

**Assurance of Student Learning
2018-2019**

Ogden College of Science and Engineering

School of Engineering and Applied Sciences

Electrical Engineering program, #537

Use this page to list learning outcomes, measurements, and summarize results for your program. Detailed information must be completed in the subsequent pages.

Student Learning Outcome 1: ABET EAC Outcome #1: Upon graduation our students have the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Instrument 1 | Artifacts assessed in certain courses/sections

Instrument 2 | Senior Exit Surveys

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 1.

Met

Not Met

Student Learning Outcome 2: ABET EAC Outcome #2: Upon graduation, our students have the ability to apply engineering design to produce solutions that meet specific needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Instrument 1 | Artifacts assessed in certain courses/sections

Instrument 2 | Senior Exit Surveys

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.

Met

Not Met

Student Learning Outcome 3: ABET EAC Outcome #3: Upon graduation, our students have the ability to communicate effectively with a range of audiences.

Instrument 1 | Artifacts assessed in certain courses/sections

Instrument 2 | Senior Exit Surveys

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.

Met

Not Met

Student Learning Outcome 4: ABET EAC Outcome #4: Upon graduation, our student have the 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.

Instrument 1 | Artifacts assessed in certain courses/sections

Instrument 2 | Senior Exit Surveys

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 4.

Met

Not Met

Student Learning Outcome 5: ABET EAC Outcome #5: Upon graduation, our students have the 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.

Instrument 1 | Artifacts assessed in certain courses/sections

Instrument 2 | Senior Exit Surveys

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 5.		Met	Not Met
Student Learning Outcome 6: ABET EAC Outcome #6: Upon graduation, our students have the ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.			
Instrument 1	Artifacts assessed in certain courses/sections		
Instrument 2	Senior Exit Surveys		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 6.		Met	Not Met
Student Learning Outcome 7: ABET EAC Outcome #7: Upon graduation, our students have the ability to acquire and apply new knowledge as needed, using appropriate learning strategies.			
Instrument 1	Artifacts assessed in certain courses/sections		
Instrument 2	Senior Exit Surveys		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 7.		Met	Not Met
Program Summary (Briefly summarize the action and follow up items from your detailed responses on subsequent pages.)			
<p>The WKU electrical engineering program is accredited by ABET, and uses ABET EAC Outcomes 1-7 for assessment. Our assessment process for each Outcome involves (a) instructors completing rubrics in certain upper-division courses according to our assessment plan, and (b) students in the major completing a survey during the senior design course.</p> <p>Regarding (a), one common action item was to add courses to our assessment plan in addition to those already part of the plan. This is, in part, to ensure a sufficient number of student scores for each Outcome. The assessment plan for this year heavily involved the project courses (EE 300, EE 401, ENGR 490 and ENGR 491); other non-project courses have been added to the assessment plan. Some of these courses have already been assessed in Fall 2019.</p> <p>Regarding (b), at least one change to the senior survey has been identified for implementation.</p> <p>The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.</p>			

Student Learning Outcome 1

Student Learning Outcome ABET EAC Outcome #1: Upon graduation our students have the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Measurement Instrument 1 Artifacts were assessed in some or all sections of the following courses: EE 300, EE 401, ENGR 490, and ENGR 491.

Criteria for Student Success The following rubric is used when assessing student performance:

Student Learning Outcome 1: Upon graduation, our students have the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.					
	Capstone 4	Milestones		Benchmark 1	
	3	2			
Calculation (Quantitative Literacy VALUE Rubric)	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.)	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.	Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.	Calculations are attempted but are both unsuccessful and are not comprehensive.	
Define Problem (Problem Solving VALUE Rubric)	Demonstrates the ability to construct a clear and insightful problem statement with evidence of all relevant contextual factors.	Demonstrates the ability to construct a problem statement with evidence of most relevant contextual factors, and problem statement is adequately detailed.	Begins to demonstrate the ability to construct a problem statement with evidence of most relevant contextual factors, but problem statement is superficial.	Demonstrates a limited ability in identifying a problem statement or related contextual factors.	
Identify Strategies (Problem Solving VALUE Rubric)	Identifies multiple approaches for solving the problem that apply within a specific context.	Identifies multiple approaches for solving the problem, only some of which apply within a specific context.	Identifies only a single approach for solving the problem that does apply within a specific context.	Identifies one or more approaches for solving the problem that do not apply within a specific context.	
Evaluate Potential Solutions (Problem Solving VALUE Rubric)	Evaluation of solutions is deep and elegant (for example, contains thorough and insightful explanation) and includes, deeply and thoroughly, all of the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is adequate (for example, contains thorough explanation) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is brief (for example, explanation lacks depth) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is superficial (for example, contains cursory, surface level explanation) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	

We look for a minimum average of 2.50 for each assessed 300-level course section, and 3.00 for each assessed 400-level course section.

