



ANNUAL REPORT ON ASSESSMENT OF  
B.S. IN MECHANICAL ENGINEERING (ME) PROGRAM  
ACADEMIC YEAR 2015-2016

PREPARED BY

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## Bachelor of Science Mechanical Engineering

05 Sept 2016 update

**1. What learning outcome(s) did you assess this year?** List all program outcomes you assessed (if you assessed an outcome not listed on your department SOAP please indicate explain). Do not describe the measures or benchmarks in this section Also please only describe major assessment activities in this report. The G.E. Committee will issue a separate call for G.E. assessment reports.

Per the published SOAP for the BSME Program as well as its response to Engineering Accreditation Commission (EAC) Criterion 4 of the BSME Program's ABET self study, the Department assesses every SLO every year. The SLOs are listed as SOs a) through k) as follows.

Upon the successful completion of the Bachelor of Science in Mechanical Engineering program at California State University, Fresno, students will have achieved the following:

- a. an ability to apply knowledge of mathematics, science, and engineering
- b. an ability to design and conduct experiments, as well as to analyze and interpret data
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. an ability to function on multidisciplinary teams
- e. an ability to identify, formulate, and solve engineering problems
- f. an understanding of professional and ethical responsibility
- g. an ability to communicate effectively
- h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. a recognition of the need for, and an ability to engage in life-long learning
- j. a knowledge of contemporary issues
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**2. What instruments (assignment) did you use to assess them?** If the assignment (activity, survey, etc.) does not correspond to the activities indicated in the timeline on the SOAP, please indicate why. Please clearly indicate how the instrument (assignment) is able to measure the outcome. If after evaluating the assessment you concluded that the measure was not clearly aligned or did not adequately measure the outcome please discuss this in your report. Please include the benchmark or standard for student performance in your assessment report (if it is stated in your SOAP then this information can just be copied into the report). An example of an expectation or standard would be "On outcome 2.3

**Direct Measures:**

1. Fundamentals of Engineering (FE) Examination: Alumni and students (usually seniors in their last semester) of the BSME program routinely take the FE examination as the first step in obtaining licensure as a Professional Engineer (PE). This FE exam is nationally-normed and is an excellent external measure of how well the BSME program prepares its graduates for industry and/or additional study. The FE examination is administered during specific periods in spring and fall of each year. Because the results from the FE exam are broken down by topic, these topics can be related to SLOs for direct measures of outcome attainment. The target for achieving an SLO is to meet or exceed the national percent correct for each section of the FE exam that applies to a particular SLO.
2. Student Performance in Courses: At the beginning of each semester, faculty are notified which courses for that semester will be required to have course worksheets completed, including student performance measures. Each faculty member teaching one of the targeted courses determines the student performance measure for the particular CLOs and the related SLOs for that course. Examples of performance measures include individual exam questions/problems, design projects, in-class activities, etc. At the end of each semester the individual faculty member completes the appropriate course worksheet for the appropriate course and reports the level of attainment of each SLO (mean, standard deviation and sample size) as appropriate. The completed course worksheet is forwarded to the ME department assessment coordinator for inclusion in the semester and annual assessment reports for subsequent evaluation by the all ME faculty at targeted faculty meetings and the annual department retreat. The target for achieving an SLO is 70% for the mean student performance of each course and for the pooled means.
3. Capstone Design Culminating Experience: The capstone design culminating experience is not only a requirement of ABET EAC accreditation but also demonstrates the level of synthesis of all preceding coursework in the curriculum. A two-course sequence for the capstone design culminating experience (i.e., ME135 in fall semester senior year and ME155 in spring semester senior year) often involves a sponsored, "real-world" problem in which teams of students work collaboratively to identify, articulate, design, analyze, prototype, test, refine and demonstrate a working version of their engineering solution to the client/sponsor. Since ME135 and ME155 reflect mastery (M) of the SLOs in the BSME program, the level of student success in obtaining and documenting a solution to an engineering problem is a strong indication of the success of the program. The target is a minimum of student performance of 70% for the each SLO as well as 70% student performance of the pooled means for all SLOs for ME135 and ME155.

**Indirect Measures:**

1. Junior Survey: Junior Surveys are administered in the fall and spring semesters of each academic year. Each semester, a junior-level course is chosen in which to administer the survey so as to assess student attitudes and perceptions in the first year of the upper

division part of the program. Up until AY2015-16, the survey had been on paper but currently the survey is web-based. The survey consists of two questions, each with 12 parts. The first question is: "How important is each of the following Program Student Outcomes (SOs) to the Bachelor of Science in Mechanical Engineering (BSME)? This is followed by a list of SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The second question is: "How satisfied are you with your education in the Mechanical Engineering Program at CSU, Fresno in regard to each of the following Program Student Outcomes (SOs)? This is followed by a list SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The results of this survey are important to understanding how well students understand the "tool box" of skills that the program has promised them (SLOs) as well as their perception of how well the program is delivering on that promise (albeit, as juniors, a work in progress). The target for any particular SLO is at least parity of student's expectation and satisfaction with the programs delivery of that SLO.

