



FLORIDA ATLANTIC UNIVERSITY

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Department of Ocean and  
Mechanical Engineering

College of Engineering &  
Computer Science

Continuous Improvement Plan

Mechanical Engineering  
Undergraduate Curriculum

Plan for the Assessment and Continuous Improvement of the  
Mechanical Engineering Undergraduate Curriculum  
Department of Ocean and Mechanical Engineering  
Florida Atlantic University  
Revised on June 7, 2026

The Mechanical Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET, 111 Market Place, Ste. 1050, Baltimore, MD 21202-4012 ([www.abet.org](http://www.abet.org)). Florida Atlantic University is accredited by the Southern Association of Colleges and Schools (SACS) Commission on Colleges to award associate, bachelor's, master's, specialist, and doctoral degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097. Both of these organizations have moved towards implementing a Continuous Improvement Program (CIP) for the curriculum and student progress. The department has responded to these requirements in the following manner:

1. The establishment of a mission statement for the department.
2. The establishment of program educational objectives for the department.
3. The development of student outcomes for student performance.
4. A mapping of the student outcomes to the program educational objectives.
5. Mapping the required courses in the curriculum to the student outcomes.
6. The establishment of faculty course review groups with responsibility for particular sequences of courses in the program.
7. The development of a common course syllabus for each course that specifies the expected course outcomes for the course and relates them to the student outcomes.
8. The development of means of assessment for each of the intended courses and student outcomes.
9. A means of providing feedback from the assessment tools to the Department ABET/SACS committee.
10. The forwarding of the recommendations of the ABET/SACS committee to the faculty at large, for decisions regarding adjustments or changes that are necessary to ensure continuous improvement of the Mechanical Engineering program.

Each of these ten steps will be presented or discussed in detail. A flowchart has also been developed to show the links between the different segments of the Continuous Improvement Program, presented in Figure 1. The assessment of student outcomes of the ME Program will be reviewed by the Undergraduate Committee.

#### 1. Mission Statement of the Mechanical Engineering Program

The mission of the Mechanical Engineering program is to provide undergraduate students with the fundamental background necessary for a career in mechanical engineering and for the continuation of their education through postgraduate studies. For graduate students, the department strives to provide the in-depth background necessary for advanced work in mechanical engineering and to continue their education at the post-graduate level. All students are prepared to conduct basic and applied research and to provide service to the engineering profession and the community.