Program Success Target for this Measurement	Target weighted averages are 2.50 for assessed 300-level course sections combined, and 3.00 for assessed 400-level course sections combined.	Percent of Program Achieving Target Weighted Averages for course sections assessed:	300-level course sections: 2.80 400-level course sections: 3.02
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Methods	<p>Instructors choose artifacts to assess, using the above rubric, in their respective courses/sections. These artifacts will be different course section-to-course section, instructor-to-instructor, and semester-to-semester. Each item of the rubric (e.g., calculation, define problem, etc.) was weighted equally when scoring the rubric. In some cases, specific items may not have been scored.</p> <p>We looked at the average obtained for each course section assessed, with each of the 300-level course sections targeted to achieve a minimum average of 2.50, and each of the 400-level course sections targeted to achieve a minimum average of 3.00. It was observed that some course sections met their targets, and some did not.</p> <p>We also performed weighted averages of all assessed 300-level course sections (combined) for the academic year, and all assessed 400-level course sections (combined) for the academic year to determine if, overall, the Outcome was met. The weighted averages were expected to be 2.50 or above for assessed 300-level course sections (combined) and 3.00 or above for assessed 400-level course sections (combined). This was our Program Success Target. As indicated above, we achieved an average of 2.80 for assessed 300-level course sections overall, and 3.02 for assessed 400-level course sections overall.</p>		
Measurement Instrument 2	Senior Exit Surveys were given to students taking the senior design course during Fall 2018 and Spring 2019. Students were asked to “Rate your ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics” on a scale of 1 to 5 (with 5 being the highest).		
Criteria for Student Success			
Program Success Target for this Measurement	Target average of 3.75	Percent of Program Achieving Target Weighted Average:	4.08
Methods	For this year there were 24 scores total, 13 for Fall 2018 and 11 for Spring 2019. The above average of 4.08 is the average of all 24 scores received on this particular item from both semesters.		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 1.		Met	Not Met
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
<p>The EE faculty decided to add EE 431, EE 460 and EE 473 to the list of courses to assess for this Outcome, effective Fall 2019.</p> <p>Also, rubrics were solicited from two other ENGR 490 instructors for Fall 2018. Although the additional rubrics were not obtained, it is believed that a sufficient number of scores for this Outcome were already obtained between Fall 2018 and Spring 2019 to be able to accurately assess student performance.</p>			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
<p>This Outcome was assessed in EE 473 during Fall 2019. However, due to the nature of the course as taught this past semester, only the first item (Calculation) was assessed. The advantage of assessing this Outcome in EE 473 is that all EE students take the course and it provided more direct data on the performance of students on this item. Since EE 300, EE 401, ENGR 490, and ENGR 491 are all project courses, with projects being different team-to-team, assessing this Outcome in EE 473 provides a means of gathering data in a course for which all students are assessed on the basis of common problem(s).</p> <p>The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.</p>			

Student Learning Outcome 2

Student Learning Outcome ABET EAC Outcome #2: Upon graduation, our students have the ability to apply engineering design to produce solutions that meet specific needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Measurement Instrument 1 Artifacts were assessed in some or all sections of the following courses: EE 401, ENGR 490, ENGR 491

Criteria for Student Success The following rubric is used when assessing student performance:

Student Learning Outcome 2: Upon graduation, our students have the ability to apply engineering design to produce solutions that meet specific needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.				
	Capstone 4	Milestones		Benchmark 1
	4	3	2	1
Acquiring Competencies (Creative Thinking VALUE Rubric)	Reflect: Evaluates creative process and product using domain-appropriate criteria.	Create: Creates an entirely new object, solution or idea that is appropriate to the domain.	Adapt: Successfully adapts an appropriate exemplar to his/her own specifications.	Model: Successfully reproduces an appropriate exemplar.
Solving Problems (Creative Thinking VALUE Rubric)	Not only develops a logical, consistent plan to solve problem, but recognizes consequences of solution and can articulate reason for choosing solution.	Having selected from among alternatives develops a logical, consistent plan to solve the problem.	Considers and rejects less acceptable approaches to solving problem.	Only a single approach is considered and is used to solve the problem.
Embracing Contradictions (Creative Thinking VALUE Rubric)	Integrates alternate, divergent, or contradictory perspectives or ideas fully.	Incorporates alternate, divergent, or contradictory perspectives or ideas in a exploratory way.	Includes (recognizes the value of) alternate, divergent, or contradictory perspectives or ideas in a small way.	Acknowledges (mentions in passing) alternate, divergent, or contradictory perspectives or ideas.
Connecting, Synthesizing, Transforming (Creative Thinking VALUE Rubric)	Transforms ideas or solutions into entirely new forms.	Synthesizes ideas or solutions into a coherent whole.	Connects ideas or solutions in novel ways.	Recognizes existing connections among ideas or solutions.
Implement Solutions (Problem Solving VALUE Rubric)	Implements the solution in a manner that addresses thoroughly and deeply multiple contextual factors of the problem.	Implements the solution in a manner that addresses multiple contextual factors of the problem in a surface manner.	Implements the solution in a manner that addresses the problem statement but ignores relevant contextual factors.	Implements the solution in a manner that does not directly address the problem statement.
Identifying specific project objectives, standards, and constraints based on general project requirements	All important objectives, standards, and constraints are identified and clearly implemented	Most important objectives, standards, and constraints are identified and implemented with minor deficiencies	Some objectives, standards, and constraints are identified with some deficiencies	Objectives, standards, and/or constraints not clearly identified or contain significant deficiencies

