



Memorandum of Understanding

This MOU has been read and approved by:

Department Chair: Jalal Torabzadeh Date: 7/1/2024
Jalal Torabzadeh

Dean, College of Engineering: Jinny Rhee Date: 7/5/2024
Jinny Rhee

Vice Provost Academic Programs: Jody Cormack Date: 7/5/2024
Jody Cormack

California State University, Long Beach

Institutional Program Assessment Council (IPAC)
Program Review Report

Department of Mechanical and Aerospace Engineering
College of Engineering

Degree programs:

Master of Science in Aerospace Engineering (MSAE)
Master of Science in Mechanical Engineering (MSME)

February 19, 2024

Program Review Report and MOU

NARRATIVE AND ANALYSIS

Overview of the review process

The Master of Science in Aerospace Engineering (MSAE) program at California State University, Long Beach (CSULB) was established in 1991 and has been offered continuously. The Master of Science in Mechanical Engineering (MSME) program has been offered at California State University, Long Beach (CSULB) since 1964. With the merger of the Mechanical Engineering and Aerospace Engineering Departments into Mechanical and Aerospace Engineering (MAE) Department in 2001, the programs continued to grow and expand their offerings with more options/concentrations. Each degree requires 30 units, 18 in common core courses, and 12 in the student's area of concentration.

The areas of concentration in the MSAE program are:

- Aerospace Structures and Materials
- Aerodynamics and Computational Fluid Dynamics
- Aerospace Systems Engineering
- Combustion and Propulsion

The areas of concentration in the MSME program are:

- Design and Manufacturing
- Dynamics, Vibration, Control, and Robotics
- Fluid and Thermal Sciences
- Mechanics and Materials

No previous program review or MOU was found for the graduate degree.

The current self-study for this review period was submitted in March 2023. The external review occurred on April 6th and 7th, 2023. The visiting reviewers were Hamid Johari (CSUN) and Adrienne Lavine (UCLA). The UPRC reviewers were unable to attend any of the virtual or in person meetings.

As part of this review, the following resources were consulted:

1. Department of Mechanical and Aerospace Engineering Self-Study Reports, March 2023.
2. Department of Mechanical and Aerospace Engineering Website <https://www.csulb.edu/college-of-engineering/mechanical-aerospace-engineering>
3. Program Review Summary Report (External Report April 2023)
4. UPRC Report submitted by Janaki Santhiveeran, (Social Work) and Susan Bloom (Cinematic Arts) June 2, 2023
5. Institutional Research and Analytics Website

This final report relies heavily upon the UPRC and the external review report.

COMMENDATIONS

The following commendations are noted in the reports:

SECTION I: PROGRAM MISSION, VISION, GOALS & PRIORITIES FOR THE FUTURE

The program has clearly articulated its mission and is disseminated through their catalog. http://catalog.csulb.edu/preview_program.php?catoid=7&poid=3424&hl=msae&returnto=search. The program has a clear plan and priorities for the future. The program is commended for redesigning lower-division laboratories and reducing equity gaps.

SECTION I: FACULTY RESOURCES / SUFFICIENCY IN RELATION TO PROGRAM OFFERINGS

The program clearly presents faculty resources on their website. The external reviewers commented, "Faculty we met cared about their teaching and student learning, and the instructional quality appears to be quite high" (p. 1).

SECTION IV: IMPROVING GRADUATE EDUCATION

Nature of Graduate Experience and Number and Variety of Graduate-only courses: The self-study documents the significant resources available to students including specialized labs and computers, (MSAE, p 22-34; MSME, p. 23-39), professors who mentor and collaborate on research which frequently leads to publication, employment and admission to PhD programs (MSAE, p.136-156; MSME, p.143-164), and the concentrations that offer many specialized graduate level courses along with the opportunity to conduct original research (MSME, p. 8-9). The external reviewers further noted in their report, "comprehensive electives in each of the concentration areas," and "students we met were satisfied with the instructional aspects of the program and were grateful for the research opportunities offered by the faculty."

SECTION V: THE PROGRAM SUPPORTS THE ACADEMIC SUCCESS OF DIVERSE LEARNERS

MSAE and MSME Graduate Advisors conduct orientation for incoming students, meet with individual students, and are generally available to respond to students' questions and concerns.

The department has a supportive culture of building an equitable and empowering culture in alignment with CSULB DEI standards. The department is committed to matching the student demographics with that of the local community, a commendable step to help URM students to value their cultural capital while embracing the opportunities provided by the department for their upward mobility and to minimize barriers for their continued success. Self-report presents persistence graduation rate among URM students, and they are comparable to non-URM students, which is commendable.