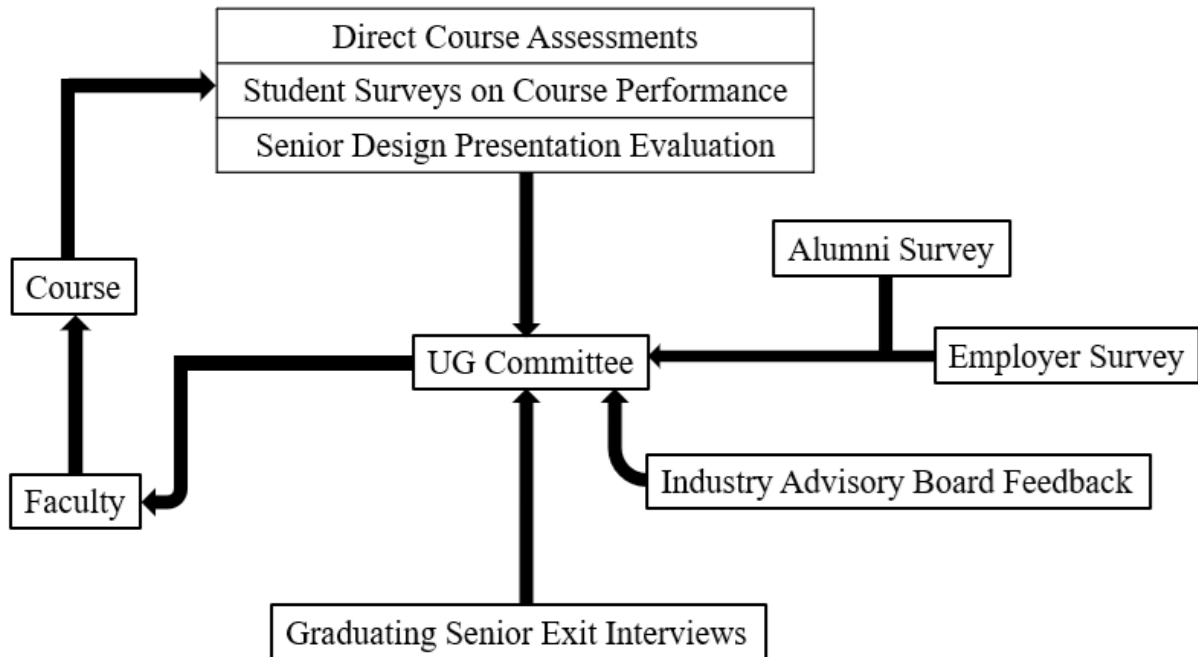


Figure 1: Assessment of student outcomes for the ME Program will be reviewed by the Undergraduate Committee.

## 2. Program Educational Objectives for the Mechanical Engineering Program

Within three to five years of graduation, graduates are expected to exhibit the following professional characteristics:

- A. **Career Contribution and Advancement:** Through their ability to solve engineering problems, meaningful design and hands-on experiences, critical thinking skills, and training in teamwork and communication, graduates will make significant contributions to their chosen field and advance professionally in mechanical engineering or allied disciplines.
- B. **Professionalism:** Graduates will act with both professional and social responsibility in their career field, including a commitment to protect both occupational and public health and safety, and apply engineering and ethical standards related to the practice of engineering.
- C. **Life-Long Learning:** Graduates will understand that their undergraduate education was just the beginning of their training and will continue to develop their knowledge and skills through progress toward or completion of graduate education and/or professional development through short courses or seminars and/or professional certification, and/or participation in professional societies.

These program educational objectives may be found on the following website:

[www.ome.fau.edu/undergraduate/mechanical/mission.php](http://www.ome.fau.edu/undergraduate/mechanical/mission.php)

### 3. Student Outcomes

The program will meet the above objectives by establishing the following student educational outcomes. These outcomes will be evaluated using various assessment tools discussed in section 8 below.

At the time of graduation, the students will attain the following:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (SO1)
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. (SO2)
3. An ability to communicate effectively with a range of audiences. (SO3)
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. (SO4)
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. (SO5)
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (SO6)
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (SO7)
8. An ability to understand, test, and apply engineering standards (additional since Spring 2025). (SO8)

The outcomes SO1-SO7 are part of the ABET student outcomes. Outcome SO8 is a newly created outcome for the ME program at FAU (since Spring 2025) that addresses the engineering standards and codes.

4. The mapping of the Mechanical Engineering student outcomes to the program educational objectives is presented in Table 1.

Table 1. Relationship of Student Outcomes (SO1-8) to Program Educational Objectives

	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Outcome 7	Outcome 8
<b>Objective 1</b> - Career Preparation: Through their ability to solve engineering problems, meaningful design and hands-on experiences, critical thinking skills, and training in teamwork and communication, graduates will make significant contributions to their	X	X	X		X	X	X	X

chosen field and advance professionally in mechanical engineering or allied disciplines.								
<b>Objective 2 – Professionalism:</b> Graduates will act with both professional and social responsibility in their career field, including a commitment to protect both occupational and public health and safety, and apply engineering and ethical standards related to the practice of engineering.	X		X					X
<b>Objective 3 – Life-Long Learning:</b> Graduates will understand that their undergraduate education was just the beginning of their training and will continue to develop their knowledge and skills through progress toward or completion of graduate education and/or professional development through short courses or seminars and/or professional certification, and/or participation in professional societies.	X		X			X		X

5. The mapping of each required course in the Mechanical Engineering program to the student outcomes is presented in Table 2.