We look for a minimum average of 3.00 for each assessed 400-level course section.

Program Success Target for this Measurement	Target weighted averages are 3.00 for assessed 400-level course sections combined.	Percent of Program Achieving Target Weighted Averages for course sections assessed:	400-level course sections: 2.83
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Methods	<p>Instructors choose artifacts to assess, using the above rubric, in their respective courses/sections. These artifacts will be different course section-to-course section, instructor-to-instructor, and semester-to-semester. Each item of the rubric (e.g., acquiring competencies, solving problems, etc.) was weighted equally when scoring the rubric. In some cases, specific items may not have been scored.</p> <p>We looked at the average obtained for each course section assessed, with each of the 400-level course sections targeted to achieve a minimum average of 3.00. It was observed that some course sections met their targets, and some did not.</p> <p>We also performed weighted averages of all assessed 400-level course sections (combined) for the academic year to determine if, overall, the Outcome was met. The weighted averages were expected to be 3.00 or above for assessed 400-level course sections (combined). This was our Program Success Target. As indicated above, we achieved an average of 2.83 for assessed 400-level course sections overall.</p>		
Measurement Instrument 2	<p>Senior Exit Surveys were given to students taking the senior design course during Fall 2018 and Spring 2019. Students were asked to “Rate your ability to apply engineering design to produce solutions that meet specific needs with consideration for public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors” on a scale of 1 to 5 (with 5 being the highest).</p>		
Criteria for Student Success			
Program Success Target for this Measurement	Target average of 3.75	Percent of Program Achieving Target Weighted Average:	4.21
Methods	<p>For this year there were 24 scores total, 13 for Fall 2018 and 11 for Spring 2019. The above average of 4.21 is the average of all 24 scores received on this particular item from both semesters.</p>		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.		Met	Not Met
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
<p>The EE faculty decided to monitor the low compiled averages for the year in both ENGR 490 and 491, and revisit. Also, it was agreed that adding some emphasis in EE 300 would be helpful.</p> <p>EE 300 was added to the assessment plan for this Outcome, with assessment performed in Fall 2019. The number of student scores (16) for this Outcome for this academic year may be too low.</p>			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
<p>This Outcome was assessed in EE 300 during Fall 2019. Only six students were enrolled in the course, however, and the average for the course was still lower than its target.</p> <p>The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.</p>			

Student Learning Outcome 3

Student Learning Outcome ABET EAC Outcome #3: Upon graduation, our students have the ability to communicate effectively with a range of audiences.

Measurement Instrument 1 Artifacts were assessed in some or all sections of the following courses: EE 300, EE 401, ENGR 491

Criteria for Student Success The following rubrics are used when assessing student performance:

Student Learning Outcome 3: Upon graduation, our students have the ability to communicate effectively with a range of audiences.				
Oral Communication	Capstone	Milestones		Benchmark
	4	3	2	1
Organization (Oral Communication VALUE Rubric)	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language (Oral Communication VALUE Rubric)	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery (Oral Communication VALUE Rubric)	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Central Message (Oral Communication VALUE Rubric)	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced, but is not explicitly stated in the presentation.
Content	Technical/Professional information at an appropriate level for course, Key concepts and terms explained clearly. Research and/or analysis of topic clearly evident Audience gains significant new knowledge and insight	Technical/Professional information at an appropriate level for course, some concepts not completely clarified, research and/or analysis of topic generally evident. Audience gains some new knowledge and insight.	Technical/Professional information at a marginal level for course, many concepts unclear or not discussed. Audience gains little new knowledge or insight	Technical/Professional information unacceptable for course, most concepts unclear or not discussed, audience gains no new knowledge or insight
Multimedia	Multimedia clearly enhances presentation. Concepts made clearer, most information easy to see and follow, details minimized and main points stand out	Multimedia contributes to the quality of the presentation. Most concepts made clearer, most information generally easy to read and follow, main points stand out, a few details difficult to follow	Multimedia poorly prepared or used inappropriately, generally do not enhance concepts, sometimes confusing, hard to see, read, and/or follow, may be confusing	Multimedia not used or so poor they are distracting, do not contribute to presentation.
Question and Answer (if applicable)	Answers confidently and adequately with no hesitation or stumbling over words.	Answers adequately with some hesitation, may stumble over a few words, some slight lack of confidence, overall good at answering questions	Answers not always adequate and show uncertainty, pauses more obvious, and somewhat distracting.	Questions either not answered or done so with great difficulty, significant uncomfortable pauses, little to no confidence.

