

**California State Polytechnic University, Pomona**  
**Mechanical Engineering Department**

**Graduate Program Assessment Plan**

October 14, 2015

This Assessment Plan describes the meaning of the Master of Science in Mechanical Engineering (MSME) program at Cal Poly Pomona, the program educational objectives, and student outcomes. It provides details of assessment process to improve and uphold the quality and integrity of the MSME degree.

**Meaning of the MSME Degree**

The MSME degree provides the students with advanced knowledge necessary to comprehend the theories relevant to the fields of their specialization while applying them in their engineering practice. The MSME degree enables students to articulate the significant challenges confronting the fields of mechanical engineering using a solid foundation built upon the advanced course work and hands-on projects. By careful selection of a challenging Master's project or thesis, students propose comprehensive approaches to some contemporary engineering problems. These project experiences distinguish the MSME graduates by providing them with the design and execution background to tackle complex problems using innovative approaches, which often can lead to industrial application and advancement in research.

**Program Educational Objectives**

Program educational objectives are broad statements that describe what MSME graduates are expected to attain within a few years of graduation. Graduates of the MSME program shall have:

1. Advanced knowledge of mechanical engineering principles to analyze, design and conduct engineering projects.

2. Professional level skills in communication, teamwork, leadership, and lifelong learning.
  
3. High level of individual, professional, and social responsibility.

**Student Outcomes**

Program learning outcomes are the skills and abilities students are expected to demonstrate at graduation. Graduates of the MSME program shall have:

1. Ability to apply advanced concepts, theory and analysis to identify, formulate and solve engineering problems.
2. Ability to apply advanced engineering tools for computations, simulations, analysis and design.
3. Ability to design and execute research relevant to mechanical engineering.
4. Ability to communicate effectively and function on multidisciplinary teams.
5. Ability to tackle contemporary engineering issues and apply knowledge learned to provide innovative engineering solutions.

Table 1 shows the relationship between the program educational objectives (PEOs) and student outcomes (SOs)

**Table 1: Relationship between Program Educational Objectives and Student Outcomes**

Program Educational Objectives	Student Outcomes				
	SO1	SO2	SO3	SO4	SO5
PEO 1	X	X	X		X
PEO 2			X	X	X
PEO 3		X			X

Table 2 maps some required courses to student outcomes

**Table 2: Relationship of Program Learning Outcomes to Required Courses**

	SO-1	SO-2	SO-3	SO-4	SO-5
ME 534 Fracture of Solids	P			P	
ME 535 Advanced Fluid Mechanics	P			P	
ME 536 Advanced Classic Dynamics	M		P		
ME 545 Advanced Thermodynamics	P			P	
ME 557 Analysis of Mechanical Design	M		P	P	P
ME 584 Convective Heat Transfer	M		P		P
ME 599 Vibration of Continuous Systems	P			P	
ME 632 Computational Fluid Mechanics		P	P		P
EGR 596 Research Methods		P	P		P
EGR 691 Directed Study	M	M	M	M	M
EGR 692 Master's Projects	M	M	M	M	M
EGR 696 Master's Thesis	M	M	M	M	M

P: Practice, M: Master

Table 3 below shows the assessment plan in the next four years.

**Table 3: Proposed Assessment Plan**

	F-14	W-15	S-15	F-15	W-16	S-16	F-16	W-17	S-17
<b>SO-1</b>	<b>C</b> ME 534	<b>D</b>	<b>C</b> ME 535	<b>D</b>		<b>C</b> ME 545	<b>C</b> ME 584	<b>D</b>	<b>C</b> ME 599
<b>SO-2</b>		<b>C</b> EGR 691	<b>D</b>		<b>C</b> EGR 596	<b>D</b>	<b>C</b> ME 632	<b>D</b>	
<b>SO-3</b>	<b>C</b> ME 536	<b>D</b>		<b>C</b> ME 557	<b>D</b>	<b>C</b> ME 584	<b>D</b>		<b>C</b> ME 632
<b>SO-4</b>	<b>C</b> ME 535	<b>D</b>		<b>C</b> ME 545	<b>D</b>	<b>C</b> ME 557	<b>D</b>		<b>C</b> ME 599
<b>SO-5</b>	<b>C</b> ME 632	<b>D</b>	<b>C</b> EGR 692/696	<b>D</b>	<b>C</b> EGR 691	<b>C</b> EGR 692/696	<b>D</b>	<b>C</b> EGR 596	<b>D</b>

**C:** Collection of Assessment Data and Analysis

**D:** Discussion of Assessment Results

### **Assessment Data Collection and Analysis:**

The program educational objectives and student outcomes will be assessed through collecting and analyzing data from courses, exams and other means. Assessment in the form of direct and indirect data will be collected. The measurements used for direct data include,

- Student performance will be assessed based on a midterm, final exam question, or final research paper with totals indicating the number of students who performed at each level (1-5).
- A sample exam or research paper at each level of performance you observed.
- Faculty assessment of student oral presentation and/or written report of term papers, design project reports, and Master's project/thesis.
- P.E. exam passing rate of MSME graduates.

The measurements used for indirect data include.

- Exit survey of graduating students.
- Survey of Alumni who graduated in 5 years and beyond.
- Survey of employers of MSME graduates.

### **Discussion of Assessment Results**

The department graduate committee will review assessment results and give feedback to improve teaching and learning as well as inform planning and decision making. The results can be reflected as follows:

- Evidence that students meet and exceed the learning expectations.
- Better alignment of curriculum with desired outcomes.
- Providing useful rubrics
- Development of explicit standards and corresponding samples of student work.