Table 2. Relationship of Student Outcomes (SO1-8) to BSME courses

	(Outcome Assessment)									
	Courses	Instructor	1	2	3	4	5	6	7	8
Fall 2025	EML 4127 Applied Thermal/Fluid Engineering	Moslemian	■	■	■	■	■	■	■	■
	EML 4521C Engineering Design	Curet	■	■	■	■	■	■	■	■
	EML 3523C Experimental Methodology	Moslemian	■	■	■	■	■	■	■	■
	EML 4500 Machine Design	Beaujean	■	■	■	■	■	■	■	■
	EML 4142 Heat Transfer	Abtahi	■	■	■	■	■	■	■	■
	EGN 3365 Engineering Materials 1	Salivar	■	■	■	■	■	■	■	■
	EML 4551 Design Project	Kim	■	■	■	■	■	■	■	■
	EGN 4432 Dynamic Systems	An	■	■	■	■	■	■	■	■
	EML 4730L Mechanical Engineering Lab	Masory	■	■	■	■	■	■	■	■
	EGM 4045 Electro-Mechanical Devices	Pratik	■	■	■	■	■	■	■	■
Spring 2026	EML 4127 Applied Thermal/Fluid Engineering	Moslemian	■	■	■	■	■	■	■	■
	EML 4521C Engineering Design	Curet	■	■	■	■	■	■	■	■
	EML 3523C Experimental Methodology	Moslemian	■	■	■	■	■	■	■	■
	EML 4500 Machine Design	Beaujean	■	■	■	■	■	■	■	■
	EML 4142 Heat Transfer	Abtahi	■	■	■	■	■	■	■	■
	EGM 4523 Intermediate Strength of Materials	Carlsson	■	■	■	■	■	■	■	■
	EML 4551 Design Project	Kim	■	■	■	■	■	■	■	■
	EGN 4432 Dynamic Systems	An	■	■	■	■	■	■	■	■
	EML 4730L Mechanical Engineering Lab	Masory	■	■	■	■	■	■	■	■
	EGM 4045 Electro-Mechanical Devices	Pratik	■	■	■	■	■	■	■	■

6. Five faculty Review Committees have been established with the responsibility for certain sequences of courses. These committees develop and maintain the common course syllabus for each course. They establish the prerequisites and corequisites for each course, the topics to be included, and the expected course outcomes. These committees are responsible for addressing feedback from surveys and assessment results, and for forwarding recommendations for change to the Undergraduate Committee for courses in their curriculum sequence. They review their course sequence each fall.

7. A common course syllabus has been developed for each required course in the Mechanical Engineering curriculum. These are posted on the Mechanical Engineering website at <https://www.fau.edu/engineering/ome/undergraduate/mechanical/common/>. The syllabi are maintained by the faculty Review Committees and updated each year as necessary, based on the evaluation of assessment data.
8. The following assessment tools for student outcomes have been developed and are in use by the Mechanical Engineering Program since 2021

### *8.1 Indirect Assessments*

Indirect assessment represents a qualitative measure of the student's attainment. The indirect assessment is carried out using the following instruments:

#### *8.1.1 Alumni Survey*

A sample alumni survey for assessing ABET student outcomes is provided in Appendix 1. This survey assesses students' attainment of student outcomes using a scale from 1 to 5, with 1-2 indicating poor, 3-4 indicating satisfactory, and 5 indicating excellent. In addition, the alumni update their work-related and contact information.

#### *8.1.2 Employer Survey*

The sample employer survey for assessing ABET student outcomes is identical to the one shown in Appendix 1 (minus the Update Information Section) and will not be repeated here.

#### *8.1.3 Graduating Senior Survey*

A sample survey for assessing student outcomes among graduating seniors is same as that for alumni, and will not be repeated here. This survey asks graduating seniors to assess the attainment of student outcomes using a scale ranging from 1 to 5, with 1-2 indicating poor, 3-4 indicating satisfactory, and 5 indicating excellent.

#### *8.1.4 Student Course Survey*

A sample survey form for students in an ME course is provided in Appendix 2. This survey asks students to assess their self-reported attainment of specific course outcomes using a scale ranging from 1 to 5, with 1-2 indicating unsatisfactory, 3-4 indicating satisfactory, and 5 indicating excellent. It should be noted that each course outcome can be mapped to only one student outcome, although multiple course outcomes can be mapped to a single student outcome.

