

PROGRAM PERFORMANCE REVIEW
External Review Report

DEPARTMENT OF MECHANICAL ENGINEERING
Master of Science

California State University, Fullerton

Review Team

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May 20, 2016



CALIFORNIA STATE UNIVERSITY, FULLERTON

College of Engineering and Computer Science

Department of Mechanical Engineering

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Mechanical Engineering Program Performance Review (PPR) Schedule

Friday, May 20, 2016

Location: Engineering Building E-101, TRS Room

08:30 AM to 09:00 AM	Breakfast in Room E-101
09:00 AM to 09:30 AM	Meeting with Department Chair, Dr. Sang June Oh
10:00 AM to 10:30 AM	Meeting with Dean, Dr. Raman Unnikrishnan
10:30 AM to 11:00 AM	Meeting with Associate Dean, Dr. Susan Barua
11:00 AM to 11:45 AM	Meeting with Faculty, Drs. Bazar and Robson, and Ngo
11:45 AM to 12:15 PM	Meeting with Faculty, Drs. James and Mayoral
12:15 PM to 01:30 PM	Lunch @ Marriott
01:30 PM to 02:00 PM	Meeting with Graduate Students
02:00 PM to 02:30 PM	Meeting with Faculty, Drs. Weiss and Wang
02:30 PM to 03:30 PM	Review Team Meeting
03:30 PM to 03:45 PM	Meeting with Department Chair, Dr. Sang June Oh
03:45 PM to 04:30 PM	Review Team Meeting

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PREAMBLE

The report reflects the collective efforts by the Program Performance Review (PPR) External Review Team of the Master of Science in Mechanical Engineering Program (hereafter Program) at California State University, Fullerton. The report is based on information presented in the Self Study provided by the Department of Mechanical Engineering (hereafter Department) and interviews with students, faculty, Department Chair, and Deans of the College of Engineering and Computer Science (hereafter College). The intent of this report is to highlight existing strengths as well as provide comments/guidance to areas of concerns.

The one day visit was conducted on May 20, 2016.

The Review Team consisted of external reviewers: Hohyun Lee, Associate Professor, Santa Clara University; Paul Oh, Lincy Professor of Unmanned Aerial Systems, University of Nevada, Las Vegas; and internal reviewer: Kavin Tsang, Associate Professor, California State University, Fullerton.

Faculty members participating in interviews included: Department Chair, San June Oh; Professor Andy Bazar, Assistant Professors Salvador Mayoral, Chean Chin Ngo, Nina Robson, Sagil James, Haowei Wang, Hope Weiss.

Deans participating in interviews included: Dean Raman Unnikrishnan, Associate Dean Susamma Barua.

Three (3) graduate students in various stages of the Program participated in interviews.

We note this review is focused only on the Master of Science in Mechanical Engineering; however, the Department does also offer an undergraduate program in the field. This point is highlighted as the same resources, e.g., faculty, classrooms, laboratories, etc., are utilized for both programs. In addition, we recognize this PPR is the first for the Program and therefore the depth of the presented data is limited and comparison/progression from previous PPR is not available.

PROGRAM STRENGTHS

The review team applauds the efforts of the Department in preparing the Self Study document and arrangements for the visit. In particular, Sang June Oh is lauded for his efforts as he is in his first year as Department Chair, also responsible for the Undergraduate Program in Mechanical Engineering, and completed a PPR for the Program. Sang June displays a sense of strong moral support for the faculty and Department. In addition, the review team acknowledges the leadership provided by Dean Raman Unnikrishanan and Associate Dean Susamma Barua. During interviews with the Deans, it was disclosed that Dean Unnikrishanan is retiring at the end of the current semester and Dean Barua will serve as Interim Dean during the next academic year. Her knowledge and involvement with the Department will ensure continued support of the Program as the College progresses through a search for a permanent Dean.

The Review Team recognize and underscore the following features of the Department, Program, and University:

- The Program Mission and Goals are aligned with University mission, goals, and strategies.
- The local Orange County community offers an abundance of industry employers in the engineering field, particularly in the specialty areas offered by the Program. Potential formal collaborations are currently being explored.
- The Department faculty and College administrators are committed to the success of the Program and are anticipatory of needed improvements.
- The curricula of the Program consist of a diverse range of courses in specialized areas of the field, providing a blend of application and theory.
- The faculty, consisting predominantly of tenure track (junior) members, are active and current in their respective areas.
- The faculty share a strong sense of community, collaboration, and ownership of the Program.
- The faculty is enthusiastic and willing to increase mentoring of students, including research projects and theses.
- The faculty are committed to maintaining a level of rigor that result in highly qualified and educated members of the profession.
- Program advising is well structured and utilized by students; “bridge courses” valued by students and faculty.
- Support for faculty research related efforts (grant development, etc.) is provided by the University.
- Students are eager to be involved with faculty research opportunities.
- The CATIA instruction provided by the Department provides students with a skill that is in high demand and sought after by industry employers.
- Existing staff appears to adequately support the Department.