2. Senior Survey: Senior Surveys are administered in the fall and spring semesters of each academic year. Each semester, a senior-level course is chosen in which to administer the survey so as to assess study attitudes and perceptions at the in the final year of the upper division part of the program. Up until AY2015-16, the survey had been on paper but currently the survey is web-based. The survey consists of two questions, each with 12 parts. The first question is: "How important is each of the following Program Student Outcomes (SOs) to the Bachelor of Science in Mechanical Engineering (BSME)? This is followed by a list of SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The second question is: "How satisfied are you with your education in the Mechanical Engineering Program at CSU, Fresno in regard to each of the following Program Student Outcomes (SOs)? This is followed by a list SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The results of this survey are important to understanding how well students understand the "tool box" of skills that the program has promised them (SLOs) as well as their perception of how well the program is delivering on that promise (now as seniors nearing the end of the degree program). The target for any particular SLO is the at least parity of student's expectation and satisfaction with the programs delivery of that SLO.
3. Course Survey: Course Surveys are administered in the fall and spring semesters of each academic year for every course offered in the Mechanical Engineering that semester. Up until AY2015-16, the survey had been on paper but currently the survey is web-based. The survey consists of one request for input, with 12 parts: "Please assess the contributions of this course to the Mechanical Engineering Program Student Outcomes (SOs) a) through k)." This is followed by a list of SLOs each with a multiple choice answer ranging from 1 (marginally) to 5 (very strong) as well as 0 (not applicable) if the course does not contribute to that SLO. The results of this survey are important to understanding how well students

understand the “tool box” of skills that the program has promised them (SLOs) as well as their perception of how well each course is delivering on that promise. The target for the particular SLOs attributed to the course is a student rating of between 3 and 4.

4. *Senior Exit Interview*: The exit interview is an annual meeting of the graduating ME seniors with a retired ME faculty together with an alumnus of the ME program where comments are solicited from students on their educational experiences in the Department, College and University. Comments by graduating students are important to faculty and provide valuable input on how well the SLOs are being attained. They also point out strengths as well as shortcomings in the program that are addressed as part of the CQI process. The target is a subjectively-positive level of satisfaction with the program.
5. *Co-op internship Survey*: A formal internship/cooperative education program (Valley Industry Partnership (VIP) for cooperative education) was initiated beginning in Spring 2007. As the program has matured, it has been the intent of the department and the college to provide this opportunity to as many students as possible. Students complete an appraisal of their experience in the middle of their internship and following completion of an internship program with a company. The target is again a subjectively-positive experience of student participants.

**3. What did you discover from the data?** Discuss the student performance in relation to your standards or expectations. Be sure to clearly indicate how many students did (or did not) meet the standard for each outcome measured. Where possible, indicate the relative strengths and weaknesses in student performance on the outcome(s).

**Direct Measures:**

1. *Fundamentals of Engineering (FE) Examination*: The results for the FE exam are reported for the institution and the nation each year for the Spring and Fall offering periods of the exam. The results are reported by topic and mapped to the specific SLOs for the program as show in Table 3-1. Also shown in Table 3-1 are the results for the most recent FE exam results. The expectation is the CSU Fresno Mechanical Engineering majors (typically seniors and recent alumni) will meet or exceed the national performance. For illustrative purposes, historical results are shown for Mathematics (SLO a) in Figure 3-1. Similar bar charts have been compiled for other topics shown in Table 3-1. Generally, students and alumni meet or exceed the national performance in most categories.
2. *Student Performance in Courses*: A summary of the SLOs (SO a) to k) is show in the Figure 3-2. For the pooled means and standard deviations, the target of 70% is exceeds for all SLOs. An example of how well the courses met SLO a) is shown in Figure 3-3. Similar bar charts have been compiled for other SLOs. Measures of student performance show that the program overall is satisfying its target for all SLOs although some courses (e.g., ME154 and ME95 may drop below 70% student performance for SLO a)).

Table 3-1 FE topics mapped to appropriate SLOs along with results for Fall 2015 and Spring 2016

FE topics	SLO for BSME at CSU, Fresno	Related Courses in BSME curriculum	% correct for CSU, Fresno ME Majors (Fall 2015)	% correct for all ABET-accredited ME Majors Nationally (Fall 2015)	% correct for CSU, Fresno ME Majors (Spring 2016)	% correct for all ABET-accredited ME Majors Nationally (Spring 2016)
Mathematics	<b>a</b>	MATH 75, 76, 77, 81	68%	69%	59%	69%
Probability and Statistics	<b>b, k</b>	ME125, ME 159	61%	67%	69%	67%
Computational Tools	<b>a, k</b>	ECE70, ME02	75%	73%	83%	72%
Ethics and Professional Practice	<b>f</b>	ME01, ME 135	53%	77%	79%	77%
Engineering Economics	<b>c</b>	ME 135, ME155	51%	67%	58%	69%
Electricity and Magnetism	<b>a, e</b>	PHYS 4B, ECE 91, 91L	77%	71%	75%	69%
Statics	<b>a, e</b>	CE20	58%	66%	53%	65%
Dynamics Kinematics and Vibrations	<b>a, e</b>	ME112, ME122, ME 134, ME142	59%	65%	61%	64%
Mechanics of Materials	<b>a, e</b>	CE121	63%	63%	55%	63%
Material Properties and Processing	<b>a, e, k</b>	ME31, ME32, ME95	57%	65%	63%	65%
Fluid Mechanics	<b>a, b, e, k</b>	ME116, ME118	55%	65%	61%	65%
Thermodynamics	<b>a, c, e, k</b>	ME136, ME156	61%	63%	52%	62%
Heat Transfer	<b>a, e, e, k</b>	ME145	51%	63%	56%	64%
Measurements Instrumentation and Controls	<b>b c, e, ,</b>	ME32, ME115, ME118, ME159	46%	61%	39%	63%
Mechanical Design and Analysis	<b>c, k</b>	ME154, ME135, ME155, ME164	55%	61%	42%	62%