### *8.2 Direct Assessments*

Direct Assessment is based on a quantitative measure of student outcomes. The direct assessment is carried out using the following instruments:

#### *8.2.1 Capstone Senior Final Design Presentation*

A group of faculty members is invited to attend the senior final design presentation and appraise the students' performance on their design projects. The appraisal of each capstone senior design project is based on an oral communication process that includes a student group presentation, followed by a question-and-answer session led by a committee of evaluators comprising instructors, faculty, and/or external members from industry laboratories. The student outcomes

assessed are SO2, SO3, SO4, SO5, SO7, and SO8. A sample evaluation form for a senior design team is provided in Appendix 3.

### 8.2.2 Student Coursework Performance

Students' performance in coursework assignments is an excellent measure of student outcomes. It should be noted that the assessment of student outcomes is based not solely on the overall course grade, but on individual assignments, including lab reports, project reports, teamwork in conducting experiments, project presentations, specific exam questions, and quizzes. To ensure that each student outcome (SO) is assessed properly based on coursework, the following four steps are adopted. A sample evaluation form for SO1 is provided in Appendix 4.

#### Step 1 Mapping Courses to Student Outcomes (SO)

- A small set of courses is assessed for each SO, and mostly 2 to 3 SOs are assessed in any course, except for the senior design courses that have more than 3 SOs.
- Course assignments to be used in the assessment of each SO are defined, and composite grades are never used as a direct assessment of an SO.
- No assignment is used to assess more than one SO.
- Every SO is assessed based on at least three courses and preferably five courses.

A mapping of the mechanical engineering courses and their associated student outcomes (SO1-8) is listed in Table 2. Note that SO8 has been implemented since Spring 2025.

#### Step 2: Creation of a Course Worksheet

- A worksheet for a course includes its course number, semester taught, instructor's name, number of students, a specific student outcome, activity to be assessed, summary of activity, and how it will be assessed.
- A performance-based rubric for the assessment is created. The rubric includes what is assessed and the level of attainment. Note that course grades are not used in the assessment. For each course assignment, achievement by ME students only will be assessed. Note that the selected ME courses in Table 3-2 are mostly specific to ME core courses, and thus, only ME students will take them. The exceptions are Dynamic Systems and Electro-Mechanical Devices, in which Ocean Engineering majors are also enrolled. For these courses, the instructors only consider the assignment grades for ME students
- In each course worksheet for a specific student outcome, the performance-based level of attainment is categorized into one of the following three levels:
  - Inadequate (Level 1)
  - Adequate (Level 2)
  - Proficient (Level 3)

The mapping between an assignment's performance and these levels is determined by the course instructor. For example, an instructor might give an Inadequate (less than 70%), Adequate (between 70% and 80%), or Proficient (more than 90%) rating, whereas another instructor might rate it differently. The number of students achieving these levels is recorded in the ABET assessment table.

### 8.3 Frequency of Assessments

The frequency of outcomes assessment is given in Table 3.

Table 3: The direct and indirect assessments used in evaluating the student outcomes

8.4

Assessment Method	Frequency	Rationale and Discussion
<b>Indirect Assessments</b>		
Alumni Survey	Once every 3 years	Once every three years, alumni who graduated within the previous five years are surveyed. Thus, all graduates are surveyed at least once to assess the achievement of outcomes
Employer Survey	Once every 3 years	Once every three years, employers who hire our alumni are surveyed.
Graduating Senior Exit Survey	Every fall and spring	This survey covers not only student outcomes but also the overall program, its strengths and weaknesses, and seeks input and opinions for improvement.
Student Assessment of Outcomes	Each fall and spring	This assesses the self-reported attainment of students on each of the course outcomes covered.
<b>Direct Assessments</b>		
Final Senior Design Presentation	Each fall and spring	The assessments of all outcomes typically required in a capstone final design presentation are conducted by a committee of faculty and/or industry representatives.
Direct Assessment of Course Outcomes	Each fall and spring	Specific course assignments from a selected set of ME courses are used for this assessment.

