

BSE, Mechanical Concentration

 Program-1268

Annual Assessment Plan

1

2 ULO 4A - ABET1

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

Outcome(s)

- 1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

- 2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

- 3 **Please Enter The Following Information Below:**

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.

Measures	Targets	Timeline
ENGR 111 – Project (Apply the steps of the Engineering Design process in working towards the solution of well-defined problem)	80% of students score 80% or better	Once every two years, 18-19
ENGR 216 – Exam problem (Develop free body diagrams and apply appropriate resolution of forces to determine forces internal to a rigid body)	80% of students score 80% or better	Once every two years, 18-19
ENGR 215 – Exam problem (Apply Kirchhoff’s Laws to solve algebraically for an unknown current or voltage in a circuit)	80% of students score 80% or better	Once every two years, 18-19



Measures	Targets	Timeline
ENGR 213 – Exam 2 problem (Use statistics to evaluate the performance of engineering design or process)	80% of students score 80% or better	Once every two years, 18-19
ENGR 214 – Exam problem (Explain the relationship between macroscopic material properties and the material's microstructure)	80% of students score 80% or better	Once every two years, 18-19
ENGR 211 – Charter (Articulate the client's need and define criteria for success in an open-ended project)	80% of students score 80% or better	Once every two years, 18-19
ENGR 411 – Charter (Articulate the client's need and define criteria for success in an open-ended project)	80% of students score 80% or better	Once every two years, 18-19
ENGR 371 – TBD (Simplify a realistic problem into analytical model with respect to a thermodynamic system and associated assumptions)	80% of students score 80% or better	Once every two years, 19-20
ENGR 471B – Exam problem (correctly identify the simplifying approximations that they made to complete an analysis of heat transfer)	80% of students score 3/3	Once every two years, 19-20
ENGR 471C – Laboratory activity (approximations to apply one-dimensional analysis to satisfactorily model three-dimensional heat transfer)	80% of students score 20/25 or better	Once every two years, 19-20



Measures	Targets	Timeline
ENGR 472 – Design Project (analysis portion of grading rubric involving head gasket design)	80% of students score 31.2/52 or better	Once every two years, 19-20
ENGR 471 - Exam problem that requires students to correctly identify the simplifying approximations that they made to complete an analysis of heat transfer.	80% of students score 75% or better	

- 4 **Results** - Please enter numeric results, indicating the number and percentage of student performance meeting the target. Record faculty discussion about the strengths and weaknesses in student performance. *Please see the May Development section on the Assessment of Student Learning website for suggestions about how to process assessment results.

ENGR 471 F20: (Instructor Observations) Although approximation exercises were added to midterm exams, students continued to give the task too little attention relative analysis. Restructuring the assessment as a stand-alone Final Exam activity brought more focus and improved outcomes. 10 of 17 students (59%) achieved a score of 12 or higher, so the assessment fails, but 14 of 17 (82%) achieved a score of 11 or higher. To reach our goal, I propose introducing the matching exercise earlier in the course to associate analysis tools with their limitations, followed by a comprehensive assessment covering all course content during the Final Exam. In view of progress made, moreover, I recommend assessing this outcome again on typical cycle. (Dept Observations) Concur with instructor's observations.

- 5 **Action Plans** - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.



ENGR 471 F20: Re-align timing within the course as described.

- 6 **Closing the Loop** - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

ENGR 471 – FALL: Re-align timing within the course as described.

ENGR 472 – FALL: No action required.

ENGR 471 F20 Response to Action Plan: Greater emphasis on the importance of identifying simplifying approximations was communicated by requiring that they be identified in at least one problem in each of the mid-term exams. The assessment was also restructured as a stand-alone element with greater weight on the Final Exam.

3 **ULO 6A - ABET2**

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

Outcome(s)

- 1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

- 2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

- 3 **Please Enter The Following Information Below:**

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.



Measures	Targets	Timeline
ENGR 411 – Report (Design a solution for a Collaboratory client aligned with their needs)	80% of students score 80% or better	Once every two years, 18-19
ENGR 378 – Scores from part of rubric used to assess a project which involves redesigning a part to improve manufacturability and producing the part	80% of students score 32/40 possible rubric points	Once every two years, 19-20
ENGR 471 – Laboratory activity (develop a parametric analysis spreadsheet tool for their organization to optimize the design of furnaces for performance, economic, and safety constraints)	80% of students score 4/5 or better	Once every two years, 19-20
ENGR 472 – Design Project (redesign and analysis portions of grading rubric involving j-brace on bridge)	80% of students score 42/53 or better	Once every two years, 19-20

- 4 **Results** - Please enter numeric results, indicating the number and percentage of student performance meeting the target. Record faculty discussion about the strengths and weaknesses in student performance. *Please see the May Development section on the Assessment of Student Learning website for suggestions about how to process assessment results.
- 5 **Action Plans** - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.
- 6 **Closing the Loop** - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.