Student Learning Outcome 3: Upon graduation, our students have the ability to communicate effectively with a range of audiences.				
Written Communication	Capstone 4	Milestones		Benchmark 1
		3	2	
Context of and Purpose for Writing (Written Communication VALUE Rubric)	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development (Written Communication VALUE Rubric)	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Control of Syntax and Mechanics (Written Communication VALUE Rubric)	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.
Interpretation (Quantitative Literacy VALUE Rubric)	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information.	Provides accurate explanations of information presented in mathematical forms. <i>For instance, accurately explains the trend data shown in a graph.</i>	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units.	Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means.
Content	Technical/Professional information at an appropriate level for course, Key concepts and terms explained clearly. Research and/or analysis of topic clearly evident Reader gains significant new knowledge and insight	Technical/Professional information at an appropriate level for course, some concepts not completely clarified, research and/or analysis of topic generally evident. Reader gains some new knowledge and insight.	Technical/Professional information at a marginal level for course, many concepts unclear or not discussed. Reader gains little new knowledge or insight	Technical/Professional information unacceptable for course, most concepts unclear or not discussed, reader gains no new knowledge or insight

We look for a minimum average of 2.50 for each assessed 300-level course section, and 3.00 for each assessed 400-level course section.

Program Success Target for this Measurement	Target weighted averages are 2.50 for assessed 300-level course sections combined, and 3.00 for assessed 400-level course sections combined.	Percent of Program Achieving Target Weighted Averages for course sections assessed:	300-level course sections (oral): 3.16 300-level course sections (written): 2.82 400-level course sections (oral): 3.23 400-level course sections (written): 3.09
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Methods	Instructors choose artifacts to assess, using the above rubrics, in their respective courses/sections. These artifacts will be different course section-to-course section, instructor-to-instructor, and semester-to-semester. Each item of the rubrics (e.g., organization, language, etc.) was weighted equally when scoring the rubric. In some cases, specific items may not have been scored. We looked at the average obtained for each course section assessed, with each of the 300-level course sections targeted to achieve a
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	<p>minimum average of 2.50, and each of the 400-level course sections targeted to achieve a minimum average of 3.00. It was observed that most course sections met their targets, but one did not.</p> <p>We also performed weighted averages of all assessed 300-level course sections (combined) for the academic year, and all assessed 400-level course sections (combined) for the academic year to determine if, overall, the Outcome was met. The weighted averages were expected to be 2.50 or above for assessed 300-level course sections (combined) and 3.00 or above for assessed 400-level course sections (combined). This was our Program Success Target. As indicated above, we achieved an average of 3.16/2.82 (oral/written) for assessed 300-level course sections overall, and 3.23/3.09 (oral/written) for assessed 400-level course sections overall.</p>				
Measurement Instrument 2	Senior Exit Surveys were given to students taking the senior design course during Fall 2018 and Spring 2019. Students were asked to “Rate your ability to communicate effectively with range of audiences” on a scale of 1 to 5 (with 5 being the highest).				
Criteria for Student Success					
Program Success Target for this Measurement	Target average of 3.75	Percent of Program Achieving Target	4.04		
		Weighted Average:			
Methods	For this year there were 24 scores total, 13 for Fall 2018 and 11 for Spring 2019. The above average of 4.04 is the average of all 24 scores received on this particular item from both semesters.				
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.			<table border="1"> <tr> <td>Met</td> <td>Not Met</td> </tr> </table>	Met	Not Met
Met	Not Met				
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)					
No actions were identified for program improvement.					
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)					
The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.					

Student Learning Outcome 4

Student Learning Outcome ABET EAC Outcome #4: Upon graduation, our students have the 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.