#### *Criteria for Satisfactory Level of Attainment of Student Outcomes*

The criteria set by the faculty for the satisfactory attainment of student outcomes and for the evaluation of assessments are summarized in Tables 4a and 4b. For the indirect assessments, the benchmark for the alumni, employer, and graduating senior surveys is that at least 70% of program constituents should find that the program has attained its desired outcomes at a satisfactory or better level. For continuous improvement, the program will not only take steps to address any shortcomings if the current criteria are not met, but also set higher standards for further improvement if all criteria are achieved. *It should be noted that the previous method for the student survey of course outcomes used averaging. Starting in the Spring of 2025, the new method will be the same as those for alumni and graduating senior surveys. This ensures consistency across all categories.*

Table 4a. Satisfactory Attainment Criteria for the Indirect Assessments of Student Outcomes

Indirect Assessment	Satisfactory Attainment Criteria set by the faculty
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Alumni Survey	At least 70% of the alumni find that all outcomes are achieved at a satisfactory or better level
Employer Survey	At least 70% of the employers find that all outcomes are achieved at a satisfactory or better level
Graduating Senior Exit Survey	At least 70% of the graduates find that all outcomes are achieved at a satisfactory or better level
Student Survey on Course Outcomes	At least 70% of the students find that all outcomes are achieved at a satisfactory or better level

Table 4b. Satisfactory Attainment Criteria for the Direct Assessments of Student Outcomes

<b>Direct Assessment</b>	<b>Satisfactory Attainment Criteria set by the faculty</b>
Senior Final Design Presentation	At least 70% of the evaluators find that all outcomes are achieved at a satisfactory or better level
Direct Assessment of Performance in Coursework	See criterion in A.3.1

For the direct assessments, the benchmark for the senior final design presentation is that at least 70% of evaluators should find that the program has attained its desired outcomes at a satisfactory or better level.

#### *8.4.1 Satisfactory Attainment Criteria for Direct Assessment of Coursework Performance*

In terms of a coursework assignment for a specific student outcome, its assessment is color-coded into red, yellow, and green, and is defined as follows:

- **Outcome Not Achieved**
  - The outcome is not achieved if more than 20% of students achieve Level 1 (inadequate). In this case, an improvement plan is required that addresses how performance can be improved.
- **Achieved Outcome, Review Required**
  - The outcome is achieved, but a review is required if at least 80% of students achieve Level 2 or 3 (adequate or proficient). In this case, an improvement plan is recommended, but not required.

- **Achieved Outcome**
  - The outcome is achieved if at least 80% of students achieve Level 3 (proficient). No improvement plan is needed.

The assessment data from all courses are collated in a color-coded Course-SO map for program-level evaluation. The following rubric is used in the evaluation:

- A SO is deemed achieved at a satisfactory level if the achievement is indicated by at least 70% of the indicator course assignments for the SO
- Otherwise, improvements are deemed required to raise the level of SO achievement.

9. The Undergraduate Committee reviews all of the assessment data. The Committee evaluates the results and makes recommendations to the faculty for action.

10. The recommendations of the Undergraduate Committee will be acted upon in a faculty meeting as deemed appropriate. Once approved, the Committee will be tasked with implementing the proposed changes.

Appendix 1: Alumni Survey on the BSME Program Student Outcomes Blank Form

Using a numerical scale ranging from 1 to 5, with 1 meaning poor, 3 satisfactory, and 5 excellent, please assess how well the BSME program at FAU achieves student outcomes through its curriculum. If you are unable to rank any of the outcome(s), please leave that blank. Please return the completed form to [acalnick@fau.edu](mailto:acalnick@fau.edu). Thanks.

<p><b>BSME Program Student Outcomes</b> The student outcomes of the BSME program at FAU are the following:</p>	<p><b>Assessment</b> 1.....3.....5 Poor                      Satisfactory Excellent</p>
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
(3) an ability to communicate effectively with a range of audiences	
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
(5) an ability to function effectively in a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	
(8) An ability to understand, test, and apply engineering standards	

## Appendix 2: Student Survey of Course Outcomes

Course Number and Title: \_\_\_\_\_

Semester Taught: \_\_\_\_\_

Instructor: \_\_\_\_\_

Please use this form to rate your personal feelings of achievement of the published outcomes for the course as listed below. The following 0-5 rating scale should be used to assess your achievement of the outcomes. This information will be presented to the ABET/SACS committee for review at the end of each semester. The committee will evaluate the students' performance on the specified outcomes and make recommendations for changes as appropriate.