ENGR 471 – FALL: No action required.

4 ULO 1A - ABET3

an ability to communicate effectively with a range of audiences

Outcome(s)

1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

3 **Please Enter The Following Information Below:**

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.

Measures	Targets	Timeline
ENGR 411 – Symposium Presentation (Blend technical details of a design solution into the “big picture” story of an open-ended problem in an oral presentation)	80% of students score 80% or better	Once every two years, 18-19
ENGR 411 – Report (Clearly summarize the overall context of and current status of a design project in a project report)	80% of students score 80% or better	Once every two years, 18-19



Measures	Targets	Timeline
ENGR 411 – Record (Document technical details relevant to a significant sub-activity of a project’s development (e.g. design, analysis, testing))	80% of students score 80% or better	Once every two years, 18-19
ENGR 411 – MVP Review (Participate effectively in a discussion about the current status of a project during a design review meeting)	80% of students score 80% or better	Once every two years, 18-19
ENGR 112 – Homework (Demonstrate a working knowledge in interpreting and developing engineering drawings)	80% of students score 80% or better	Once every two years, 18-19

- 4 **Results** - Please enter numeric results, indicating the number and percentage of student performance meeting the target. Record faculty discussion about the strengths and weaknesses in student performance. *Please see the May Development section on the Assessment of Student Learning website for suggestions about how to process assessment results.
- 5 **Action Plans** - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.
- 6 **Closing the Loop** - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

5 **ULO 6B - ABET4**

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

Outcome(s)



- 1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

- 2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

- 3 **Please Enter The Following Information Below:**

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.

Measures	Targets	Timeline
ENGR 301 – TBD (Make informed choices using an appropriate ethical framework)	80% of students score 80% or better	Once every two years, 18-19
ENGR 301 – TBD (Demonstrate familiarity with a code of ethics for the engineering profession)	80% of students score 80% or better	Once every two years, 18-19
ENGR 301 – Paper (Express how the student’s own belief system influences their professional practice)	80% of students score 80% or better	Once every two years, 18-19
ENGR 302 – Paper (Describe the codes, standards, and professional obligations (licensure, etc.) for the industry in which you expect to practice)	80% of students score 80% or better	Once every two years, 18-19

Measures	Targets	Timeline
ENGR 301 – Paper (Evaluate the impact of a particular technological advancement)	80% of students score 80% or better	Once every two years, 18-19
ENGR 411 – MVP Review (The team is taking a comprehensive approach, considering all facets of the problem at hand)	80% of students score 80% or better	Once every two years, 18-19
ENGR 302 – ELI assessment question (Describe two transferable skills acquired during the experience)	80% of students score 80% or better	Once every two years, 18-19
ENGR 302 – ELI assessment question (Describe a problem that you faced or observed during your experience; describe the problem, and articulate an approach you did or would take toward a solution to the problem)	80% of students score 80% or better	Once every two years, 18-19

- 4 **Results** - Please enter numeric results, indicating the number and percentage of student performance meeting the target. Record faculty discussion about the strengths and weaknesses in student performance. *Please see the May Development section on the Assessment of Student Learning website for suggestions about how to process assessment results.
- 5 **Action Plans** - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.
- 6

Closing the Loop - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

6 ULO 4B - ABET5

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

Outcome(s)

1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

3 Please Enter The Following Information Below:

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.

Measures	Targets	Timeline
ENGR 111 – Homework (Identify specific behaviors and skills that support team effectiveness)	80% of students score 80% or better	Once every two years, 18-19
ENGR 111 – Homework (Identify roles that you typically assume in a team environment)	80% of students score 80% or better	Once every two years, 18-19

Measures	Targets	Timeline
ENGR 211 – TBD (Summarize the roles of various (engineering and non-engineering) disciplines in a specific environment or case study)	80% of students score 80% or better	Once every two years, 18-19
ENGR 411 – faculty and peer evaluations (Function effectively on a project design team)	80% of students score 80% or better	Once every two years, 18-19

4 Results - Please enter numeric results, indicating the number and percentage of student performance meeting the target. Record faculty discussion about the strengths and weaknesses in student performance. *Please see the May Development section on the Assessment of Student Learning website for suggestions about how to process assessment results.

5 Action Plans - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.

6 Closing the Loop - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

7 ULO 4C - ABET6

an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome(s)

1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

There is no selected outcome.



3 Please Enter The Following Information Below:

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.

