

Physics and Engineering  
Program Learning Outcome Assessment  
2025-26

## Program Learning Outcomes

Graduates from the Physics B.S. and B.A. programs will demonstrate the following learning outcomes:

1. an ability to identify, formulate, and solve complex problems by applying principles of science and mathematics.
2. an ability to apply physical principles, mathematical reasoning, and computational techniques 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.
  - Students will effectively communicate complicated technical information in writing.
  - Students will effectively communicate complicated technical information orally.
  - Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand.
4. an ability to recognize ethical and professional responsibilities and make informed judgments, which must consider the impact of scientific solutions in global, economic, environmental, and societal contexts.
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.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use scientific judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Graduates from the Engineering program will demonstrate the following learning outcomes:

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.
  - Students will effectively communicate complicated technical information in writing.
  - Students will effectively communicate complicated technical information orally.
  - Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand.
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 on 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.

*Note: Because these program learning outcomes are very similar and the assessment points for them are the same, assessment data for physics majors and engineering majors have been combined into a single report.*

## Physics and Engineering

The Physics and Engineering faculty revised the assessment plan beginning in 2025-26. This included expanding rubrics to best capture each outcome being assessed. Historical and new rubrics are attached to each learning outcome below.

**Learning Outcome:** ABET #1: Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (CC: CT)

### Outcome Measures and Criteria for Success:

Course	Outcome Assessed	Assessment Method	Threshold	Frequency
EGR2014 EGR2014L	Students will be able to set up a problem with the appropriate variables and solve the problem. (ME and EE)	Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR2024 EGR2024L (New Assessment beginning 2026-27)	Students will be able to set up a problem with the appropriate variables and solve the problem. (all)	Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR3034 EGR3034L (New Assessment beginning 2026-27)	Students will be able to apply a theoretical model to calculate a solution to a problem using appropriate computational techniques/software. (ME)	Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR4063 (New Assessment beginning 2026-27)	Students will be able to set up a problem with the appropriate variables and solve the problem (ME and EE)	Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR4103 (replaced EGR4013) (New Assessment beginning 2026-27)	Students will be able to apply a theoretical model to calculate a solution to a problem using appropriate computational techniques/software. (EE and CSE)	Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall

EGR4082 (phasing out starting 2025-26)	Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (all)	Faculty/Review Team Assessment of Final Project	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4082 (phasing out starting 2025-26)	Student reflection on preparation to solve problems using engineering, science and mathematics. (all)	Senior Survey (Indirect Method)	80% of the respondents will say that they are satisfied or higher	Annually
PHY2044	Students will be able to set up a problem with the appropriate variables and solve the problem (all)	Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall

**Longitudinal Data:**

Note that the PHE department changed assessment processes to align with ABET expectations for engineering curriculum. The data shown is all that we are expected to collect for ABET, both formative and summative data. The italicized data is from our previous assessment systems.

EGR2014 (Formative)	Percent of Students Above 2.5					
	2025-26					
1.2 Students will be able to apply appropriate scientific and engineering principles	96%					
1.3 Students will be able to formulate the appropriate assumptions, equations, and/or relationships applicable to facilitate mathematical expression and solution	88%					
1.4 Students will be able to solve a complex engineering problem	88%					

EGR2014 (Formative)	Percent of Students Above 2.5					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<i>Identify necessary information given in the problem to arrive at a solution.</i>	100%	67%	77%	67%	73%	79%
<i>Formulate appropriate equations with corresponding variables.</i>	100%	67%	100%	67%	64%	79%
<i>Solve the problem by applying the principles identified.</i>	100%	67%	100%	67%	64%	79%

EGR2024 (Formative)	Percent of Students Above 2.5					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<i>Identify necessary information given in the problem to arrive at a solution.</i>	100%	82%	90%	100%	57%	77%
<i>Formulate appropriate equations with corresponding variables.</i>	100%	73%	90%	100%	71%	77%
<i>Solve the problem by applying the principles identified.</i>	100%	73%	90%	88%	64%	38%

PHY2044 (Formative)	Percent of Students Above 2.5					
	2025-26					
1.2 Students will be able to apply appropriate scientific and engineering principles	64%					
1.3 Students will be able to formulate the appropriate assumptions, equations, and/or relationships applicable to facilitate mathematical expression and solution	64%					
1.4 Students will be able to solve a complex engineering problem	54%					

EGR3034 (Summative)	Percent of Students Above 2.5					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<i>Identify necessary information given in the problem to arrive at a solution.</i>		81%		100%		100%
<i>Formulate appropriate equations with corresponding variables.</i>		81%		100%		82%
<i>Solve the problem by applying the principles identified.</i>		94%		100%		64%

<i>EGR4013 - Old System (Summative)</i>	<i>Percent of Students Above 2.5</i>			
	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>
<i>Identify necessary information given in the problem to arrive at a solution.</i>	<i>63%</i>		<i>87%</i>	
<i>Formulate appropriate equations with corresponding variables.</i>	<i>56%</i>		<i>87%</i>	
<i>Solve the problem by applying the principles identified.</i>	<i>63%</i>		<i>73%</i>	

<i>EGR4103 - New System (Summative)</i>	<i>Percent of Students Above 2.5</i>						
	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25*</i>	<i>2025-26</i>
<i>Can identify a theoretical model to calculate a solution to a problem (EE and CSE)</i>				<i>100%</i>			
<i>Can apply appropriate computational techniques/software (EE and CSE)</i>				<i>100%</i>			
<i>Identify necessary information given in the problem to arrive at a solution.</i>						<i>100%</i>	
<i>Formulate appropriate equations with corresponding variables.</i>						<i>82%</i>	
<i>Solve the problem by applying the principles identified.</i>						<i>6%</i>	

\* Used different rubric for 2024-25.

<i>EGR4082 (Summative)</i>	<i>Percent of Students Above 2.5</i>					
	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (all).</i>	<i>64%</i>	<i>40%</i>	<i>67%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>

EGR4082 (Student Survey)	Percentage of Students Indicating Satisfied or Higher		
	2022-23	2023-24	2024-25
How well do you feel that you have been prepared to: [Apply the principles of knowledge of engineering, science, and mathematics to solve problems?]	100%	90%	71%

*Previous Learning Outcome: Students will apply physical principles, mathematical reasoning, and computational techniques to solve real-world problems.*

*Previous Outcome Measure: Embedded final exam questions given in upper division mastery class on a rotating basis (EGR/PHY3063, EGR/PHY3043 and PHY4053).*

*Previous Criteria for Success (how do you judge if the students have met your standards): At least 75% of students will achieve an average score of 2.5 or higher on criteria described in application rubric.*

*Previous Data:*

	Percentage Over 2.5									
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
	PHY431	PHY361	PHY431	PHY361	PHY431	PHY361	PHY431	PHY3063	PHY/EGR3043	PHY/EGR3063
Application Rubric	84%	88%	82%	80%	71%	96%	81%	92%	100%	53%

*\* Note the courses were renumbered in the 2019-20 academic year. PHY361 became PHY3063. PHY431 became PHY4053. At that time some courses were cross listed as both engineering and physics.*

### Conclusions Drawn from Data:

Significant underperformance in freshman class PHY 2044, however we see an improvement on all levels for the sophomore class EGR2014. This is somewhat expected since this is the first college level physics class taken by the students.

### Changes to be Made Based on Data:

Introduce study techniques for STEM courses in their first semester Intro Engineering and PHY 2044 class.

### Rubric:

EGR2014 – Attached

EGR2024 – Attached

EGR3034 – Attached

EGR4013 – Attached

EGR4103 – Attached

EGR4082 – There is no rubric since it comes from the review sheet of the faculty and external professional review committee.

Senior Survey – No rubric for this since they are survey results.