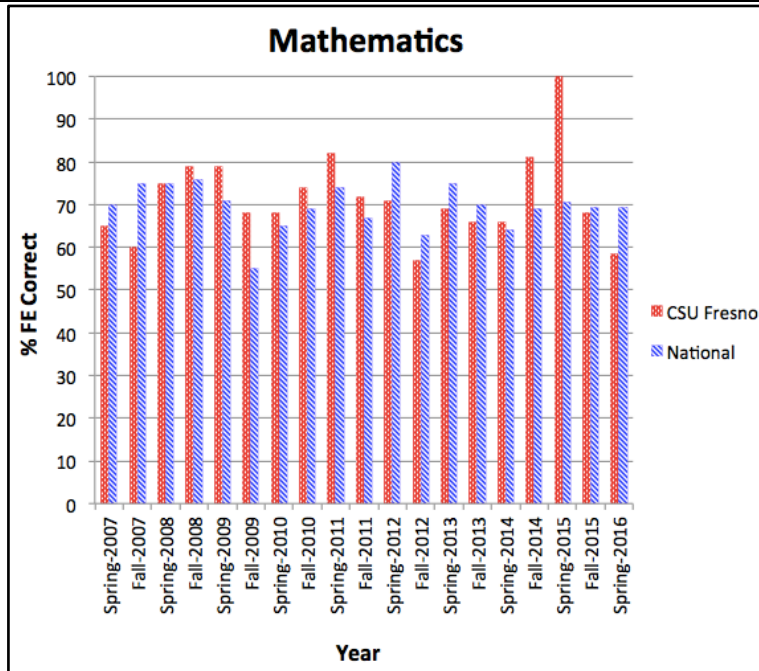


Figure 3-1 Example of historical FE results for Mathematics (CSU Fresno ME major results and National results)

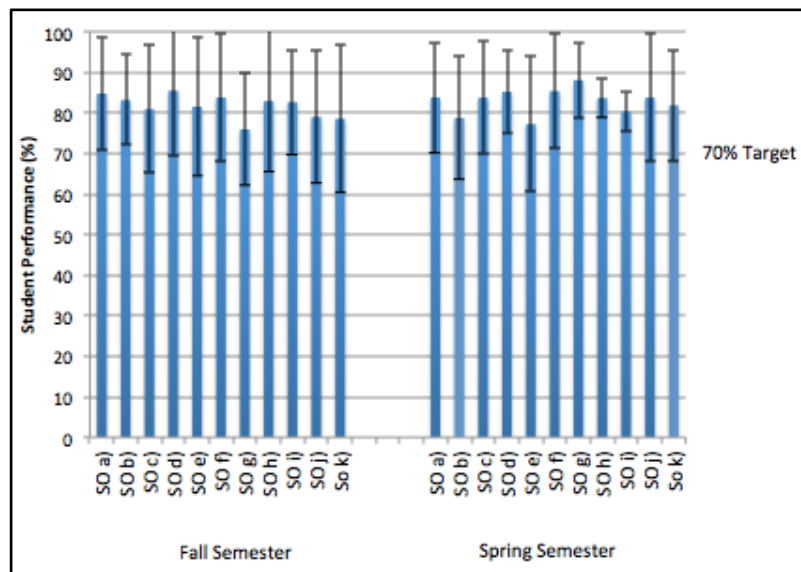


Figure 3-2 Summary of pooled SLO results for Fall and Spring semesters using student performance in courses