Measures	Targets	Timeline
ENGR 213 – Project (Develop an experimental hypothesis)	80% of students score 80% or better	Once every two years, 18-19
ENGR 213 – Project (Interpret experimental data in a way that draws meaningful conclusions)	80% of students score 80% or better	Once every two years, 18-19
ENGR 214 – Lab report (Design a process that produces material properties consistent with a client specification)	80% of students score 80% or better	Once every two years, 18-19
ENGR 323 – Homework assignment (Determine whether misfit statically indeterminate beam results in over-stressing)	80% of students score 8/10 or better	Once every two years, 19-20
ENGR 471A – Laboratory activity (use experimental data to calibrate a mathematical model of heat transfer developed by students to guide design decisions)	80% of students score 4/5 or better	Once every two years, 19-20

Measures	Targets	Timeline
ENGR 471B – Exam or homework problem (analyze the difference between measured and ambient	80% of students score 26/30 or better	Once every two years, 19-20

- 4 **Results** - Please enter numeric results, indicating the number and percentage of student performance meeting the target. Record faculty discussion about the strengths and weaknesses in student performance. *Please see the May Development section on the Assessment of Student Learning website for suggestions about how to process assessment results.
- 5 **Action Plans** - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.
- 6 **Closing the Loop** - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

ENGR 471 – FALL: No action required.

- 8 **ULO 1B - ABET7**
an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Outcome(s)

- 1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.
- 2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

There is no selected outcome.
- 3 **Please Enter The Following Information Below:**



Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.

Measures	Targets	Timeline
ENGR 302 – Writing (Demonstrate awareness of professional societies relevant to the student's discipline)	80% of students score 80% or better	Once every two years, 18-19
ENGR 302 – Writing (Demonstrate awareness of professional credentials necessary for success in the student's discipline)	80% of students score 80% or better	Once every two years, 18-19
ENGR 302 – Writing (Explain the purpose of a college education and the necessity for education beyond that)	80% of students score 80% or better	Once every two years, 18-19
ENGR 302 – Interview/Writing (Summarize the positive effect of lifelong learning in another professional's career)	80% of students score 80% or better	Once every two years, 18-19
ENGR 411 – Survey (Solve a problem that requires independent study of a technical subject)	80% of students score 80% or better	Once every two years, 18-19
ENGR 302 – ELI question (Identify a skill area in need of growth)	80% of students score 80% or better	Once every two years, 18-19

- 4 **Results** - Please enter numeric results, indicating the number and percentage of student performance meeting the target. Record faculty discussion about the strengths and weaknesses in student performance. *Please see the May Development section on the Assessment of Student Learning website for suggestions about how to process assessment results.
- 5 **Action Plans** - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.
- 6 **Closing the Loop** - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

- 2 Holistic program improvement goals: Programs are expected to have at least one action plan to improve student learning annually. If you have not yet identified an action plan associated with this year's assessment results, or if the department has identified additional issues that require action plans, describe the specific, measurable action plan and its relation to evidence of student performance.

Assessment Rubric

1 Process

	1	2	3	4
Is the plan being implemented faithfully and revised as needed?	 Assessment plan is not implemented.	 Most aspects of plan are being implemented or all aspects are implemented to some degree.	 Assessment plan is fully implemented.	 Plan is faithfully executed and modified/evaluated as needed.

2 Explanations:

3 **Engagement**

	1	2	3	4
Are all relevant parties are meaningfully involved in the creation/revision, implementation, analysis, interpretation and learning improvement process?	<p style="text-align: center;"> Limited involvement beyond chair/director</p>	<p style="text-align: center;"> All educators contributing to the curriculum are aware of process and results</p>	<p style="text-align: center;"> All educators contributing to the curriculum participate in conversations regarding the use of assessment data to improve student learning</p>	<p style="text-align: center;"> All relevant stakeholders (students, employers, alumni) are meaningfully involved in the creation/revision, implementation, analysis, interpretation, and/or improvement processes associated with this assessment plan.</p>

4 Explanations:

5 **Program Learning Objectives**

	1	2	3	4
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	1	2	3	4
<p>Are the program learning objectives clear, measurable, aligned with ULOs/GLOs, and representative of the range of learning for that major/program?</p>	<p style="text-align: center;">○</p> <p>PLOs are problematic (vague, abstract, not aligned with ULOs/GLOs) or missing.</p>	<p style="text-align: center;">○</p> <p>PLOs are clear, mostly measurable, partially aligned with ULOs/GLOs.</p>	<p style="text-align: center;">○</p> <p>PLOs are clear, measurable, aligned with ULOs/GLOs, and represent a summary of the knowledge, skills, beliefs, and values that a graduate of this major/program should attain by completing the required curriculum, accounting for variations in learning outcomes due to tracks/concentrations</p>	<p style="text-align: center;">○</p> <p>PLOs are clear, measurable, aligned with ULOs/GLOs, and representative of the range of learning students achieve through completion of the program. The learning objectives provide a comprehensive view of the knowledge, skills, beliefs, and values that are important for a graduate of this major/program and account for variations in learning outcomes due to tracks/concentrations.</p>