PHY2044 – Attached

## Engineering and Physics Rubric

PLO1: Student will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (CC: CT)

Courses evaluated: EGR 2014/2014L, EGR 2024/2024L, EGR 3034/3034L, EGR 4013

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
Identify necessary information given in the problem to arrive at a solution	No mistakes	Few mistakes, mostly correct	Some mistakes, some understanding	Many mistakes, not interpreting information
Formulate appropriate equations with corresponding variables	No mistakes	Few mistakes, mostly correct	Some mistakes, some understanding	Many mistakes, not interpreting information
Solve the problem by applying the principles identified	No mistakes	Few mistakes, mostly correct	Some mistakes, some understanding	Many mistakes, not interpreting information

### EGR4103 Rubric

PLO1: Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (CC: CT)

Outcome Assessed	Excellent (4)	Good (3)	Satisfactory (2)	Unsatisfactory (1)	Excellent (4)
Can identify a theoretical model to calculate a solution to a problem. (EE and CSE)	No mistakes	Few mistakes, mostly correct	Some mistakes, some understanding	Many mistakes, not interpreting information	No mistakes
Can apply appropriate computational techniques/software. (EE and CSE)	No mistakes	Few mistakes, mostly correct	Some mistakes, some understanding	Many mistakes, not interpreting information	No mistakes

### PHY 2044 Assessment Method: Exam Question

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

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>1.2</b> Students will be able to apply appropriate scientific and engineering principles	Principles are appropriately and accurately applied to the physical problem considered.	Principles are appropriately (though not always accurately) applied to the physical problem considered.	Identifies some information and assumptions relevant to the analysis.	Incorrect principles applied or few scientific or engineering principles demonstrated and applied.
<b>1.3</b> Students will be able to formulate the appropriate assumptions, equations, and/or relationships applicable to facilitate mathematical expression and solution	Clearly and comprehensively identifies relevant known properties, equations, and appropriate assumptions. Gathers information in a concise and organized form.	Identifies most of the relevant information, equations, and assumptions. Focuses the analysis on the desired result. Gathers information in an appropriate form.	Approach appears somewhat unfocused. Information gathering is somewhat unorganized.	Demonstrates little or no understanding of what information and assumptions are needed to perform the analysis. Approach is not directed to the objective of the analysis. Unable to organize the analysis.
<b>1.4</b> Students will be able to solve a complex engineering problem	In addition to being complete and correct and addressing the identified problem, solution is elegant and/or optimized.	For the most part, solution is complete, correct, and addresses the identified problem.	Solution is only partially correct or only partially addresses the identified problem. Some key parts may be missing.	Solution is incorrect, does not address the identified problem, or is missing most or all key parts (schematics, drawings, code, procedures, etc.).

### EGR 2014 Assessment Method: Exam Question

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

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>1.2</b> Students will be able to apply appropriate scientific and engineering principles	Principles are appropriately and accurately applied to the physical problem considered.	Principles are appropriately (though not always accurately) applied to the physical problem considered.	Identifies some information and assumptions relevant to the analysis.	Incorrect principles applied or few scientific or engineering principles demonstrated and applied.
<b>1.3</b> Students will be able to formulate the appropriate assumptions, equations, and/or relationships applicable to facilitate mathematical expression and solution	Clearly and comprehensively identifies relevant known properties, equations, and appropriate assumptions. Gathers information in a concise and organized form.	Identifies most of the relevant information, equations, and assumptions. Focuses the analysis on the desired result. Gathers information in an appropriate form.	Approach appears somewhat unfocused. Information gathering is somewhat unorganized.	Demonstrates little or no understanding of what information and assumptions are needed to perform the analysis. Approach is not directed to the objective of the analysis. Unable to organize the analysis.
<b>1.4</b> Students will be able to solve a complex engineering problem	In addition to being complete and correct and addressing the identified problem, solution is elegant and/or optimized.	For the most part, solution is complete, correct, and addresses the identified problem.	Solution is only partially correct or only partially addresses the identified problem. Some key parts may be missing.	Solution is incorrect, does not address the identified problem, or is missing most or all key parts (schematics, drawings, code, procedures, etc.).

## Physics and Engineering

**Learning Outcome:** ABET #2: Students will demonstrate 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 Measures and Criteria for Success:

Course	Outcome Assessed	Assessment Method	Threshold	Frequency
EGR1023	Student design teams will be able to successfully implement the engineering design process to identify a feasible solution to a problem (all)	Faculty Team Assessment of Final Project (Open House Demo)	At least 80% of the teams will score 2.5 or higher on the associated rubric	Odd Fall
EGR2024 (New Assessment beginning 2026-27)	Student design teams will be able to successfully implement an engineering design process that addresses real problems for existing communities. Constraints should include the technical as well as considering public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (all)	Final Report	At least 80% of the teams will score 2.5 or higher on the associated rubric	Even Fall
EGR3093	Student design teams will be able to successfully implement an engineering design process that addresses real problems for existing communities. Constraints should include the technical as well as considering public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (EE and CE)	Faculty Team Assessment of Final Project (Open House Demo)	At least 80% of the teams will score 2.5 or higher on the associated rubric	Odd Fall
EGR3113 (New Assessment beginning 2026-27)	Student design teams will be able to successfully implement an engineering design process that addresses real problems for existing communities. Constraints should include the technical as well as considering public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (ME and EE)	Faculty Team Assessment of Final Project (Open House Demo)	At least 80% of the teams will score 2.5 or higher on the associated rubric	Even Fall

EGR4072	Student design teams will be able to successfully implement an engineering design process to identify a feasible solution to a problem.	Faculty/Review Team Assessment of Project Proposal	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4072	Student design teams will be able to describe the constraints that impact the engineering solution to a problem. Constraints should include the technical as well as considering public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	Faculty/Review Team Assessment of Project Proposal	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4072	Student design teams will be able to build a budget for the project and discuss financial limitations.	Faculty/Review Team Assessment of Project Proposal	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4082 (phasing out starting 2025-26)	Student design teams will be able to construct a prototype of their solution and evaluate its effectiveness.	Faculty/Review Team Assessment of Final Project	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4082 (phasing out starting 2025-26)	Student reflection on preparation to design engineering solutions. (all)	Senior Survey (Indirect Method)	80% of the respondents will say that they are satisfied or higher	Annually

**Longitudinal Data:**

Note that the PHE department changed assessment processes to align with ABET expectations for engineering curriculum. The data shown is all that we are expected to collect for ABET, both formative and summative data. The italicized data is from our previous assessment system.

EGR1023 (Formative)	Percent of Students Above 2.5						
	2025-26						
2.1 Students will be able to define the problem context and constraints	80%						
2.3 Students will be able to generate design alternatives	60%						
2.4 Students will be able to select a design	50%						
2.8 Students will be able to identify potential improvements	100%						

EGR3093 (Summative)	Percent of Students Above 2.5						
	2025-26						
2.1 Students will be able to define the problem context and constraints	100%						
2.3 Students will be able to generate design alternatives	100%						
2.4 Students will be able to select a design	100%						
2.8 Students will be able to identify potential improvements	100%						

EGR4072 (Summative)	Percent of Students Above 2.5						
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Student design teams will be able to successfully implement an engineering design process to identify a feasible solution to a problem.	33%	30%	70%	100%	100%	N/A	100%
Student design teams will be able to describe the constraints that impact the engineering solution to a problem. Constraints should include the technical as well as considering public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.	33%	50%	70%	100%	100%	100%	100%
Student design teams will be able to build a budget for the project and discuss financial limitations.	78%	30%	80%	100%	100%	100%	68%

EGR4082 (Summative)	Percent of Students Above 2.5					
	2019-20*	2020-21*	2021-22	2022-23	2023-24	2024-25
<i>Student design teams will be able to construct a prototype of their solution and evaluate its effectiveness.</i>	67%	40%	67%	83%	100%	100%

\*Covid Impacted students' ability to create prototypes

EGR4082 (Student Survey)	Percentage of Students Indicating Satisfied or Higher		
	2022-23	2023-24	2024-25
<i>How well do you feel that you have been prepared 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?]</i>	67%	100%	71%

*Previous Learning Outcome: Students will design and conduct experiments or complete engineering design projects as well as analyze and interpret data.*

*Previous Outcome Measure: Assessment of design as part of EGR/PHY4082 Senior Project.*

*Previous Criteria for Success: At least 75% of students will achieve an average score of 2.5 or higher on criteria described in experimental rubric.*

*Previous Data:*

	Percentage of Students scoring 2.5 or higher									
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Design Rubric	75%	N/A	88%	93%	89%	86%	100%	69%	80%	78%

*\*Note that 2019-20 and 2020-21 were COVID years.*

**Conclusions Drawn from Data:**

EGR1023 did well on defining the problem constraints and future improvements, however lacked the ability to justify design choices against other design possibilities.

EGR4072 did not clearly present their budget to the review committee. This was most likely a miscommunication between the parties, since there exists a detailed budget in their final report.

**Changes to be Made Based on Data:**

The assignment used for EGR1023 is a three-week final project, which introduces a time limit to effectively consider various design choices. We can intentionally require students to generate and document various design alternatives as supplemental materials.

**Rubric:**

EGR1023 – Attached

EGR3093 – Attached

EGR4072 and EGR4082 – There is no rubric since it comes from the review sheet of the faculty and external professional review committee.

Senior Survey – No rubric for this since they are survey results.

