necessary, then an arrangement for splitting her time in the two locations should be considered.

3. The department should consider prioritizing fund-raising to support graduate fellowships.

4. The department should review the uniformity of TA assignments and address inequities in the TA assignment workloads.

5. As the department chooses to require a Ph.D. qualifying exam, the specific procedures and expectations need to be made clear, especially since these procedures and expectations vary by area. It would be appropriate to include this information in the CEE Graduate Program Handbook. Furthermore, the department administration should officially certify and record the results of qualifying exams.

6. The department needs to identify and carry out steps to increase the diversity of the grad student population with regard to targeted minorities.

7. The diversity of research areas, particularly with the Granger initiative, can make recruiting outstanding graduate students a challenge. The department should consider working together to pool experiences with non-traditional recruiting strategies. This could be particularly useful for new faculty who might not have a large network of peers that more senior faculty often use to identify graduate students.