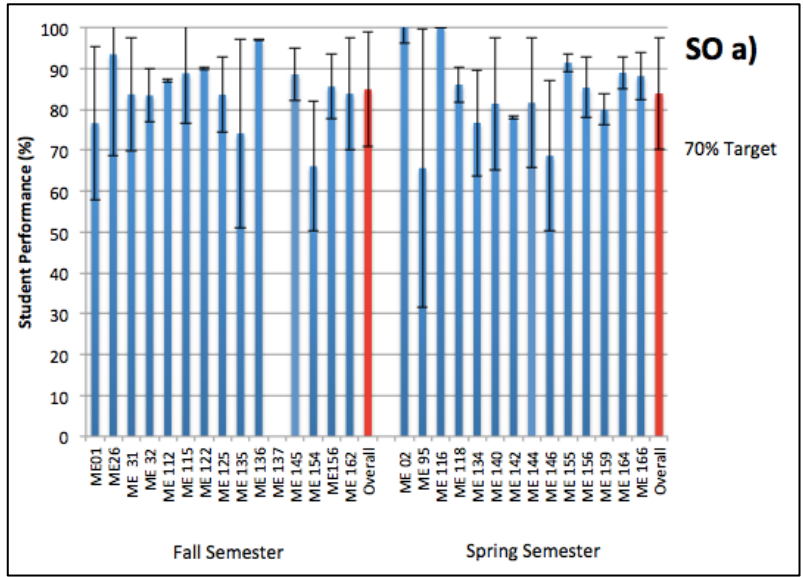


Figure 3-3 Summary of results for SLO a) for each course in Fall and Spring semesters

3. *Capstone Design Culminating Experience*: ME135 Introduction of Design: Senior Capstone Design I and ME155 Senior Capstone Design II are a two-semester Fall/Spring senior capstone design culminating experience. As such, these courses reflect mastery (M) level emphasis of all SLOs. A target of 70% attainment for each SLO as well as pooled for all SLOs in ME135 and ME155 points to mastery. Results for Fall and Spring semester are shown in Figure 3-4.

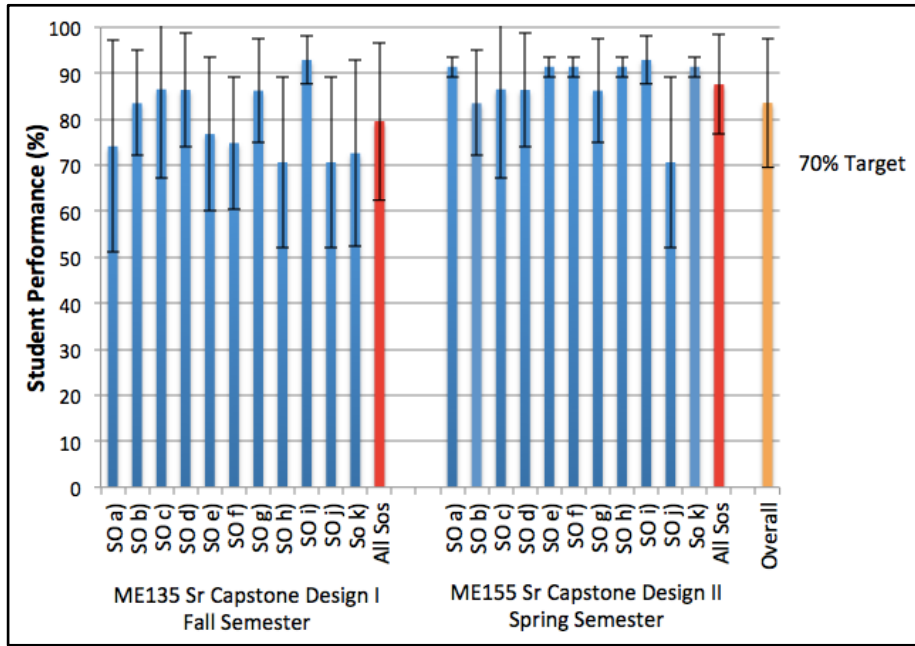


Figure 3-4 Results of SLO assessment for Senior Capstone Design Culminating Experience



**Indirect Measures:**

1. Junior Survey: Results of the Junior Survey are tabulated in Table 3-2. The results of the Junior Surveys are viewed as a reference baseline although they do indicate student satisfaction in almost all student outcomes. Improvement in these outcomes is expected as the student takes more of the upper division courses. The assessment of Senior Survey and Senior Exit Interview indicate changes in the performance of the students. Results of the Junior Survey are shared with the faculty and measures to improve the performance have been discussed on a regular basis since 2007. Faculty have noted that for some SLOs, juniors are less satisfied with their education to date than the rating of the importance of that SLO to their degree. It is felt that some of this dissatisfaction is related to the number of lecturers used in recent years because of the paucity of tenured/tenure track faculty compared to the large number of ME students (in some cases 70:1 student/faculty ratio). With the recent addition of new full-time faculty (four starting in Fall 2016) and a gradual decrease in ME majors due to impaction, these satisfaction numbers will improve.

Table 3-2 Junior Survey (4-5 = High, 3-4 = Medium, 2-3 = Low, 1-2 = Weak)

Student Learning Outcome	How important is each SLO to BSME degree?		How satisfied with education at CSU, Fresno for each SLO?	
	Fall	Spring	Fall	Spring
a. An ability to apply knowledge of mathematics, science, and engineering	4.7	4.6	4.4	4.0
b. An ability to design and conduct experiments, as well as to analyze and interpret data	4.7	4.3	3.6	3.9
c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	4.8	4.3	3.8	3.7
d. An ability to function on multidisciplinary teams	4.3	4.1	3.5	3.5
e. an ability to identify, formulate, and solve engineering problems	4.9	4.5	4.4	3.9
f. An understanding of professional and ethical responsibility	4.3	3.9	4.0	3.7
g. An ability to communicate effectively	4.6	4.3	4.2	3.6
h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	4.6	4.1	3.6	3.3
i. A recognition of the need for, and an ability to engage in life-long learning	4.5	4.1	4.0	3.8
j. A knowledge of contemporary issues	4.4	4.1	3.1	3.5
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	4.7	4.6	4.3	4.1