**EGR 1023 Assessment Method: Faculty Team Assessment of Final Project**

2. Students will demonstrate 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 Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>2.1 Students will be able to define the problem context and constraints</b>	Problem context is thoroughly defined with comprehensive consideration of health, safety, and societal factors.	Problem context is fully defined with consideration of major factors.	Problem context is not fully defined with limited consideration of factors	Problem context definition is missing or incomplete.
<b>2.3 Students will be able to generate design alternatives</b>	Design alternatives are thoroughly developed with consideration of all constraints.	Design alternatives are fully developed with consideration of major constraints.	Design alternatives are not fully developed with limited consideration of constraints.	Design alternatives are missing or undeveloped.
<b>2.4 Students will be able to select a design</b>	Basis for selection is thoroughly described and documented with explicit consideration of contextual factors.	Basis for selection is described and documented with consideration of major factors.	Basis for selection is somewhat described with limited consideration of factors.	Basis for selection is missing or undeveloped.
<b>2.8 Students will be able to identify potential improvements</b>	Thoroughly identifies potential improvements with specific strategies to address changing constraints.	Identifies major improvements with reasonable strategies for implementation.	Identifies limited improvements with few implementation strategies.	Few or no improvements are identified.

### EGR 3093 Assessment Method: Faculty Team Assessment of Final Project

2. Students will demonstrate 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 Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>2.1 Students will be able to define the problem context and constraints</b>	Problem context is thoroughly defined with comprehensive consideration of health, safety, and societal factors.	Problem context is fully defined with consideration of major factors.	Problem context is not fully defined with limited consideration of factors	Problem context definition is missing or incomplete.
<b>2.3 Students will be able to generate design alternatives</b>	Design alternatives are thoroughly developed with consideration of all constraints.	Design alternatives are fully developed with consideration of major constraints.	Design alternatives are not fully developed with limited consideration of constraints.	Design alternatives are missing or undeveloped.
<b>2.4 Students will be able to select a design</b>	Basis for selection is thoroughly described and documented with explicit consideration of contextual factors.	Basis for selection is described and documented with consideration of major factors.	Basis for selection is somewhat described with limited consideration of factors.	Basis for selection is missing or undeveloped.
<b>2.8 Students will be able to identify potential improvements</b>	Thoroughly identifies potential improvements with specific strategies to address changing constraints.	Identifies major improvements with reasonable strategies for implementation.	Identifies limited improvements with few implementation strategies.	Few or no improvements are identified.

## Physics and Engineering

**Learning Outcome:** ABET #3: Students will demonstrate an ability to communicate effectively with a range of audiences.

- Students will be able to speak about their work with precision, clarity and organization. (CC: OC)
- Students will be able to write about their work with precision, clarity and organization. (CC: WC)
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (CC: IL)

**Outcome Measures and Criteria for Success:**

Course	Outcome Assessed	Assessment Method	Threshold	Frequency
EGR2014L	(WC) Students will be able to write a lab report that accurately summarizes the experiment and the results (ME and EE)	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR2024L (New Assessment beginning 2026-27)	Students will be able to write a lab report that accurately summarizes the experiment and the results.	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR3034L (New Assessment beginning 2026-27)	(WC) Students will be able to write a lab report that accurately summarizes the experiment and the results (ME)	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR3053L	(WC) Students will be able to write a lab report that accurately summarizes the experiment and the results (EE and CE)	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR3093L (phasing out starting 2025-26)	Students will be able to write a lab report that accurately summarizes the experiment and the results.	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Alternating Year
EGR3113L (New Assessment beginning 2026-27)	(OC) Students will be able to speak about their work to a wide range of audiences that emphasizes design choices and constraints (ME and EE)	Faculty Team Assessment Final Project (Open House Demo)	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR4082	(OC) Students will be able to speak about their work with precision, clarity and organization. (all)	Faculty Team Assessment of Final Project Presentation	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually

EGR4082	(WC) Students will be able to write about their work with precision, clarity and organization. (all)	Faculty Team Assessment of Final Project Report	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4082	(IL) Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (all)	Faculty Team Assessment of Final Project Report	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4082	Student reflection on preparation to communicate effectively (all)	Senior Survey (Indirect Method)	80% of the respondents will say that they are satisfied or higher	Annually
EGR4103L (New Assessment beginning 2026-27)	(WC) Students will be able to clearly document the design process for the final project (EE and CE)	Final Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall

**Longitudinal Data:**

Note that the PHE department changed assessment processes to align with ABET expectations for engineering curriculum. The data shown is all that we are expected to collect for ABET, both formative and summative data, so some formative data has been added as well as some additional data gathered from laboratory reports.

EGR2014 (Formative)	Percent of Students Above 2.5					
	2025-26					
3.6 Produce clear and effective written content	58%					
3.7 Use appropriate technical language and terminology	77%					
3.8 Create professional quality figures, tables, and graphics	46%					
3.9 Follow appropriate documentation and citation standard	12%					

<i>EGR2024 (Formative)</i>	<i>Percent of Students Above 2.5</i>					
	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25*</i>
<i>Students will be able to write a lab report that accurately summarizes the experiment and the results</i>	0%	33%	56%			100%
<i>Writing is precise, clear, and organized</i>				100%	100%	
<i>Writing accurately summarizes the experiment</i>				100%	100%	
<i>Writing accurately summarizes the main results of the experiment</i>				100%	100%	

\* The wrong rubric was used in 2024-25.

<i>EGR3053 (Summative)</i>	<i>Percent of Students Above 2.5</i>					
	<i>2025-26</i>					
<i>3.6 Produce clear and effective written content</i>	100%					
<i>3.7 Use appropriate technical language and terminology</i>	100%					
<i>3.8 Create professional quality figures, tables, and graphics</i>	100%					
<i>3.9 Follow appropriate documentation and citation standard</i>	100%					

<i>EGR3093 (Summative)</i>	<i>Percent of Students Above 2.5</i>					
	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students will be able to write a lab report that accurately summarizes the experiment and the results</i>	100%	N/A	100%	N/A	60%	N/A

EGR4082 (Summative)	Percent of Students Above 2.5					
	2025-26					
3.3 Displays appropriate structure and organization in their oral communication	100%					
3.4 Creates professional quality visual aids	100%					
3.6 Produce clear and effective written content	100%					
3.7 Use appropriate technical language and terminology	100%					
3.8 Create professional quality figures, tables, and graphics	100%					
3.10 Identify and evaluate information sources	100%					
3.11 Use information ethically and legally	100%					

<i>EGR4082 - Speaking (Summative)</i>	<i>Percentage of Students at 2.5 or Higher</i>						
	<i>2018-19</i>	<i>2019-20*</i>	<i>2020-21*</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students will be able to speak about their work with precision, clarity and organization. (CC: OC)</i>	<i>75%</i>	<i>100%</i>	<i>88%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>

<i>EGR4082 - Writing (Summative)</i>	<i>Percentage of Students at 2.5 or Higher</i>						
	<i>2018-19</i>	<i>2019-20*</i>	<i>2020-21*</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students will be able to write about their work with precision, clarity and organization. (CC: WC)</i>	<i>100%</i>	<i>No Data</i>	<i>80%</i>	<i>67%</i>	<i>100%</i>	<i>100%</i>	<i>0%</i>

<i>EGR4082 - Information Literacy (Summative)</i>	<i>Percentage of Students at 2.5 or Higher</i>						
	<i>2018-19</i>	<i>2019-20*</i>	<i>2020-21*</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students will be able to identify, locate, evaluate, and effectively use and cite information for the task at hand. (CC: IL)</i>	44%	No Data	80%	100%	83%	0%	0%

\* Indicates a COVID year

EGR4082 (Student Survey)	Percentage of Students Indicating Satisfied or Higher			
	2022-23	2023-24	2024-25	2025-26
How well do you feel that you have been prepared to: [Communicate truthfully and effectively?]	100%	90%	71%	63%
How well do you feel that you have been prepared to: [Communicate orally?]	83%	100%	71%	88%
How well do you feel that you have been prepared to: [Communicate in writing?]	100%	100%	71%	100%

**Conclusions Drawn from Data:**

EGR2014 underperformed on written communication. This class was taught in a way that did not emphasize the writing portion of communication. This was the result of miscommunication between the previous and current instructor.

EGR4082 saw an improvement in oral and written communication from the previous year, however, there appears to be a lack of preparation to communicate truthfully and effectively. This may be due to the vague nature of the question.

**Changes to be Made Based on Data:**

Adjust EGR2014 curriculum such that there is intentional writing standards carried over from EGR 2024, which students would see the previous semester.

In EGR4082 consider rewording the survey questions to avoid ambiguity.

**Rubrics:**

EGR2014 - Attached

EGR2024 - Attached

EGR3053 - Attached

EGR3093 - Attached

EGR4082 Report Rubric – Attached

EGR4082 Presentation Rubric – Attached

Oral Presentation - attached

Writing - attached

Information Literacy – This is a subset of the writing rubric.