CONCERNS

The following concerns and / or gaps are noted in the reports:

SECTION III: IMPROVING STUDENT LEARNING

ASSESSMENT CONDUCTED AND REPORTED OVER CYCLE; ASSESSMENT FINDINGS/CLOSING THE LOOP

No annual assessment was completed during the timeframe covered by the self-studies. The external reviewers write, "The department should continue to work on developing an assessment plan to determine if the graduate level learning outcomes are being met. This should include developing a curriculum map that delineates which courses support which learning outcomes. To assess whether learning outcomes are being met, the department

could then look at student performance in those courses; the comprehensive exam is also a potential mechanism for measuring achievement of learning outcomes since it covers specific core courses.” While the program had plans as of the writing of the self-study to implement an assessment plan and curriculum map, they are encouraged to implement the plan annually to ensure the clearly articulated program learning outcomes are being met. Furthermore, follow-up assessments focused on closing the loop on prior years’ improvement plans should be built into the overall assessment plan.

OPPORTUNITIES

The following future opportunities are noted in the reports:

SECTION II: STUDENT SUCCESS

The self-study notes that graduation rates have been stable for the last three years and provide data tables but do not delve further into the numbers. When compared to the COE and CSULB overall 2-year graduation rates for master's programs, the MAE rates are lower (COE-35%, CSULB- 49.4% and MAE-23.8%). Additionally, the external reviewers note “MAE 501 has a significant number of CDFW (probably mostly C) grades in most semesters, the department should consider how they can better support incoming students. For some students, it may be difficult to maintain a 3.0 GPA after receiving a C.” It is recommended that the program research this issue and provide a plan to ensure that MAE students are not taking longer than other engineering programs to graduate.

The self-studies note that enrollment has been stable, with an expected drop during the pandemic due to international students being unable to obtain visas. However, the enrollment rate of those admitted has been declining the last few years even though the headcount has remained somewhat stable (42, 46, 33 for 2020, 2021, 2022 but enrollment rates of 43.8%, 37.7% and 31.4% suggesting a downward trend. The external reviewers write the following recommendations to counter this, “The department should promote the strengths of the program to prospective students. These include the applied nature of the degree, the high-quality teaching of the faculty, and the class schedule designed for working students. The website does currently reflect some of these strengths, but not all.” They also recommend, “The department should conduct outreach to local companies and to their own undergraduates in order to attract applicants, and may want to call admitted students to discuss the program with them (if they are not already doing so); and “implement the 4+1 BS/MS plan.”

SECTION V: Program Promotes Faculty-Student Research/Creative Activity Collaboration

There is an increase in the number of tenure line faculty teaching graduate level courses. Such actions have promoted faculty-student research collaborations. In addition, faculty actively collaborate with scientists and industry experts outside the department and create research collaborations for the benefit of students. Although there is health research activity in the Department, the current structure for compensating faculty in the form of re-assigned time after a thesis is completed does not seem to be meeting it’s objectives. Faculty need reduced loads while working with students.

SECTION V: RESOURCES (LAB, LIBRARY, ETC.) AVAILABLE TO THE PROGRAM ARE SUFFICIENT TO SUPPORT EDUCATIONAL GOALS

The department should develop additional resources to support educational goals. For example, the department does not have a repository of faculty-student research collaborations.

RECOMMENDATIONS

To the Department of Mechanical and Aerospace Engineering with support from the College of Engineering and Academic Affairs it is recommended to:

1. Research length of time to graduation and take steps to remove barriers towards graduation.
2. Create better student support for MAE 501, which has high DFW rates. This could include creating a review workshop early in the term on mathematical concepts and/or offer tutoring sessions. Another idea is to offer a diagnostic quiz so that students can identify the areas where they need to review, coupled with making review materials available.
3. Develop a plan to grow graduate enrollments, which could include:
 - a. Conduct outreach to local companies and to their own undergraduates alumni in order to attract applicants.
 - b. Call admitted students to discuss the program or offer an open house in order to increase admit to enroll yields.
 - c. Consider expediting the development of 4+1 BS/MS program
4. Develop a comprehensive assessment plan for undergraduate and graduate programs to complete annual assessments using direct and indirect methods and report on closing the loop activities to illustrate that continuous learning outcome data are used to inform decision making. Provide an annual update (due June 1) on progress made towards MOU actions to the COE dean, the Vice Provost for Academic Programs, and the Coordinator of Program Review and Assessment. Your review cycle will therefore be from 2023-2030. A comprehensive self-study will be due June 2030 for a 2030-2031 Academic Year review process.
5. Revisit the formula be modified to provide credit for advising students conducting research immediately, not after they file a thesis. Consider avenues to provide students with funding as research assistants.
6. Consider developing DEI statements and plans at the department levels
7. Develop a repository of faculty-student research collaborations as suggested by external reviewers. The Graduate Center can help you to develop a repository in Scholar Works.

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