2. Senior Survey: Results of Senior Surveys of the graduating class are tabulated in Table 3-3. Senior Survey results show similar levels of satisfaction in receiving instruction related to all SLOs. This is expected of the senior group, since senior level courses emphasize group projects involving design and development of systems, experimentation, presentations in both oral and written form, and real life constraints, in almost all courses. These trends indicate that there is an acceptable development in the preparation of CSU Fresno ME majors to become successful engineers. However as with the Junior Survey, faculty have noted that for some SLOs, seniors are less satisfied with their education than the rating of the importance of that SLO to their degree. It is felt that some of this dissatisfaction is related to the number of lecturers used in recent years because of the paucity of tenured/tenure track faculty compared to the large number of ME students (in some cases 70:1 student/faculty ratios). With the recent addition of new full-time faculty (four starting in Fall 2016) and a gradual decrease in ME majors due to impaction, these satisfaction numbers will improve.

Table 3-3 Senior Survey (4-5 = High, 3-4 = Medium, 2-3 = Low, 1-2 = Weak)

Student Learning Outcome	How important is each SLO to BSME degree?		How satisfied with education at CSU, Fresno for each SLO?	
	Fall	Spring	Fall	Spring
a. An ability to apply knowledge of mathematics, science, and engineering	4.7	4.6	3.7	3.6
b. An ability to design and conduct experiments, as well as to analyze and interpret data	4.3	4.5	3.5	3.3
c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	4.5	4.6	3.5	3.4
d. An ability to function on multidisciplinary teams	4.1	4.4	3.6	3.6
e. an ability to identify, formulate, and solve engineering problems	4.9	4.5	4.4	3.9
f. An understanding of professional and ethical responsibility	4.1	4.2	3.4	3.4
g. An ability to communicate effectively	4.3	4.5	3.8	3.8
h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	4.6	4.1	3.6	3.3
i. A recognition of the need for, and an ability to engage in life-long learning	4.0	3.9	3.3	3.4
j. A knowledge of contemporary issues	4.4	4.1	3.1	3.5
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	4.7	4.6	3.8	3.5

3. Course Survey: Student SLO surveys have been administered in all ME courses each semester since Fall 2006. These surveys were instituted in order to guide the faculty in defining which SLOs a course should satisfy and obtain feedback from the students on how well they feel that these SLOs have been achieved. Course surveys of students as to how well each outcome is attained in each course (scale of 0 to 5) are also used to provide an indirect assessment of how well each SLO is being satisfied. Using Course Surveys, the target for attainment of a SLO in a particular course is a mean of 3 to 4 or greater. An example of course survey results for SLO a) is shown in Figure 3-5. Similar bar charts have been compiled for other SLOs.
  
4. Senior Exit Interview: Results of the Senior Exit Interview are presented in Table 3-3. Comments by graduating students are important to faculty and provide valuable input on how well the SLOs are being attained. Results of the Senior Exist Interview also point out some strengths and shortcomings in the program which are addressed as part of the CQI process.

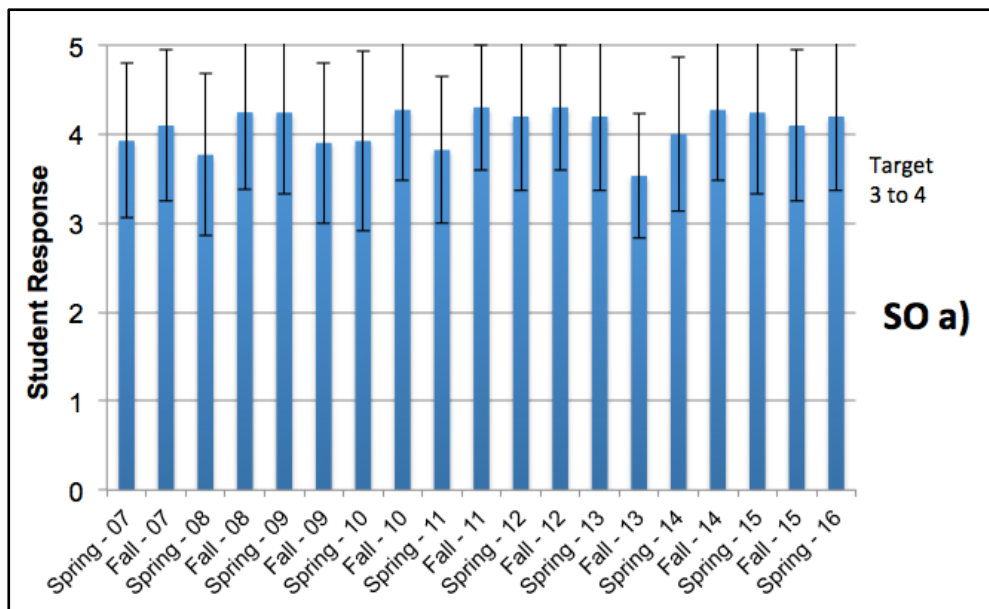


Figure 3-5 Results of Course Surveys for SLO a) from Spring 2007 until Spring 2016