The senior data comes from a survey and thus has no rubric

**EGR 2014 and 2014L Assessment Method: Lab Report**

**3. Students will demonstrate an ability to communicate effectively with a range of audiences (CC: OC, WC, IL)**

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
<b>3.6 Produce clear and effective written content</b>	Writing is exceptionally clear, fluent, and concise. Main points are well-developed with excellent support. Organization is logical and enhances understanding.	Writing is clear and well-organized. Main points are adequately developed with appropriate support.	Writing is sometimes unclear or disorganized. Main points lack sufficient development or support.	Writing is unclear, disorganized, and difficult to follow. Main points are undeveloped or unsupported.
<b>3.7 Use appropriate technical language and terminology</b>	Consistently uses precise technical terminology appropriate to the audience. Technical concepts are clearly explained when necessary.	Generally uses appropriate technical terminology with adequate explanations when needed.	Sometimes uses inappropriate technical terminology or fails to explain technical concepts adequately.	Consistently misuses technical terminology or uses overly technical language without necessary explanation.
<b>3.8 Create professional quality figures, tables, and graphics</b>	Figures, tables, and graphics are expertly designed, properly labeled, and effectively support the document's purpose.	Figures, tables, and graphics are well-designed, labeled appropriately, and support the document's purpose.	Figures, tables, or graphics have minor design flaws, labeling issues, or only partially support the document's purpose.	Figures, tables, or graphics are poorly designed, inadequately labeled, or fail to support the document's purpose.
<b>3.9 Follow appropriate documentation and citation standard</b>	Documentation and citations follow required formatting standards perfectly. Sources are thoroughly and accurately documented.	Documentation and citations generally follow required formatting standards with minor errors. Most sources are properly documented.	Documentation and citations contain several formatting errors. Some sources are improperly documented or missing.	Documentation and citations contain major formatting errors or are largely missing.

**EGR 2024 Assessment Method: Lab Report (Current)**

PLO3: Students will demonstrate an ability to communicate effectively with a range of audiences.

- Students will be able to speak about their work with precision, clarity, and organization. (CC: OC)
- Students will be able to write about their work with precision, clarity and organization. (CC: WC)
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (CC: IL)

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
Writing is precise, clear, and organized	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
Writing accurately summarizes the experiment	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
Writing accurately summarizes the main results of the experiment	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized

**EGR 2024L Assessment Method: Lab Report (Past)**

PLO3: Students will demonstrate an ability to communicate effectively with a range of audiences.

- Students will be able to speak about their work with precision, clarity, and organization. (CC: OC)
- Students will be able to write about their work with precision, clarity and organization. (CC: WC)
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (CC: IL)

PLO6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
<b>3.</b> Students will be able to write a lab report that accurately summarizes the experiment and the results.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
<b>6.</b> Students will be able to carry out an experiment based on instructions and accurately record data.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
<b>6.</b> Students will be able to analyze experimental data and draw conclusions.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized

**EGR 3053 and 3053L Assessment Method: Lab Report**

**3. Students will demonstrate an ability to communicate effectively with a range of audiences (CC: OC, WC, IL)**

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>3.6 Produce clear and effective written content</b>	Writing is exceptionally clear, fluent, and concise. Main points are well-developed with excellent support. Organization is logical and enhances understanding.	Writing is clear and well-organized. Main points are adequately developed with appropriate support.	Writing is sometimes unclear or disorganized. Main points lack sufficient development or support.	Writing is unclear, disorganized, and difficult to follow. Main points are undeveloped or unsupported.
<b>3.7 Use appropriate technical language and terminology</b>	Consistently uses precise technical terminology appropriate to the audience. Technical concepts are clearly explained when necessary.	Generally uses appropriate technical terminology with adequate explanations when needed.	Sometimes uses inappropriate technical terminology or fails to explain technical concepts adequately.	Consistently misuses technical terminology or uses overly technical language without necessary explanation.
<b>3.8 Create professional quality figures, tables, and graphics</b>	Figures, tables, and graphics are expertly designed, properly labeled, and effectively support the document's purpose.	Figures, tables, and graphics are well-designed, labeled appropriately, and support the document's purpose.	Figures, tables, or graphics have minor design flaws, labeling issues, or only partially support the document's purpose.	Figures, tables, or graphics are poorly designed, inadequately labeled, or fail to support the document's purpose.
<b>3.9 Follow appropriate documentation and citation standard</b>	Documentation and citations follow required formatting standards perfectly. Sources are thoroughly and accurately documented.	Documentation and citations generally follow required formatting standards with minor errors. Most sources are properly documented.	Documentation and citations contain several formatting errors. Some sources are improperly documented or missing.	Documentation and citations contain major formatting errors or are largely missing.

### EGR 3093L Assessment Method: Lab Report

PLO3: Students will demonstrate an ability to communicate effectively with a range of audiences.

- Students will be able to speak about their work with precision, clarity, and organization. (CC: OC)
- Students will be able to write about their work with precision, clarity and organization. (CC: WC)
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (CC: IL)

PLO6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

Criteria	4 – Excellent	3 – Good	2 – Fair	1 – Poor
<b>3.</b> Students will be able to write a lab report that accurately summarizes the experiment and the results.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
<b>6.</b> Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources of error.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized

### EGR 4082 Assessment Method: Final Report

Outcome Assessed	Excellent (4)	Good (3)	Fair (2)	Poor (1)
<b>3.6 Produce clear and effective written content</b>	Writing is exceptionally clear, fluent, and concise. Main points are well-developed with excellent support. Organization is logical and enhances understanding.	Writing is clear and well-organized. Main points are adequately developed with appropriate support.	Writing is sometimes unclear or disorganized. Main points lack sufficient development or support.	Writing is unclear, disorganized, and difficult to follow. Main points are undeveloped or unsupported.
<b>3.7 Use appropriate technical language and terminology</b>	Consistently uses precise technical terminology appropriate to the audience. Technical concepts are clearly explained when necessary.	Generally uses appropriate technical terminology with adequate explanations when needed.	Sometimes uses inappropriate technical terminology or fails to explain technical concepts adequately.	Consistently misuses technical terminology or uses overly technical language without necessary explanation.
<b>3.8 Create professional quality figures, tables, and graphics</b>	Figures, tables, and graphics are expertly designed, properly labeled, and effectively support the document's purpose.	Figures, tables, and graphics are well-designed, labeled appropriately, and support the document's purpose.	Figures, tables, or graphics have minor design flaws, labeling issues, or only partially support the document's purpose.	Figures, tables, or graphics are poorly designed, inadequately labeled, or fail to support the document's purpose.
<b>3.10 Identify and evaluate information sources</b>	Consistently identifies and evaluates highly relevant, authoritative information sources. Demonstrates excellent critical assessment of source quality.	Identifies and evaluates appropriate information sources with reasonable critical assessment.	Sometimes selects information sources with limited relevance or authority. Critical assessment of sources is inconsistent.	Frequently selects inappropriate sources or fails to evaluate sources critically.
<b>3.11 Use information ethically and legally</b>	Consistently demonstrates full understanding of ethical and legal use of information. All sources are properly acknowledged and cited.	Demonstrates good understanding of ethical and legal use of information. Sources are generally acknowledged and cited appropriately.	Demonstrates limited understanding of ethical and legal use of information. Some sources may not be properly acknowledged or cited.	Shows poor understanding of ethical and legal use of information. Sources are frequently unacknowledged or improperly cited.

**EGR 4082 Assessment Method: Faculty/Review Team assessment of Final Project**

<b>Outcome Assessed</b>	<b>Excellent (4)</b>	<b>Good (3)</b>	<b>Fair (2)</b>	<b>Poor (1)</b>
<b>3.3 Displays appropriate structure and organization in their oral communication</b>	The entire presentation is understandable, logical, and easy to follow; smooth flow and good transitions among team members.	Most of the presentation is understandable, logical, and easy to follow; some hesitancy to flow.	Parts of the presentation are difficult to understand, not always logical, and difficult to follow; interrupted flow.	Most or all of the presentation is difficult to understand and follow; no flow.
<b>3.4 Creates professional quality visual aids</b>	Makes very effective use of visual aids, which are always clear, meaningful, and easy to interpret.	Makes good use of visual aids, which are usually clear and easy to interpret.	Makes some use of visual aids, but they are confusing or do not enhance the presentation.	Marginal or poor use of visual aids; needs more practice using visual aids.
<b>4.3 Evaluates global impacts of engineering solutions</b>	Comprehensively evaluates global impacts of engineering solutions across multiple dimensions. Demonstrates sophisticated understanding of international contexts.	Evaluates major global impacts of engineering solutions. Shows adequate understanding of international contexts.	Limited evaluation of global impacts. Basic understanding of international contexts.	Fails to consider global impacts of engineering solutions.
<b>4.4 Assesses economic considerations in engineering decisions</b>	Thoroughly assesses economic implications across short and long-term horizons. Demonstrates advanced understanding of economic factors.	Assesses major economic implications of engineering decisions. Shows good understanding of economic factors.	Limited assessment of economic implications. Basic understanding of economic factors.	Fails to consider significant economic implications of engineering decisions.
<b>4.6 Considers societal implications of engineering work</b>	Thoroughly examines societal implications across diverse communities. Demonstrates sophisticated understanding of social equity considerations.	Examines major societal implications of engineering work. Shows good understanding of social impacts.	Limited examination of societal implications. Basic understanding of social impacts.	Fails to consider significant societal implications of engineering work.