Measurement Instrument 1 Artifacts were assessed in some or all sections of the following courses: ENGR 490, ENGR 491

Criteria for Student Success The following rubric is used when assessing student performance:

Student Learning Outcome 4: Upon graduation, our students have the 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					
	Capstone 4	Milestones		Benchmark 1	
	3	2			
Ethical Issue Recognition (Ethical Reasoning VALUE Rubric)	Student can recognize ethical issues when presented in a complex, multilayered (gray) context AND can recognize <u>crossrelationships</u> among the issues.	Student can recognize ethical issues when issues are presented in a complex, multilayered (gray) context OR can grasp <u>crossrelationships among the issues</u> .	Student can recognize basic and obvious ethical issues and grasp (incompletely) the complexities or interrelationships among the issues.	Student can recognize basic and obvious ethical issues but fails to grasp complexity or <u>interrelationships</u> .	
Application of Ethical Perspectives/Concepts (Ethical Reasoning VALUE Rubric)	Student can independently apply ethical perspectives/concepts to an ethical question, accurately, and is able to consider full <u>implications</u> of the application.	Student can independently (to a new example) apply ethical perspectives/ concepts to an ethical question, accurately, but does not consider the specific <u>implications</u> of the application.	Student can apply ethical perspectives/concepts to an ethical question, independently (to a new example) and the <u>application</u> is inaccurate.	Student can apply ethical perspectives/ concepts to an ethical question with support (using examples, in a class, in a group, or a fixed-choice setting) but is unable to apply ethical perspectives/concepts <u>independently</u> (to a new example.).	
Responsibility of Engineer	Given a situation, clearly articulates the responsibilities of the engineer in a global and societal context with all major issues addressed	Given a situation, generally articulates the responsibilities of the engineer in a global and societal context with most major issues addressed	Given a situation, attempts to articulate the responsibilities of the engineer in a global and societal context but misses several key points	Has not grasped the role of a responsible engineer in a global society	
Cultural Impact of Solutions	Clearly articulates the impact of engineering solutions in a global society	Can basically articulate the impact of engineering solutions in a global society	Has some ability to articulate the impact of engineering solutions in a global society	Cannot articulate the impact of engineering solutions in a global society	
Application of appropriate code of ethics	Clear link of dilemma and resolution (s) to an appropriate code of ethics	Link between dilemma and final resolution to appropriate code of ethics	Superficial discussion of a code of ethics to dilemma and resolution	Code of ethic not incorporated into discussion of dilemma or resolution	

We look for a minimum average of 3.00 for each assessed 400-level course section.

Program Success Target for this Measurement	Target weighted averages are 3.00 for assessed 400-level course sections combined.	Percent of Program Achieving Target Weighted Averages for course sections assessed:	400-level course sections: 3.39
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Methods Instructors choose artifacts to assess, using the above rubric, in their respective courses/sections. These artifacts will be different course section-to-course section, instructor-to-instructor, and semester-to-semester. Each item of the rubric (e.g., ethical issue recognition, application of ethical perspectives/concepts, etc.) was weighted equally when scoring the rubric. In some cases, specific items may not have been scored.

We looked at the average obtained for each course section assessed, with each of the 400-level course sections targeted to achieve a minimum average of 3.00. It was observed that all assessed course sections met their targets.

We also performed weighted averages of all assessed 400-level course sections (combined) for the academic year to determine if, overall,

	the Outcome was met. The weighted averages were expected to be 3.00 or above for assessed 400-level course sections (combined). This was our Program Success Target. As indicated above, we achieved an average of 3.39 for assessed 400-level course sections overall.		
Measurement Instrument 2	Senior Exit Surveys were given to students taking the senior design course during Fall 2018 and Spring 2019. Students were asked to “Rate your ability to 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” on a scale of 1 to 5 (with 5 being the highest).		
Criteria for Student Success			
Program Success Target for this Measurement	Target average of 3.75	Percent of Program Achieving Target Weighted Average:	4.21
Methods	For this year there were 24 scores total, 13 for Fall 2018 and 11 for Spring 2019. The above average of 4.21 is the average of all 24 scores received on this particular item from both semesters.		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 4.			Met
Not Met			
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
We decided to look at other courses to assess, since there are some ENGR 490 and 491 assessments that do not capture most/all the students. The number of student scores (17) for this Outcome may be too low.			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
EE 300 was added to the assessment plan for this Outcome, with assessment performed in Fall 2019.			
The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.			

Student Learning Outcome 5

Student Learning Outcome ABET EAC Outcome #5: Upon graduation, our students have the 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.

Measurement Instrument 1 Artifacts were assessed in some or all sections of the following courses: EE 300, EE 401, ENGR 490, ENGR 491

Criteria for Student Success The following rubric is used when assessing student performance:

Student Learning Outcome 5: Upon graduation, our students have the 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				
	Capstone 4	Milestones 3 2		Benchmark 1
Contributes to Team Meetings (Teamwork VALUE Rubric)	Helps the team move forward by articulating the merits of alternative ideas or proposals.	Offers alternative solutions or courses of action that build on the ideas of others.	Offers new suggestions to advance the work of the group.	Shares ideas but does not advance the work of the group.
Facilitates the Contributions of Team Members (Teamwork VALUE Rubric)	Engages team members in ways that facilitate their contributions to meetings by both constructively building upon or synthesizing the contributions of others as well as noticing when someone is not participating and inviting them to engage.	Engages team members in ways that facilitate their contributions to meetings by constructively building upon or synthesizing the contributions of others.	Engages team members in ways that facilitate their contributions to meetings by restating the views of other team members and/or asking questions for clarification.	Engages team members by taking turns and listening to others without interrupting.
Individual Contributions Outside of Team Meetings (Teamwork VALUE Rubric)	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence.	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.
Fosters Constructive Team Climate (Teamwork VALUE Rubric)	Supports a constructive team climate by doing all of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.	Supports a constructive team climate by doing any three of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.	Supports a constructive team climate by doing any two of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.	Supports a constructive team climate by doing any one of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.
Responds to Conflict (Teamwork VALUE Rubric)	Addresses destructive conflict directly and constructively, helping to manage/resolve it in a way that strengthens overall team cohesiveness and future effectiveness.	Identifies and acknowledges conflict and stays engaged with it.	Redirecting focus toward common ground, toward task at hand (away from conflict).	Passively accepts alternate View points/ideas/opinions.

We look for a minimum average of 2.50 for each assessed 300-level course section, and 3.00 for each assessed 400-level course section.

Program Success Target for this Measurement	Target weighted averages are 2.50 for assessed 300-level course sections combined, and 3.00 for assessed 400-level course sections combined.	Percent of Program Achieving Target Weighted Averages for course sections assessed:	300-level course sections: 3.00 400-level course sections: 3.15
Methods	<p>Instructors choose artifacts to assess, using the above rubric, in their respective courses/sections. These artifacts will be different course section-to-course section, instructor-to-instructor, and semester-to-semester. Each item of the rubric (e.g., contributes to team meetings, facilitates the contributions of team members, etc.) was weighted equally when scoring the rubric. In some cases, specific items may not have been scored.</p> <p>We looked at the average obtained for each course section assessed, with each of the 300-level course sections targeted to achieve a minimum average of 2.50, and each of the 400-level course sections targeted to achieve a minimum average of 3.00. It was observed that most course sections met their targets, but some did not.</p> <p>We also performed weighted averages of all assessed 300-level course sections (combined) for the academic year, and all assessed 400-level course sections (combined) for the academic year to determine if, overall, the Outcome was met. The weighted averages were expected to be 2.50 or above for assessed 300-level course sections (combined) and 3.00 or above for assessed 400-level course sections (combined). This was our Program Success Target. As indicated above, we achieved an average of 3.00 for assessed 300-level course sections overall, and 3.15 for assessed 400-level course sections overall.</p>		
Measurement Instrument 2	Senior Exit Surveys were given to students taking the senior design course during Fall 2018 and Spring 2019. Students were asked to “Rate your 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” on a scale of 1 to 5 (with 5 being the highest).		
Criteria for Student Success			
Program Success Target for this Measurement	Target average of 3.75	Percent of Program Achieving Target Weighted Average:	4.25
Methods	For this year there were 24 scores total, 13 for Fall 2018 and 11 for Spring 2019. The above average of 4.25 is the average of all 24 scores received on this particular item from both semesters.		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 5.			Met Not Met
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
We decided to look at other courses to assess, since there are some ENGR 490 and 491 assessments that do not capture most/all the students.			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
EE 345, EE 431, and EE 460 were added to the assessment plan for this Outcome, with assessment of EE 460 performed in Fall 2019.			
The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.			

Student Learning Outcome 6

Student Learning Outcome ABET EAC Outcome #6: Upon graduation, our students have the ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Measurement Instrument 1 Artifacts were assessed in some or all sections of the following courses: EE 431, EE 460

Criteria for Student Success The following rubric is used when assessing student performance:

Student Learning Outcome 6: Upon graduation, our students have the ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions				
	Capstone 4	Milestones		Benchmark 1
		3	2	
Design Process (Inquiry and Analysis VALUE Rubric)	All elements of the methodology or theoretical framework are skillfully developed. Appropriate methodology or theoretical frameworks may be synthesized from across disciplines or from relevant subdisciplines.	Critical elements of the methodology or theoretical framework are appropriately developed, however, more subtle elements are ignored or unaccounted for.	Critical elements of the methodology or theoretical framework are missing, incorrectly developed, or unfocused.	Inquiry design demonstrates a misunderstanding of the methodology or theoretical framework.
Conclusions (Inquiry and Analysis VALUE Rubric)	States a conclusion that is a logical extrapolation from the inquiry findings.	States a conclusion focused solely on the inquiry findings. The conclusion arises specifically from and responds specifically to the inquiry findings.	States a general conclusion that, because it is so general, also applies beyond the scope of the inquiry findings.	States an ambiguous, illogical, or unsupported conclusion from inquiry findings.
Compliance with Standards	Test performed in full compliance with applicable standard	Test performed in general compliance with standard with only minor procedural error that does not completely invalidate the result	Test performed in general compliance with standard, but a procedural error resulted in faulty results	Test not performed in compliance with standard and results invalid
Application of Results	Results of experiment applied completely and accurately to the situation	Results applied generally/conceptually correct with only a minor error	Results applied generally/conceptually correct with a few errors	Results not applied correctly to the situation
Designing an experiment or experimental procedure	Students select and/or design all appropriate test(s) or process(es) to the situation at hand.	Students generally select and/or design the appropriate test(s) or process(es) to the situation at hand.	Students select or design some appropriate tests or processes, with a notable error or omission.	Students select or design some appropriate tests or processes, with significant errors or omissions.