Table 3-4 Summary of Senior Exit Interview

Topic	Response
Participation in professional organizations	<p>Among the seniors that were present, many had membership <i>in</i> professional organizations such as ASME, ASHRAE, SAE, SWE, and NSBE, with larger membership represented in ASHRAE (11) and ASME (9). Some students were members in more than one organization. Few seniors held leadership role, as officers of student sections they represented..</p> <ul style="list-style-type: none"> <li>• <b>Industry Experience:</b> Students had internship work experience with industry. Seniors who availed the VIP Program were very satisfied with the experience they gained. None of the students in the group availed themselves of internship positions announced by the University Placement Center,</li> <li>• <b>Preparedness for Professional Certification:</b> Students do not seem to recognize the role of Professional Engineering (PE) licensing in Mechanical Engineering career jobs. Some (22 %) had passed FE exam and a few (11 %) were waiting for the results.</li> </ul>
Academic Advising	<p>A majority of students (72%) expressed that they were satisfied with the academic advising received and a smaller number (11%) of students did not comment. About 17 % were not satisfied with the advising they received although the reasons were based on individual experiences.</p>
Univ. Education Experience and Life on Campus at CSU, Fresno	<p>The students were satisfied with their overall university experience.</p>
Professional growth	<p>The following suggestions were made to enhance their professional growth in the ME Program</p> <ul style="list-style-type: none"> <li>• Early in the program, students should be informed about the opportunities that exist for Mechanical Engineers and provide a road map for achieving their career goals.</li> <li>• Encourage Student Professional Clubs to interact with Industry and organize sponsored projects.</li> <li>• Encourage students to participate in the Design Projects that meet the requirement of National and Regional Competitions, such as SAE Formula Car/ASME-HPV/HVAC National Design, and allow credit for the work done on the project towards design units required for the degree.</li> </ul>
Educational Experience Provided in ME program	<p>A large number of students (67 %) were satisfied with the educational experience provided by ME Program, and a small number (33 %) expressed some concerns.</p>
Mechanical Engineering Curriculum	<p>Most of the students (94 %) were satisfied with Mechanical Engineering curriculum offered at CSU, Fresno. The students had few concerns about their workshop experience and the Department may consider addressing them to improve the work shop practices. They were:</p>
Courses taken from other engineering disciplines (CE and ECE) were relevant to ME curriculum	<p>The following remarks may serve as, as a feedback, to the faculty teaching engineering courses from other departments.</p> <ul style="list-style-type: none"> <li>• Courses, taken primarily by ME majors, should have input from ME faculty, as to the content of the course material and how it integrates with ME courses.</li> <li>• Coordinated effort made by the faculty from ME along with CE and ECE will resolve some concerns.</li> </ul>
Preparation in Math, Physics, and Chemistry courses	<p>The following comments were made by the students in regard to non-engineering courses, required in the program.</p> <ul style="list-style-type: none"> <li>• Math series (Math 75, 76, 77, and 81 or Engr 101) courses are theoretical and should include examples relevant for engineering application.</li> <li>• Physics series (Phys 4A, L; Phys 4B; and Phys 4C) courses were standard courses.</li> <li>• Chemistry 1A course is Ok as it is.</li> </ul>
General Education Courses	<p>The following comments were made in regard to required GE Courses.</p> <ul style="list-style-type: none"> <li>• Courses offered in Speech/Communication Series (Comm 3, 7, and 8) were satisfactory</li> <li>• Courses offered in Philosophy Series (Phil 1/20; Phil 120) were satisfactory</li> <li>• Course offered in Political Science series (Pl Sci 2/120) were satisfactory.</li> </ul>
General Concluding Remarks on ME Curriculum	<ul style="list-style-type: none"> <li>• Students were satisfied with current mechanical engineering curriculum, as it is offered now.</li> <li>• However they would like to see the curriculum to be flexible enough to introduce advanced topics offered as Tech Electives. and application of several design software used by companies in engineering practices.</li> </ul>
Final Comments and suggestions	<p><b>Computing facilities:</b></p> <ul style="list-style-type: none"> <li>• Provide more open hours for computing labs with key card entry</li> </ul> <p><b>Mechanical Engineering Labs:</b></p> <ul style="list-style-type: none"> <li>• Modernize labs and use proper analysis software in the labs</li> </ul> <p><b>Workshop facilities:</b></p> <ul style="list-style-type: none"> <li>• Provide adequate tooling in machine shops and remove requirement for students to purchase their own tools.</li> </ul> <p><b>Library facilities:</b></p> <ul style="list-style-type: none"> <li>• Resources are good but not effectively used by engineering majors who need on-line library use.</li> </ul>
Preparedness for Entry Level Jobs	<p>The seniors were asked to rate their preparation to fill entry level mechanical engineering positions in industry, as they graduate with a BSME. About 27 % felt that they were well prepared to take up entry level positions, 53 % felt that they were prepared to take up the entry level jobs, and 20 % felt that they were not sure if they had enough preparation to take up a job. Provide 1) opportunities for industry internship, with minimal interference with graduation, 2) proper facilities and resources to work on class and club projects, 3) course credit for competitions organized by professional societies, 4) opportunities to interact with industry by promoting industry sponsored projects and seminars on advanced topics.</p>