### PHY-ENG Oral Presentation Rubric Update

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
<b>Command of material</b>	<input type="checkbox"/> Clearly knows material	<input type="checkbox"/> Knows most key facts	<input type="checkbox"/> Reads some, knows some	<input type="checkbox"/> Reads many sentences from slides
	<input type="checkbox"/> Expands on PowerPoint slides	<input type="checkbox"/> Some expansion on slides	<input type="checkbox"/> No expansion on slides	<input type="checkbox"/> Dependent on notes
	<input type="checkbox"/> Content appropriate for audience	<input type="checkbox"/> Partial adaptation for audience	<input type="checkbox"/> Little adaptation of content for audience	<input type="checkbox"/> Lacks adaptation of content to audience
<b>Organization</b>	<input type="checkbox"/> Clear and concise outline	<input type="checkbox"/> Clear outline	<input type="checkbox"/> Some sense of outline	<input type="checkbox"/> No clear sense of outline
	<input type="checkbox"/> Relevant graphics and key text items on slides	<input type="checkbox"/> Too much information on slides (not concise)	<input type="checkbox"/> Too much information and detail	<input type="checkbox"/> Slides are in paragraphs; too much detailed information on one slide
	<input type="checkbox"/> Plus/minus 30 seconds of time limit	<input type="checkbox"/> Plus/minus 60 seconds of time limit	<input type="checkbox"/> Plus/minus 1.5 minutes of time limit	<input type="checkbox"/> Plus/minus 2 minutes of time limit
<b>Presentation skills</b>	<input type="checkbox"/> Clearly has practiced several times; smooth transitions	<input type="checkbox"/> Practiced, but transitions are not smooth	<input type="checkbox"/> Practiced, but no transitions between slides	<input type="checkbox"/> Not practiced, doesn't anticipate content of next slide
	<input type="checkbox"/> Free of uhms and the like	<input type="checkbox"/> Few uhms and the like	<input type="checkbox"/> Many uhms and the like	<input type="checkbox"/> Uhms and the like detract from the presentation
	<input type="checkbox"/> Clearly heard and used inflection for emphasis	<input type="checkbox"/> Understood much of the time and some inflection	<input type="checkbox"/> Some difficulty hearing and little inflection	<input type="checkbox"/> Cannot be heard and/or speaks in a monotone
	<input type="checkbox"/> Engages audience with eye contact	<input type="checkbox"/> Some engagement with eye contact	<input type="checkbox"/> Infrequent eye contact	<input type="checkbox"/> No eye contact
	<input type="checkbox"/> Engages audience with gestures	<input type="checkbox"/> Some engagement with gestures	<input type="checkbox"/> Some distracting gestures	<input type="checkbox"/> Frequent distracting gestures
<b>Presentation tools</b>	<input type="checkbox"/> PPT background is matched to content, legible font, graphics, seamless transitions	<input type="checkbox"/> Appropriate background, font, transitions	<input type="checkbox"/> Distracting backgrounds, transitions, fonts hard to read	<input type="checkbox"/> No attention to backgrounds, transitions, fonts very hard to read
	<input type="checkbox"/> Appropriate graphics used	<input type="checkbox"/> Some graphics used to enhance presentation	<input type="checkbox"/> Graphics do not enhance presentation	<input type="checkbox"/> Distracting use of graphics

### PHY-ENG Written Presentation Rubric

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
<b>Structural pieces</b>	<input type="checkbox"/> Abstract is a clear and concise summary of all relevant results and descriptions in the order emphasized in the paper	<input type="checkbox"/> Abstract could be made clear and/or concise with minor changes	<input type="checkbox"/> Abstract is missing some information and/or contains unnecessary information	<input type="checkbox"/> Abstract does not contain necessary information
	<input type="checkbox"/> Introduction indicates precise subject, scope, and purpose	<input type="checkbox"/> Introduction is missing one of the following: precise subject, scope or purpose	<input type="checkbox"/> Introduction is missing two of the following: precise subject, scope or purpose	<input type="checkbox"/> Introduction does not give precise subject, scope and purpose
	<input type="checkbox"/> Main body is well organized, logical and contains all necessary information without extra information	<input type="checkbox"/> Main body lacks some organization	<input type="checkbox"/> Main body is missing some important pieces and/or is not well organized	<input type="checkbox"/> Main body is not well organized, lacks logical arguments and relevant data
	<input type="checkbox"/> Conclusion appropriately sums up, gives conclusions, and recommendations	<input type="checkbox"/> Conclusion does two of the following: sums up, gives conclusions, and recommendations	<input type="checkbox"/> Conclusion does one of the following: sums up, gives conclusions, and recommendations	<input type="checkbox"/> Conclusion does not provide any summation, conclusions, or recommendations
	<input type="checkbox"/> Multiple references from reputable sources	<input type="checkbox"/> Most references from distinct reputable sources	<input type="checkbox"/> Some references from reputable sources	<input type="checkbox"/> No bibliography or all references from untrusted sources
	<input type="checkbox"/> References cited in the body of the document	<input type="checkbox"/> Some citations of reference in the body	<input type="checkbox"/> Limited citation references	<input type="checkbox"/> No citation of references
<b>Data</b>	<input type="checkbox"/> Data is clearly presented in properly formatted tables, figures and graphs where appropriate	<input type="checkbox"/> Some data could be presented more clearly	<input type="checkbox"/> Data is poorly presented and some key data is missing	<input type="checkbox"/> Several pieces of key data are missing
	<input type="checkbox"/> All uncertainties are shown and error propagation is carried out where appropriate	<input type="checkbox"/> Most uncertainties are shown and propagation of error carried out	<input type="checkbox"/> Many uncertainties are missing and/or propagation or error not carried out correctly	<input type="checkbox"/> No uncertainties of measurements are shown
<b>Grammar, spelling and style</b>	<input type="checkbox"/> No grammatical or spelling errors	<input type="checkbox"/> Few grammatical and spelling errors	<input type="checkbox"/> Some grammatical and spelling errors	<input type="checkbox"/> Many grammatical and spelling errors
	<input type="checkbox"/> Equations well formatted and variables introduced as needed	<input type="checkbox"/> A few errors in formatting equations	<input type="checkbox"/> Poorly formatted equations	<input type="checkbox"/> Incorrect equations
	<input type="checkbox"/> Appropriate style (no first-person, past tense when reporting was done)	<input type="checkbox"/> A few informal statements and/or tense	<input type="checkbox"/> Several areas which are too informal and tense errors	<input type="checkbox"/> Very informal and/or use of future tense where not appropriate
	<input type="checkbox"/> Clear sentences and ideas are presented in a way that won't be misunderstood	<input type="checkbox"/> A few unclear sentences	<input type="checkbox"/> Many complex and unclear sentences	<input type="checkbox"/> Many sentences are unclear and have overly complex construction
	<input type="checkbox"/> Concise and quantitative as subject matter permits	<input type="checkbox"/> A few unnecessary words and ideas	<input type="checkbox"/> Frequent extra and inexact words	<input type="checkbox"/> Many vague, inexact, and/or idle words
	<input type="checkbox"/> Arguments are complete and logical	<input type="checkbox"/> Most arguments are complete	<input type="checkbox"/> Several arguments are difficult to follow	<input type="checkbox"/> Arguments are incomplete, illogical, and may contain unnecessary information and specialized jargon

## Physics and Engineering

**Learning Outcome:** ABET #4: Students will demonstrate an ability to recognize ethical and professional responsibilities and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