FINDINGS & RECOMMENDATIONS

The Review Team suggests the following areas to consider for further reflection and deliberation by the Department:

- Strategic Plan
- Enrollment
- Research

Strategic Plan

Finding: The Department has undergone significant changes in recent years, involving faculty and leadership. As such, the current faculty have “inherited” a program in mid evolution. At present, it appears decisions about the efforts and resources in support of the Program are made in response to changes rather than in a directed manner based on goals of the Program. The most evident example, is the sudden enrollment growth precipitating the need to hire more faculty. The mission and vision of the Program are overarching and align with University efforts but a Department specific plan to direct future efforts and ensure success has not been developed.

There also appears to be disconnect between the junior and senior faculty in the Department; mentoring by experienced role models appear to be limited, creating various levels of appreciation and value of professional networking in the junior faculty. Left to their own efforts, professional development of junior faculty may be negatively impacted.

Recommendation: It is recommended that the Department establish a clear and concise Strategic Plan to support the mission of the Program; This can be accomplished via mechanisms such as a *Department Retreat*; in addition to providing clarity and direction, the experience would further build morale and community within the Department. Interviews at all levels were consistent with the faculty expressing empowerment to pose and implement new ideas and models of both education and research. As the majority of the faculty is of the tenure track (junior) rank, their participation in the process will enhance individual professional development and cope with the changing leadership.

Integrating an external advisor in this process could establish the foundation for collaborations with stakeholders in the local community. The Department can coordinate with the alumni, development, or other relevant offices to evaluate the program educational objectives. Exit survey or LinkedIn will be helpful to track post-graduate career path.

Other suggested focus areas for the plan include enrollment, research experience, and community collaborations.

Enrollment

Finding: A concern identified in the Self Study Report and consistently brought forward in interviews is the enrollment of the Program; specifically, increased enrollment is disproportionate to existing resources. The lag in resources, both personnel and facilities, appears to already impact student learning/experience as the majority elect comprehensive examination rather than research theses or project as faculty are unable to accommodate the enormous number of requests.

A desire/intention to continue hiring faculty to address increased enrollment was shared throughout the review process, although a target number for faculty size was not apparent. As the current PPR is focused on the graduate program, data pertaining to the undergraduate program was not available.

Recommendation: The Review Team is unable to comment on an appropriate faculty number/size as the needs and demands of the undergraduate program heavily influence the function of all faculty. However, the Review Team suggests the current strategy of increasing faculty size without simultaneously instituting control to enrollment growth will likely exacerbate other areas of concerns such as the lack of classroom/laboratory space and research activities.

Another suggestion for consideration is to adopt *Specialization Leads*; this would assist with enrollment as well as balance faculty load. Currently, the Department identifies 4 specializations: (1) Robotics, Controls, and Automated Manufacturing; (2) Design and Materials for Manufacturing; (3) Thermo and Fluids Engineering; and (4) Power and Energy. Assembling the faculty into these groups (and designating a lead) would strategize course assignments. An added benefit of such groupings would be for co-advising groups of graduate students. Furthermore, graduate students could potentially be assigned to help with Senior Design advising or leverage such capstone projects into a thesis.

The Department is encouraged to investigate measures for enrollment control such as non-traditional formats of impactation, revisiting current admission criteria, emphasizing research activities, and redefining areas of specialization.

Research

Finding: The infrastructure is inadequate to encourage faculty/student scholarship. Many faculty members raised an issue on their teaching load, which also made students question the availability of faculty member for supervising their project. As a result, many students opted for the comprehensive test option to fulfill the "culminating experience" requirement. In addition, research space is not readily available for the faculty to conduct their research, raising concerns towards their ability to successfully progress towards tenure and promotion. Some faculty shared they had identified potential space but feel it is inefficiently allocated. No mechanism to support graduate students for research exists (limited scholarship opportunity). Some faculty were not aware of available resources provided by the University in support of research and scholarship. It appears there is limited participation at professional conferences or

research fairs/events, etc.

Recommendation: The Review Team encourages increasing involvement with opportunities within the College as well as across the University and CSU System to showcase the work by students and faculty.

Proactive recruiting strategies and creating an encouraging environment for research activities could yield quality graduate students. Other possible options include: involving undergraduate students in research activities, along with creating a BS+1 year MS program; holding annual research fairs or outreach program to gain public recognition for research activities in the Department.

The Review Team encourages the Department to engage in discussions with the College to develop mechanisms to provide incentive, e.g., course release or conference support, to faculty for research activities. As a part of this process, the Department Chair should utilize external resources such as other departments and colleges.

Professors-of-the-Practice may be another attractive mechanism and strategy. Given the large number of regional companies, there is likely an abundant supply of professional engineers that would be qualified to serve as such professors. Beyond offsetting teaching load, such positions increase the visibility of the Department, faculty and students to the engineer's company. Such positions also help to align and modernize curricula with current state-of-the-art practices and needs in industry.

Summary

The Department is commended for their efforts and work in developing a high quality and impactful Program. The faculty are also commended for their commitment to integrating application and theory with student learning and research. The Department is presented with unique challenges as they move forward in developing the Program. Furthermore, it is critical for the Department to prioritize the success of the large proportion of junior faculty as they discuss the future efforts of the Department.

This report was reviewed and approved by all members of the Review Team to accurately reflect the program review conducted on May 20, 2016.

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