5. *Co-op internship Survey*: Dating back to 2007, about 60 ME students have completed an appraisal of their experiences in the middle of their internship and following completion of an internship program with a company. The general response was that the students found the internship to be a very valuable experience. Results of the 2013 internship survey are shown in Table 3-5. There is no real target other than a 50% appraisal is deemed acceptable.

Table 3-5 Co-op/Internship survey; VIP Program performance appraisal  
(4-5 = High, 3-4 = Medium, 2-3 = Low, 1-2 = Weak)

Question	Response	Percentage
1. How would you rate your overall experience?	4-5 (High)	50%
2. How would you rate the quality of the work you did?	4-5 (High)	50%
3. How would you rate the quality of the supervision you received?	4-5 (High)	50%
4. How would you rate the quality of the training you received?	4-5 (High)	50%
5. How would you rate the quality of the work environment?	4-5 (High)	50%
6. How would you rate the quality of the work schedule?	4-5 (High)	50%
7. How would you rate the quality of the work life balance?	4-5 (High)	50%
8. How would you rate the quality of the work life balance?	4-5 (High)	50%
9. How would you rate the quality of the work life balance?	4-5 (High)	50%
10. How would you rate the quality of the work life balance?	4-5 (High)	50%
11. How would you rate the quality of the work life balance?	4-5 (High)	50%
12. How would you rate the quality of the work life balance?	4-5 (High)	50%
13. How would you rate the quality of the work life balance?	4-5 (High)	50%
14. How would you rate the quality of the work life balance?	4-5 (High)	50%
15. How would you rate the quality of the work life balance?	4-5 (High)	50%
16. How would you rate the quality of the work life balance?	4-5 (High)	50%
17. How would you rate the quality of the work life balance?	4-5 (High)	50%
18. How would you rate the quality of the work life balance?	4-5 (High)	50%
19. How would you rate the quality of the work life balance?	4-5 (High)	50%
20. How would you rate the quality of the work life balance?	4-5 (High)	50%

**4. What changes did you make as a result of the data?** Describe how the information from the assessment activity was reviewed and what action was taken based on the analysis of the assessment data.

Some but not all changes are listed here.

- 1) Implementation of a higher admission index for ME (3500 for ME vs. 3100 for University) along with stricter transfer student requirements, change of major requirements and pre-requisite requirements (C or better in engineering, math and science courses) are increasing quality and decreasing attrition by attracting the best students.
- 2) New faculty in Energy and Fluids (E&F) and Systems, Dynamics, Controls (SDC) strengthen teaching in courses in those areas and reduce the number of required lecturers, thereby increasing quality and consistency of teaching and advising.
- 3) Curricular changes have resulted in robust and consistent two-course Senior Capstone Design sequence (ME135 and ME155).
- 4) More Technical Elective (TE) offerings provide greater variety for students and reflect expertise of new faculty.



Table 5-2 Assessment Methods Timeline

	Type	Technique	Timeline (Year)							Frequency	
			2015	2016	2017	2018	2019	2020	2021		
Goals = Program Educational Outcomes	"Indirect"	Alumni Survey			<input checked="" type="checkbox"/> (S)			<input checked="" type="checkbox"/> (S)		Two periods in six years	
		Employer Survey		<input checked="" type="checkbox"/> (F)			<input checked="" type="checkbox"/> (F)			Two periods in six years	
		IAC Feedback		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		Three periods in six years	
Student Learning Outcomes	"Direct"	FE Exam Results	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester	
		Student Performance in Courses	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Culminating Capstone Design Experience	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	Annual
	"Indirect"	Jr Survey	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Sr Survey	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Course Survey	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Sr Exit Interview	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	Annual
		Co-op/Intern Survey		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)	Three periods in six years

**6. What progress have you made on items from your last program review action plan?**

Please provide a brief description of progress made on each item listed in the action plan. If no progress has been made on an action item, simply state "no progress."

- **Recruit three-five new tenure track faculty.** Eight new faculty have been hired since 2011 but three faculty have left (two resignations and one retirement). As of Fall 2016, there are 11 tenure/tenure-track faculty, one full-time lecturer and one FERP faculty in his final year in the Department of Mechanical Engineering serving about 550 undergraduate and graduate students. [nearly complete]
- **Upgrade existing teaching/research laboratories** – Approximately \$250,000 of Lyles Gift funds have been expended to address over \$2.5 M of deferred maintenance and modernization of ME facilities. Currently, three laboratories in Engineering West are undergoing renovation and four-unit, outdoor laboratory annex (~\$400,000 of university funding) is planned to augment the undergraduate design experiences. Approximately, \$150,000 of university funds were expended to procure a scanning electron microscope (SEM) to support the Advanced Materials

focal areas of the Department's two programs. [in progress and about 20% complete]