**Outcome Measures and Criteria for Success:**

Course	Outcome Assessed	Assessment Method	Threshold	Frequency
EGR1023 EGR1023L	Students will be able to determine an ethical response to a hypothetical engineering problem, acknowledging the impact of their solutions in the context of the problem (global, economic, environmental, societal),	Homework Assignment or Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR2014 EGR2014L	Students will be able to determine an ethical response to a hypothetical engineering problem, acknowledging the impact of their solutions in the context of the problem (global, economic, environmental, societal).	Homework Assignment or Exam Question	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR2024 EGR2024L (New Assessment beginning 2026-27)	Students will be able to discuss the impact of their proposed solution to an engineering problem, considering global, economic, environmental, and societal contexts (all)	Homework Assignment	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR4082	Students will be able to describe the role of engineering ethics, professional responsibility and the impact of contexts in their project.	Faculty/Review Team Assessment of Final Project	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4082	Student reflection on preparation to recognize ethical and professional responsibilities and make informed judgements.	Senior Survey (Indirect Method)	80% of the respondents will say that they are satisfied or higher	Annually
EGR4092 (New Assessment beginning 2026-27)	Students will be able to determine an ethical response to a hypothetical engineering problem, acknowledging the impact of their solutions in the context of the problem (global, economic, environmental, societal) (all)	Application of a code of ethics to situation in their internship	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall

**Longitudinal Data:**

Note that the PHE department changed assessment processes to align with ABET expectations for engineering curriculum. The data shown is all that we are expected to collect for ABET, both formative and summative data. Specifically assessing ethical considerations is new for the department and we have been building a set of modules on ethics to be placed throughout the curriculum. 2022-23 was the first year of using these modules.

EGR1023 (Formative)	Percentage of Students With Average 2.5 or Above		
	2025-26		
4.1 Recognize ethical issues in engineering	18%		
4.2 Apply professional codes of ethics	50%		

EGR1023 (Formative)	Percentage of Students With Average 2.5 or Above		
	2022-23	2023-24	2024-25
<i>Can identify an ethical issue in a problem or scenario.</i>	71%	67%	73%
<i>Can apply an ethical framework to ethical issue (virtue, utilitarianism, deontology, analogies) to scenario.</i>	64%	50%	77%
<i>Can make and support plausible ethical decision(s).</i>	71%	50%	73%

EGR2014 (Formative)	Percentage of Students With Average 2.5 or Above		
	2025-26		
4.1 Recognize ethical issues in engineering	65%		
4.2 Apply professional codes of ethics	54%		

<i>EGR2014 (Formative)</i>	<i>Percentage of Students With Average 2.5 or Above</i>		
	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Can identify an ethical issue in a problem or scenario.</i>	<i>83%</i>	<i>100%</i>	<i>100%</i>
<i>Can apply an ethical framework to ethical issue (virtue, utilitarianism, deontology, analogies) to scenario.</i>	<i>83%</i>	<i>89%</i>	<i>93%</i>
<i>Can make and support plausible ethical decision(s).</i>	<i>83%</i>	<i>89%</i>	<i>86%</i>

<i>EGR4082 (Summative)</i>	<i>Percentage of Students With Average 2.5 or Above</i>		
	<i>2025-26</i>		
<i>4.3 Evaluates global impacts of engineering solutions</i>	<i>100%</i>		
<i>4.4 Assesses economic considerations in engineering decisions</i>	<i>100%</i>		
<i>4.6 Considers societal implications of engineering work</i>	<i>100%</i>		

<i>EGR4082 (Summative)</i>	<i>Percentage of Students With Average 2.5 or Above</i>		
	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students will be able to describe the role of engineering ethics, professional responsibility, and their impact of contexts in their project.</i>	<i>83%</i>	<i>100%</i>	<i>100%</i>

EGR4082 (Student Survey)	Percentage of Students Indicating Satisfied or Higher			
	2022-23	2023-24	2024-25	2025-26
How well do you feel that you have been prepared to: [Recognize ethical and professional responsibilities in engineering?]	100%	90%	57%	63%
How well do you feel that you have been prepared to: [Make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts?]	83%	100%	86%	88%

EGR4092 (Summative) - Previously EGR4072	Percentage of Students With Average 2.5 or Above			
	2022-23	2023-24	2024-25	2025-26
Can identify an ethical issue in a problem or scenario.	100%	100%	33%	NA
Can apply an ethical framework to ethical issue (virtue, utilitarianism, deontology, analogies) to scenario.	50%	100%	0%	NA
Can make and support plausible ethical decision(s).	100%	89%	50%	NA

### Conclusions Drawn from Data:

EGR1023 is introduced to the code of ethics in the middle of their final project, which appears to make it difficult for students to connect ethics to their particular project.

EGR2014 underperformed as well, possibly since the code of ethics is introduced in the latter portion of the course.

EGR4082 self-reported they do not feel prepared to recognize ethical and professional responsibilities in engineering. This is surprising since there are dedicated lectures that focus on this in the EGR4082 class.

### Changes to be Made Based on Data:

EGR1023 and EGR 2014 can have the code of ethics introduced earlier in the semester to better prepare for their final projects.

We can consider reinforcing the Engineering code of ethics in a 3000-level class.

**Rubric:**

EGR1023 – Attached

EGR2014 – Attached

EGR4082 – Attached

EGR4092 – Attached

Senior Survey – No rubric for this since they are survey results

## EGR 1023 and EGR2014 Assessment Method: Homework Assignment

4. Students will demonstrate an ability to recognize ethical and professional responsibilities and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>4.1</b> Recognize ethical issues in engineering	Thoroughly identifies and describes ethical issues in complex engineering situations. Demonstrates deep understanding of professional ethics.	Identifies most ethical issues in engineering situations. Shows adequate understanding of professional ethics.	Identifies some ethical issues but misses others. Limited understanding of professional ethics.	Fails to identify significant ethical issues. Poor understanding of professional ethics.
<b>4.2</b> Apply professional codes of ethics	Correctly applies professional codes of ethics to engineering situations. Demonstrates comprehensive understanding of ethical standards.	Generally applies professional codes of ethics appropriately. Shows good understanding of ethical standards.	Limited application of professional codes of ethics. Basic understanding of ethical standards.	Incorrectly applies or fails to apply professional codes of ethics.

**EGR 4082 Assessment Method: Faculty/Review Team assessment of Final Project**

<b>Outcome Assessed</b>	<b>Excellent (4)</b>	<b>Good (3)</b>	<b>Fair (2)</b>	<b>Poor (1)</b>
<b>3.3 Displays appropriate structure and organization in their oral communication</b>	The entire presentation is understandable, logical, and easy to follow; smooth flow and good transitions among team members.	Most of the presentation is understandable, logical, and easy to follow; some hesitancy to flow.	Parts of the presentation are difficult to understand, not always logical, and difficult to follow; interrupted flow.	Most or all of the presentation is difficult to understand and follow; no flow.
<b>3.4 Creates professional quality visual aids</b>	Makes very effective use of visual aids, which are always clear, meaningful, and easy to interpret.	Makes good use of visual aids, which are usually clear and easy to interpret.	Makes some use of visual aids, but they are confusing or do not enhance the presentation.	Marginal or poor use of visual aids; needs more practice using visual aids.
<b>4.3 Evaluates global impacts of engineering solutions</b>	Comprehensively evaluates global impacts of engineering solutions across multiple dimensions. Demonstrates sophisticated understanding of international contexts.	Evaluates major global impacts of engineering solutions. Shows adequate understanding of international contexts.	Limited evaluation of global impacts. Basic understanding of international contexts.	Fails to consider global impacts of engineering solutions.
<b>4.4 Assesses economic considerations in engineering decisions</b>	Thoroughly assesses economic implications across short and long-term horizons. Demonstrates advanced understanding of economic factors.	Assesses major economic implications of engineering decisions. Shows good understanding of economic factors.	Limited assessment of economic implications. Basic understanding of economic factors.	Fails to consider significant economic implications of engineering decisions.
<b>4.6 Considers societal implications of engineering work</b>	Thoroughly examines societal implications across diverse communities. Demonstrates sophisticated understanding of social equity considerations.	Examines major societal implications of engineering work. Shows good understanding of social impacts.	Limited examination of societal implications. Basic understanding of social impacts.	Fails to consider significant societal implications of engineering work.