6 Explanations:

7 **Measures**

	1	2	3	4

	1	2	3	4
<p>Are the instruments used to assess learning relevant to the objective? Do measures yield information/data you can use to drive improvement?</p>	<p>○</p> <p>Not all objectives have a measure identified. OR Measures do not directly connect to the objectives.</p>	<p>○</p> <p>All objectives have at least one direct measure. Measures connect to learning objectives superficially or tangentially and/or include learning other than stated objectives. Relies almost exclusively on the same form of assessment (survey, exam, project). Relies almost exclusively on data from a single source (course, program, activity).</p>	<p>○</p> <p>All objectives have at least one direct measure. Some objectives have multiple measures. Measures clearly connect to learning objectives. And two of the following four criteria: Objective measures more than one point in time (formative). Indirect measure are used strategically. Plan Incorporates different forms of assessment (survey, exam, project). Plan incorporates from a variety of sources (course, program, activity).</p>	<p>○</p> <p>Measures meet all of the following criteria: All objectives have at least one direct measure. Some objectives have multiple measures. Measures clearly connect to learning objectives. Objectives measured more than one point in time (formative). Indirect measures are used strategically. Plan incorporates different forms of assessment (survey, exam, project). Plan incorporates data from a variety of sources (course, program, activity).</p>

8 Explanations:

9 **Targets**

	1	2	3	4

	1	2	3	4
<p>Are the targets based on professional standards and/or analysis of past student work? Are targets challenging and achievable?</p>	<p>Some targets are missing.</p>	<p>Targets are arbitrarily chosen or reflect minimal expectations.</p>	<p>Targets are challenging and achievable based on prior student performance, and reflect an appropriate level of performance.</p>	<p>Targets are challenging and achievable. Targets are based on professional standards and/or prior student performance. Targets are set at a level to inspire program improvement.</p>

10 Explanations:

11 **Timeline**

	1	2	3	4
<p>Is the timeline for data collection manageable with sufficient data points to effectively inform decision making and program review?</p>	<p>Not identified clearly for all measures.</p>	<p>Clearly states semester/year for each objective/measure. Data analysis delayed from data collection. Time between collection points may not facilitate informed decision making.</p>	<p>Clearly stated and manageable schedule. At least two data points for each objective per review cycle.</p>	<p>Timeline for data collection is manageable and allows for continuous improvement with timely and meaningful decision making even before program review.</p>

12 Explanations:

Action Plan

	1	2	3	4
<p>Is the department effectively examining and using assessment data to revise curriculum and pedagogy to support student learning?</p>	<p>○</p> <p>Assessment data not collected/analyzed/used for decisions and/or results not documented in AEFIS.</p>	<p>○</p> <p>Data collected, documented and discussed by department. Department reviewed confidence in measures and data as sufficient indicators of student performance. If data indicated changes were needed, action plans were developed in consultation with dean (e.g. improving outcomes, measures, targets, curriculum or pedagogy).</p>	<p>○</p> <p>Data collected, documented and discussed by department. Department and dean confirmed confidence in measures and data as sufficient indicators of student performance. Action plans (e.g. improving outcomes, measures, targets, curriculum or pedagogy) developed in consultation with dean. If prior year data warranted action plans, the department implemented the changes.</p>	<p>○</p> <p>Department collected and discussed follow-up data after the implementation of action plans in order to determine whether changes resulted in improvement or whether additional action is necessary. Data confirms effective curriculum and pedagogy for learning outcomes. Score of 4 should be assigned only if objectives, measures, targets and timeline all score a 4.</p>

14 Explanations:

15 **Dissemination**

	1	2	3	4

	1	2	3	4
<p>Is the department communicating learning objectives, results and improvements related to student learning to a wide audience?</p>	<p><input type="radio"/></p> <p>No record of assessment results and changes made as a result of assessment findings.</p>	<p><input type="radio"/></p> <p>The department/program retains records of assessment results and positive changes made as a result of assessment findings, and results are entered in assessment software system.</p>	<p><input type="radio"/></p> <p>The department/program retains records of assessment results and changes made as a result of assessment findings, results are entered in assessment software system, and assessment results and improvements are publicly posted.</p>	<p><input type="radio"/></p> <p>The department/program retains records of assessment results and changes made as a result of assessment findings, and results are entered in assessment software system. Assessment results and improvements are publicly posted and shared proactively with faculty, prospective students, employers and alumni in ways that facilitate their discussion.</p>

16 Explanations:

Additional Feedback

1 Please enter any additional feedback for changes that should be made:

CLOSE AND EXIT