We look for a minimum average of 2.50 for each assessed 300-level course section, and 3.00 for each assessed 400-level course section.

Program Success Target for this Measurement	Target weighted averages are 2.50 for assessed 300-level course sections combined, and 3.00 for assessed 400-level course sections combined.	Percent of Program Achieving Target Weighted Averages for course sections assessed:	300-level course sections: NA 400-level course sections: 3.26
Methods	<p>Instructors choose artifacts to assess, using the above rubric, in their respective courses/sections. These artifacts will be different course section-to-course section, instructor-to-instructor, and semester-to-semester. Each item of the rubric (e.g., design process, conclusions, etc.) was weighted equally when scoring the rubric. In some cases, specific items may not have been scored.</p> <p>We looked at the average obtained for each course section assessed, with each of the 300-level course sections targeted to achieve a minimum average of 2.50, and each of the 400-level course sections targeted to achieve a minimum average of 3.00. It was observed that all 400-level course sections assessed met their targets. No 300-level course sections were assessed for this Outcome this year, although our assessment plan called for including EE 345.</p> <p>We also performed weighted averages of all assessed 400-level course sections (combined) for the academic year to determine if, overall, the Outcome was met. The weighted averages were expected to be 2.50 or above for assessed 300-level course sections (combined) and 3.00 or above for assessed 400-level course sections (combined). This was our Program Success Target. As indicated above, we achieved an average of NA (meaning no sections assessed) for 300-level course sections overall, and 3.26 for assessed 400-level course sections overall.</p>		
Measurement Instrument 2	Senior Exit Surveys were given to students taking the senior design course during Fall 2018 and Spring 2019. Students were asked to “Rate your ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions” on a scale of 1 to 5 (with 5 being the highest).		
Criteria for Student Success			
Program Success Target for this Measurement	Target average of 3.75	Percent of Program Achieving Target Weighted Average:	3.96
Methods	For this year there were 24 scores total, 13 for Fall 2018 and 11 for Spring 2019. The above average of 3.96 is the average of all 24 scores received on this particular item from both semesters.		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 6.			Met Not Met
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
We decided to add ENGR 490 and ENGR 491 to the assessment plan for this Outcome.			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
ENGR 490 and ENGR 491 were assessed in Fall 2019.			
The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.			