**Ethics Rubric – EGR4092**

	Unsatisfactory (1)	Satisfactory (2)	Good (3)	Excellent (4)
<p>Can identify an ethical issue in a problem or scenario.</p> <p>(Ethical Issue Recognition)</p>	<p>Student is unable to identify the core ethical issue of the scenario.</p>	<p>Student identifies a concern of the scenario, but not a core ethical issue.</p>	<p>Student identifies a core ethical issue, but not a secondary concern.</p>	<p>Student identifies a core ethical issue along with secondary concerns.</p>
<p>Can apply an ethical framework to an ethical issue (virtue, utilitarianism, deontology, analogies) to scenario.</p> <p>(Application of Ethical Perspectives/Concepts)</p>	<p>Student is unable to state an ethical framework.</p>	<p>Student states an ethical framework and makes an attempt to apply it to the scenario.</p>	<p>Student states an ethical framework and is mostly correct in applying it to the scenario.</p>	<p>Student states an ethical framework and can correctly apply it to the scenario.</p>
<p>Can make and support plausible ethical decision(s).</p> <p>(Informed Judgement)</p>	<p>Student is unable to form and support a plausible ethical decision.</p>	<p>Student forms a plausible ethical decision, however no support is given.</p>	<p>Student forms a plausible ethical decision and provides minimum support.</p>	<p>Student forms a plausible ethical decision and provides strong support.</p>

## Physics and Engineering

**Learning Outcome:** ABET #5: Students will demonstrate 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 Measures and Criteria for Success:**

Course	Outcome Assessed	Assessment Method	Threshold	Frequency
EGR1023 EGR1023L	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
PHY3004 PHY3004L (phasing out starting 2025-26)	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Annually
EGR3034 EGR3034L (New Assessment beginning 2026-27)	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR3093 EGR3093L	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR3113 EGR3113L (New Assessment beginning 2026-27)	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall

EGR4042 EGR4042L (phasing out starting 2025-26)	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Alternating Year
EGR4072	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Annually
EGR4082	Students will demonstrate 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.	Homework Assignment to Complete Evaluation of Each Team Member	At least 80% of the students will score 2.5 or higher on the associated rubric	Annually
EGR4082	Student reflection on preparation to be part of a team.	Senior Survey (Indirect Method)	80% of the respondents will say that they are satisfied or higher	Annually

**Longitudinal Data:**

Note that the PHE department changed assessment processes to align with ABET expectations for engineering curriculum. The data shown is all that we are expected to collect for ABET, both formative and summative data. This is an expansion of the data that we collected previously.

EGR1023 (Formative)	Percent of Students at 2.5 or Higher			
	2022-23	2023-24	2024-25	2025-26
Focus on Task	100%	100%	100%	100%
Extent to which works together	100%	100%	95%	93%
Meeting habits	100%	100%	95%	93%
Attitude while listening and discussing	100%	100%	100%	100%
Problem solving	100%	100%	86%	100%
Goal completion	100%	100%	100%	93%

<i>PHY3004 (Summative)</i>	<i>Percent of Students at 2.5 or Higher</i>							
	<i>2017-18</i>	<i>2018-19</i>	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Teamwork Rubric</i>	<i>91%</i>	<i>86%</i>						
<i>Focus on Task</i>			<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
<i>Extent to which works together</i>			<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
<i>Meeting habits</i>			<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
<i>Attitude while listening and discussing</i>			<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
<i>Problem solving</i>			<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
<i>Goal completion</i>			<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>

<i>EGR3093 (Summative)</i>	<i>Percent of Students at 2.5 or Higher</i>			
	<i>2025-26</i>			
<i>5.1 Produce research information for team</i>	<i>88%</i>			
<i>5.2 Contribute to team effort and work by providing leadership, establishing goals, planning tasks and meeting objectives</i>	<i>75%</i>			
<i>5.3 Take responsibility</i>	<i>75%</i>			
<i>5.4 Demonstrate respect for teammates by creating and fostering a collaborative and inclusive environment</i>	<i>75%</i>			

<i>EGR4042/4043 (Summative) Alternating Year Class</i>	<i>Percent of Students at 2.5 or Higher</i>		
	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25*</i>
<i>Focus on Task</i>	<i>100%</i>	<i>N/A</i>	<i>N/A</i>
<i>Extent to which works together</i>	<i>100%</i>	<i>N/A</i>	<i>N/A</i>
<i>Meeting habits</i>	<i>100%</i>	<i>N/A</i>	<i>N/A</i>
<i>Attitude while listening and discussing</i>	<i>100%</i>	<i>N/A</i>	<i>N/A</i>
<i>Problem solving</i>	<i>100%</i>	<i>N/A</i>	<i>N/A</i>
<i>Goal completion</i>	<i>100%</i>	<i>N/A</i>	<i>N/A</i>

\* Assessment missed in 2024-25

EGR4072 (Summative)	Percent of Students at 2.5 or Higher		
	2025-26		
Focus on Task	100%		
Extent to which works together	100%		
Meeting habits	100%		
Attitude while listening and discussing	100%		
Problem solving	100%		
Goal completion	100%		

EGR4082 (Summative)	Percent of Students at 2.5 or Higher			
	2022-23	2023-24	2024-25	2025-26
Focus on Task	100%	100%	86%	100%
Extent to which works together	83%	100%	100%	88%
Meeting habits	83%	100%	86%	100%
Attitude while listening and discussing	100%	100%	100%	100%
Problem solving	100%	100%	86%	100%
Goal completion	100%	100%	100%	100%

EGR4082 (Student Survey)	Percentage of Students Indicating Satisfied or Higher			
	2022-23	2023-24	2024-25	2025-26
How well do you feel that you have been prepared to: [Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives?]	83%	100%	71%	88%

**Conclusions Drawn from Data:**

Students are meeting the benchmark in this area. The only place where the score was lower was in EGR3093 due to the small sample size, if one student has raised their score by one point, the benchmark would have been 100%

**Changes to be Made Based on Data:**

None at this time.

**Rubric:**

EGR3093 – Attached

See the next page for the rubric used in all other classes.

The senior survey data comes from a survey given to seniors in their final project class.

## EGR 3093 Assessment Method: Homework Assignment to Complete Evaluation of Each Team Member

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.

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>5.1 Produce research information for team</b>	Collected a great deal of information which went beyond the basics.	Collected basic information related to the topic	Collected some information related to the topic, but information was incomplete.	Did not collect any information that related to the topic.
<b>5.2 Contribute to team effort and work by providing leadership, establishing goals, planning tasks and meeting objectives</b>	Initiated the generation of innovative ideas and creative solutions. Always prepared for team meetings	Provided innovative ideas and generated creative solutions. Helped to establish goals and planning tasks. Not always prepared for team meetings.	Contributed ideas and solutions if reminded or prompted. Poor contribution to establishing goals and planning tasks. Not prepared for team meetings	Did not contribute to team effort and work. Expected others to do more work because of other commitments
<b>5.3 Take responsibility</b>	Performed all duties of assigned team role with no reminders. Never tardy to meetings or turning in work	Performed most or nearly all duties with few reminders. Tardy to meetings or turning in work once or twice	Performed some duties, but often needed reminding. Often tardy to meetings or turning in work	Performed very few or no duties of assigned team role. Always tardy to meetings or turning in work
<b>5.4 Demonstrate respect for teammates by creating and fostering a collaborative and inclusive environment</b>	Courteous. Provided instructive feedback. Participated in discussions, listened avidly, respected colleagues, and valued others' viewpoints.	Usually courteous. Provided constructive feedback when necessary. Typically valued others' viewpoints. Has good listening skills.	Sometimes courteous. Provided constructive feedback and valued others' viewpoints, but only sometimes. Listening skills need improvement.	Criticized others' work in a negative way. Did not value others' viewpoints. Has poor listening skills.

## Physics and Engineering Teamwork Rubric

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
<b>Focus on Task</b>	<input type="checkbox"/> Stays on task all of the time	<input type="checkbox"/> Stays on task most of the time	<input type="checkbox"/> Stays on task some of the time with some reminders from group	<input type="checkbox"/> Hardly ever on task, lets others do task
<b>Extent to which works together</b>	<input type="checkbox"/> A very strong group member who works hard and helps others in the group	<input type="checkbox"/> A strong group member who works hard	<input type="checkbox"/> Sometimes active group member but needs to try harder	<input type="checkbox"/> Frequently choosing not to help out
<b>Meeting habits</b>	<input type="checkbox"/> On time to meetings or any assigned tasks	<input type="checkbox"/> Usually on time and completes any assigned task	<input type="checkbox"/> Sometimes late for meeting or not completing tasks	<input type="checkbox"/> Late or absent for many or all meetings
<b>Attitude while listening and discussing</b>	<input type="checkbox"/> Respectful listener, discusses, and helps direct the group in solving problems	<input type="checkbox"/> Respectful, listens and asks questions	<input type="checkbox"/> Has trouble listening with respect and takes over discussions without letting others have a turn	<input type="checkbox"/> Does not listen or consider other's ideas, blocks group from reaching agreement
<b>Problem solving</b>	<input type="checkbox"/> Actively seeks and suggests solutions to problems	<input type="checkbox"/> Improves on solutions and suggestions given by others	<input type="checkbox"/> Does not offer solutions but is willing to try solutions offered by others	<input type="checkbox"/> Does not try to solve problems or help others solve problems
<b>Goal completion</b>	<input type="checkbox"/> Works to complete group goals	<input type="checkbox"/> Usually helps to complete group goals	<input type="checkbox"/> Occasionally helps to complete group goals	<input type="checkbox"/> Does not help to complete group goals