- **Reconfigure (Engineering West) EW Building to establish better fabrication facilities, project space and design studio** – Three laboratories are being renovated and a four-unit, outdoor laboratory annex is planned to augment the undergraduate design experience. Once these modifications have been completed the rest of the space will be reconfigured to improve its efficiencies. [in progress and about 10% complete]
- **Prepare and submit quality funding proposals with emphasis on HSI and STEM workforce** – A multi-year, collaborative (SUNY-Buffalo) proposal was submitted in 2014 for review in 2015 to NASA for expanding NASA URM workforce. Although funding was not received in 2015, a collaborative framework was established. [in process and about 5% complete]
- **Define and maintain caps on ME majors (e.g., 300-400 undergraduate and 25 graduate)** – This goal is being implemented as part two step process:
  - Step 1 – Use impaction to control admissions by increasing Admissions Index from 2900 to 3900 for first time freshmen. Additional plans include increase standards for transfer students such as minimum GPA, completion of all math and science lower division requirements, etc. [in progress and about 60% complete]
  - Step 2 – Control sustained enrollment by i) requiring MATH 75 (or its equivalent) for all lower division ME courses except ME01; ii) requiring C or better in all engineering courses and those math and science courses that do not already have this in place (e.g., CHEM1A and MATH81) (in addition to the C or better already in place for MATH and PHYS attainment), iii) automatically denying third attempts for courses for any BSME major, iv) requiring a minimum GPA of B and completion of MATH 75 for change of major, v) actively providing counseling direction to alternate majors for those students who are demonstrating low probability of success in the BSME major. [in progress and 80% complete]
- **Limit enrollment maximums per course (e.g., 15 for lab and 35 for lecture)** - This has already been partially implemented in AY2015-16. The result was that for ME lecture courses, 57 sections were offered in Fall 2015 with total enrollment of 1199 for an average enrollment per lecture section of 21. In Spring 2016, 67 lecture sections were offered with total enrollment of 1234 for an average enrollment per lecture section of 18. Similarly, for ME laboratory courses, 23 sections were offered in Fall 2015 with total enrollment of 385 for an average enrollment per lab section of 17. In Spring 2016, 21 lab sections were offered with total enrollment of 418 for an average enrollment per lab section of 20. [in progress but 75% complete]
- **Define impaction terms to increase quality and decrease attrition** – Impaction results are as follows. The goal of impaction is to not trade quality for quantity. The BSME is a high-demand professional major across the United States with the BSME program at CSU, Fresno being no exception. In Fall 2015 before impaction, the number of ME applications was 794 and the number of enrolled first-time freshman ME majors was 162. In Fall 2016 after impaction, the number of ME applications was 751 and the number of enrolled first-time freshman ME majors was 134. Because impaction should positively affect the preparedness and hence quality of incoming freshmen, one measure of the success of impaction is the retention of students from



freshman to sophomore year. For Fall 2015, 162 freshmen were enrolled in the BSME program and in Fall 2016, 80 sophomores were enrolled in the BSME program. For Fall 2016, 134 freshmen were enrolled in the BSME program and it remains to be seen how many sophomores will be enrolled in the BSME program in Fall 2017. Another measure of impact is graduation rate, but the effects will not be seen for many years. Anecdotal evidence from faculty and students indicates that the efforts to increase preparedness and quality of students is increasing the quality of the learning experience (both student/teacher interaction, less time spent on remediation, more time spent on appropriate or advanced topic, better quality and successful projects, etc). [in progress but impact appears to be having the design effect]

- **Finalize, publicize, and implement focal areas for BSME (e.g., advanced materials, alternative energy, mechatronics)** – Documents have been published and website updates are in the posted. Equipment (e.g. SEM, light microscopy, etc.) have been procured. Eight new faculty have been hired in the last few years to provide intellectual horsepower for these focal areas. [in progress but 75% complete]
- **Maintain national accreditation** - After a general program review by Engineering Accreditation Commission (EAC) of ABET in 2012, an interim report was submitted in June 2014 that resulted in reaccreditation by EAC of ABET to 30 September 2019. This reaccreditation period represents a period of six years. The upcoming reaccreditation requires submission of a self study in June 2018 and a site visit in Fall of 2018. For the BSME program, accreditation is based on successful maintenance of eight Engineering Accreditation Commission (EAC) criteria (1. Students, 2. PEOs, 3. SOs, 4. CQI, 5. Curriculum, 6. Faculty, 7. Facilities, and 8. Institutional Support) and two ASME professional criteria (1. Curricular preparation for professional practice and 2. Faculty remaining current). This maintenance requires continual attention to these criteria. [in progress but 100% complete for now]

**Additional Guidelines:** If you have not fully described the assignment then please attach a copy of the questions or assignment guidelines. If you are using a rubric and did not fully describe this rubric (or the criteria being used) than please attach a copy of the rubric. If you administered a survey please attach a copy of the survey so that the Learning Assessment Team (LAT) can review the questions.

Not applicable or see SOAP for forms/surveys.