Student Learning Outcome 7

Student Learning Outcome	ABET EAC Outcome #7: Upon graduation, our students have the ability to acquire and apply new knowledge as needed, using appropriate learning strategies.																										
Measurement Instrument 1	Artifacts were assessed in some or all sections of the following courses: EE 300, EE 401, ENGR 490, ENGR 491																										
Criteria for Student Success	The following rubric is used when assessing student performance:																										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5" style="text-align: center;">Student Learning Outcome 7: Upon graduation, our students have the ability to acquire and apply new knowledge as needed, using appropriate learning strategies.</th> </tr> <tr> <th></th> <th style="text-align: center;">Capstone 4</th> <th style="text-align: center;">3</th> <th style="text-align: center;">Milestones 2</th> <th style="text-align: center;">Benchmark 1</th> </tr> </thead> <tbody> <tr> <td style="width: 20%;">Independence (Foundations and Skills for Lifelong Learning VALUE Rubric)</td> <td>Educational interests and pursuits exist and flourish outside classroom requirements. Knowledge and/or experiences are pursued independently.</td> <td>Beyond classroom requirements, pursues substantial, additional knowledge and/or actively pursues independent educational experiences.</td> <td>Beyond classroom requirements, pursues additional knowledge and/or shows interest in pursuing independent educational experiences.</td> <td>Begins to look beyond classroom requirements, showing interest in pursuing knowledge independently.</td> </tr> <tr> <td>Transfer (Foundations and Skills for Lifelong Learning VALUE Rubric)</td> <td>Makes explicit references to previous learning and applies in an innovative (new and creative) way that knowledge and those skills to demonstrate comprehension and performance in novel situations.</td> <td>Makes references to previous learning and shows evidence of applying that knowledge and those skills to demonstrate comprehension and performance in novel situations.</td> <td>Makes references to previous learning and attempts to apply that knowledge and those skills to demonstrate comprehension and performance in novel situations.</td> <td>Makes vague references to previous learning but does not apply knowledge and skills to demonstrate comprehension and performance in novel situations.</td> </tr> <tr> <td>Initiative (Foundations and Skills for Lifelong Learning VALUE Rubric)</td> <td>Completes required work, generates and pursues opportunities to expand knowledge, skills, and abilities.</td> <td>Completes required work, identifies and pursues opportunities to expand knowledge, skills, and abilities.</td> <td>Completes required work and identifies opportunities to expand knowledge, skills, and abilities.</td> <td>Completes required work.</td> </tr> </tbody> </table>			Student Learning Outcome 7: Upon graduation, our students have the ability to acquire and apply new knowledge as needed, using appropriate learning strategies.						Capstone 4	3	Milestones 2	Benchmark 1	Independence (Foundations and Skills for Lifelong Learning VALUE Rubric)	Educational interests and pursuits exist and flourish outside classroom requirements. Knowledge and/or experiences are pursued independently.	Beyond classroom requirements, pursues substantial, additional knowledge and/or actively pursues independent educational experiences.	Beyond classroom requirements, pursues additional knowledge and/or shows interest in pursuing independent educational experiences.	Begins to look beyond classroom requirements, showing interest in pursuing knowledge independently.	Transfer (Foundations and Skills for Lifelong Learning VALUE Rubric)	Makes explicit references to previous learning and applies in an innovative (new and creative) way that knowledge and those skills to demonstrate comprehension and performance in novel situations.	Makes references to previous learning and shows evidence of applying that knowledge and those skills to demonstrate comprehension and performance in novel situations.	Makes references to previous learning and attempts to apply that knowledge and those skills to demonstrate comprehension and performance in novel situations.	Makes vague references to previous learning but does not apply knowledge and skills to demonstrate comprehension and performance in novel situations.	Initiative (Foundations and Skills for Lifelong Learning VALUE Rubric)	Completes required work, generates and pursues opportunities to expand knowledge, skills, and abilities.	Completes required work, identifies and pursues opportunities to expand knowledge, skills, and abilities.	Completes required work and identifies opportunities to expand knowledge, skills, and abilities.
Student Learning Outcome 7: Upon graduation, our students have the ability to acquire and apply new knowledge as needed, using appropriate learning strategies.																											
	Capstone 4	3	Milestones 2	Benchmark 1																							
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Transfer (Foundations and Skills for Lifelong Learning VALUE Rubric)	Makes explicit references to previous learning and applies in an innovative (new and creative) way that knowledge and those skills to demonstrate comprehension and performance in novel situations.	Makes references to previous learning and shows evidence of applying that knowledge and those skills to demonstrate comprehension and performance in novel situations.	Makes references to previous learning and attempts to apply that knowledge and those skills to demonstrate comprehension and performance in novel situations.	Makes vague references to previous learning but does not apply knowledge and skills to demonstrate comprehension and performance in novel situations.																							
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	We look for a minimum average of 2.50 for each assessed 300-level course section, and 3.00 for each assessed 400-level course section.																										
Program Success Target for this Measurement	Target weighted averages are 2.50 for assessed 300-level course sections combined, and 3.00 for assessed 400-level course sections combined.	Percent of Program Achieving Target	300-level course sections: 2.63 400-level course sections: 2.86																								
Methods	Instructors choose artifacts to assess, using the above rubric, in their respective courses/sections. These artifacts will be different course section-to-course section, instructor-to-instructor, and semester-to-semester. Each item of the rubric (e.g., independence, transfer, etc.) was weighted equally when scoring the rubric. In some cases, specific items may not have been scored.																										
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Measurement Instrument 2	Senior Exit Surveys were given to students taking the senior design course during Fall 2018 and Spring 2019. Students were asked to “Rate your ability to acquire and apply new knowledge as needed, using appropriate learning strategies” on a scale of 1 to 5 (with 5 being the highest).		
Criteria for Student Success			
Program Success Target for this Measurement	Target average of 3.75	Percent of Program Achieving Target	4.08
		Weighted Average:	
Methods	For this year there were 24 scores total, 13 for Fall 2018 and 11 for Spring 2019. The above average of 4.08 is the average of all 24 scores received on this particular item from both semesters.		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 7.			Met
			Not Met
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
EE faculty noted that scores were lower for Independence item. They also recognized there is no way for faculty to measure that in rubric, as it alludes to activity outside the course. This information will be added to senior exit survey.			
As stated previously, the EE faculty decided to monitor the low compiled averages for the year in ENGR 490 and 491, and revisit. Also, adding some emphasis in EE 300 will be helpful.			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
The EE program assessment plan calls for rubric collection each semester (fall and spring), and a meeting of EE faculty to discuss the rubric results.			