5 – Complete understanding of the technical content of the outcome or the specified skills and confidence in applying the techniques to engineering problems.

4 – Good understanding of the technical content of the outcome or the specified skills and an ability to apply the techniques to engineering problems.

3 – Adequate understanding of the technical content of the outcome or the specified skills and some ability to apply the techniques to engineering problems.

2 – Marginal understanding of the technical content of the outcome or the specified skills, and some difficulty in applying the techniques to engineering problems.

1 – No understanding of the technical content of the outcome or the specified skills.

0 – Did not cover the information specified in the outcome in the class.

Outcome 1:

\_\_\_\_\_

Outcome 2:

\_\_\_\_\_

Outcome 3:

\_\_\_\_\_

Outcome 4:

\_\_\_\_\_

Outcome 5:

\_\_\_\_\_

Appendix 3: EML 4521/4551 Engineering Design & Design Project Presentation

Instructor: \_\_\_\_\_  
 Semester: \_\_\_\_\_  
 Year: \_\_\_\_\_

Project Title: \_\_\_\_\_

Evaluator's Name (Please Print): \_\_\_\_\_

Evaluator's Affiliation (Please Print): \_\_\_\_\_

Dear Evaluator: Based on the design accomplishments, team effort, and project presentation, please rate the team's overall attainment of the following outcomes. **If any of the outcome(s) cannot be evaluated based on the available information, you may leave those unevaluated.** Any additional comments are welcome.

ABET Outcomes	Evaluation		
	Poor	Satisfactory	Excellent
ABET outcome (1): an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics			
ABET outcome (2): An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			
ABET outcome (3): An ability to communicate effectively with a range of audiences.			
ABET outcome (4): An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
ABET outcome (5): An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			
ABET outcome (6): an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			
ABET outcome (7): An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.			
ABET outcome (8): An ability to understand, test, and apply engineering standards			

Additional Comments: (Continue on the other side if more space is needed.)

Appendix 4: ABET Student Outcome 1 Blank Form (Direct Course Assessment)

Course Information:

Semester / Year:

Instructor:

**ABET Outcome: SO1**

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

**Indicator for Assessing SO1**

<b>Indicator</b>	<b>Inadequate (1)</b>	<b>Adequate (2)</b>	<b>Proficient (3)</b>
Identify, formulate, and solve an engineering problem	Achieve only 1 of the following: <ul style="list-style-type: none"><li>• Sufficiently identify the problem</li><li>• Sufficiently formulate the problem</li><li>• Sufficiently solve the problem</li></ul>	Achieve 2 of the following: <ul style="list-style-type: none"><li>• Sufficiently identify the problem</li><li>• Sufficiently formulate the problem</li><li>• Sufficiently solve the problem</li></ul>	Achieve all of the following: <ul style="list-style-type: none"><li>• Sufficiently identify the problem</li><li>• Sufficiently formulate the problem</li><li>• Sufficiently solve the problem</li></ul>

**Assignment Related to the Indicator:**

### Mapping from the Assignment to the Indicator's Performance

<b>Inadequate (1)</b>	<b>Adequate (2)</b>	<b>Proficient (3)</b>
Student achieves <XX% in the assignment	Student achieves $\geq$ XX% but $\leq$ 80% in the assignment	Student achieves $\geq$ XX% in the assignment

### ABET SO1 Assessment Table

ABET Student Outcome	Assignment	Indicator	Level of Achievement (1-3)		
			# of students achieving Inadequate (1)	# of students achieving Adequate (2)	# of students achieving Proficient (3)
1		Identify, formulate and solve Engineering Problems			

### **Rubric for Assessing Student Outcome Criteria:**

- At least 80% of students achieve Level 3 → **Achieved outcome**
- At least 80% of students achieve level 2 or above, but less than 80% of students achieve Level 3. → **Achieved outcome with concerns**
- More than 20% of students achieve level 1 → **Outcome not achieved**

### ABET SO1 Evaluation

ABET outcome (1):

- Outcome not achieved
- Achieved outcome, needs review
- Achieved outcome

### Improvement Plan

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