## Physics and Engineering

**Learning Outcome:** ABET #6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

### Outcome Measures and Criteria for Success:

Course	Outcome Assessed	Assessment Method	Threshold	Frequency
EGR2014	Students will be able to carry out an experiment based on instructions and accurately record data (ME and EE)	Procedures in Lab Document	80% of the respondents will say that they are satisfied or higher	Odd Fall
EGR2024 EGR2024L (phasing out starting 2025-26)	Students will be able to carry out an experiment based on instructions and accurately record data.	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Annually
EGR2024 EGR2024L (phasing out starting 2025-26)	Students will be able to analyze experimental data and draw conclusions.	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Annually
PHY3004 PHY3004L (phasing out starting 2025-26)	Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources or error.	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Annually
EGR3053# EGR3053L (2023 and beyond) EGR3093 EGR3093L (old)  (phasing out starting 2025-26)	Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources or error.	Lab Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Alternating Year
EGR2014	Students will be able to analyze experimental data and draw conclusions (ME and EE)	Lab Report	80% of the respondents will say that they are satisfied or higher	Odd Fall
EGR3113 (New Assessment beginning 2026-27)	Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources or error (ME and EE)	Lab Report	80% of the respondents will say that they are satisfied or higher	Even Fall

EGR3123	Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources or error (ME)	Lab Report	80% of the respondents will say that they are satisfied or higher	Odd Fall
EGR4082	Student reflection on preparation to conduct experiments and interpret data.	Senior Survey (Indirect Method)	80% of the respondents will say that they are satisfied or higher	Annually

### Longitudinal Data:

Note that the PHE department changed assessment processes to align with ABET expectations for engineering curriculum. This includes both formative and summative data. As can be seen in the data, the measurement/rubric has changed over time.

EGR2014 (Formative)	Percent of Students at 2.5 or Higher					
	2025-26					
6.2 Develop an experiment plan	62%					
6.3 Acquire data according to the experiment plan	88%					
6.4 Analyze and interpret data	46%					

EGR2024 (Formative)	Percent of Students at 2.5 or Higher					
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<i>Students will be able to carry out an experiment based on instructions and accurately record data</i>	0%	27%	100%			
<i>Students are able to carry out the experiment from instructions</i>				100%	100%	100%
<i>Students will be able to analyze experimental data and draw conclusions</i>	0%	45%	60%	100%	79%	100%

<i>PHY3004 (Summative)</i>	<i>Percent of Students at 2.5 or Higher</i>					
	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources of error</i>	<i>40%</i>	<i>100%</i>	<i>63%</i>	<i>100%</i>	<i>50%</i>	<i>75%</i>

<i>EGR3053 (Summative)</i>	<i>Percent of Students at 2.5 or Higher</i>					
	<i>2019-20</i>	<i>2020-21</i>	<i>2021-22</i>	<i>2022-23</i>	<i>2023-24</i>	<i>2024-25</i>
<i>Students are able to follow instructions</i>					<i>100%</i>	<i>N/A</i>
<i>Students are able to carry out the experiment from instructions</i>					<i>100%</i>	<i>N/A</i>
<i>Data is accurately recorded</i>					<i>100%</i>	<i>N/A</i>
<i>Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources of error</i>	<i>100%</i>		<i>100%</i>			

<i>EGR3123 (Summative)</i>	<i>Percent of Students at 2.5 or Higher</i>					
	<i>2025-26</i>					
<i>6.2 Develop an experiment plan</i>	<i>100%</i>					
<i>6.3 Acquire data according to the experiment plan</i>	<i>100%</i>					
<i>6.4 Analyze and interpret data</i>	<i>100%</i>					
<i>6.5 Use engineering judgement to draw conclusions</i>	<i>100%</i>					

EGR4082 (Student Survey)	Percentage of Students Indicating Satisfied or Higher			
	2022-23	2023-24	2024-25	2025-26
How well do you feel that you have been prepared to: [Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions?]	83%	100%	57%	88%

**Conclusions Drawn from Data:**

The students generally meet our benchmarks at the summative level. EGR2014 is underperforming on experimental planning and data analysis. However, they do well on acquiring the data.

**Changes to be Made Based on Data:**

EGR2014 can emphasize analysis techniques that are expected to be seen in the report. The ability to develop an experimental plan requires improvements in written communication. Continue to emphasize writing standards in this class.

**Rubrics:**

EGR2014 – Attached

EGR2024 – Attached

PHY3004: Rubric is attached.

EGR3053: Rubric is attached.

EGR3123 – Attached

EGR4082: This is data from a survey given to seniors.

### EGR 2014 Assessment Method: Lab Report

6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CC: QR)

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>6.2 Develop an experiment plan</b>	All relevant variables and externalities are identified. A data collection procedure is formulated and explained in detail without being unnecessarily complicated.	Almost all variables are identified. Data collection procedures are formulated adequately, but do not account for all externalities.	Some variables are identified, but some key variables are missing. A data collection procedure is described, but details required to accurately reproduce the experiment are missing.	The majority of key variables are not identified. A data collection procedure is incomplete, unclear, or not documented.
<b>6.3 Acquire data according to the experiment plan</b>	Procedures were followed and any procedural changes required are justified and explained.	Procedures were mostly followed and any procedural changes required are noted.	Procedures were mostly followed, but changes made are not clearly described and explained.	Procedures were not followed.
<b>6.4 Analyze and interpret data</b>	Analysis is thorough and there are no errors. Analysis goes above and beyond the experiment plan.	Analysis is mostly complete and follows experiment plan. Many methods for analysis are used with only a few errors.	Analysis is incomplete. A few methods for analysis are used, but there are many errors.	Analysis is poorly performed or missing.

**EGR 2024 and 2024L Assessment Method: Lab Report (Past)**

PLO6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
Students are able to follow instructions	No mistakes	Few mistakes, mostly follows instructions	Some mistakes, some confusion following instructions	Many mistakes, clearly does not follow instructions
Students are able to carry out the experiment from instructions	No mistakes	Few mistakes, mostly correct experimental setup	Some mistakes, some confusion with experimental setup	Many mistakes, wrong experimental setup
Data is accurately recorded	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some confusion with data	Many mistakes, data is not organized or labeled properly

**EGR 2024 and 2024L Assessment Method: Lab Report (Past)**

PLO6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
Analyze experimental data	Arrives at significant results of the experiment from data and identifies key features in data	Arrives at significant results of the experiment from data	Arrives at some of the significant results of the experiment from data	Does not analyze data or incorrectly analyzes data
Draw conclusions from data	Significant conclusions of the experiment are stated and further inferences are made from data	Significant conclusions of the experiment are stated	Some Significant conclusions of the experiment are stated	No conclusions stated or inaccurate conclusions from data

**EGR 2024L Assessment Method: Lab Report (Past)**

PLO3: Students will demonstrate an ability to communicate effectively with a range of audiences.

- Students will be able to speak about their work with precision, clarity, and organization. (CC: OC)
- Students will be able to write about their work with precision, clarity and organization. (CC: WC)
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (CC: IL)

PLO6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
<b>3.</b> Students will be able to write a lab report that accurately summarizes the experiment and the results.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
<b>6.</b> Students will be able to carry out an experiment based on instructions and accurately record data.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
<b>6.</b> Students will be able to analyze experimental data and draw conclusions.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized

**PHY 3004L Assessment Method: Lab Report**

PLO3: Students will demonstrate an ability to communicate effectively with a range of audiences.

- Students will be able to speak about their work with precision, clarity, and organization. (CC: OC)
- Students will be able to write about their work with precision, clarity and organization. (CC: WC)
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (CC: IL)

PLO6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

<b>Criteria</b>	<b>4 – Excellent</b>	<b>3 – Good</b>	<b>2 – Fair</b>	<b>1 – Poor</b>
<b>3.</b> Students will be able to write a lab report that accurately summarizes the experiment and the results.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized
<b>6.</b> Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources of error.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized

### EGR 3053L Assessment Method: Lab Report

PLO3: Students will demonstrate an ability to communicate effectively with a range of audiences

- Students will be able to speak about their work with precision, clarity, and organization. (CC: OC)
- Students will be able to write about their work with precision, clarity and organization. (CC: WC)
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand. (CC: IL)

PLO6: Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CC: QR)

Criteria	4 – Excellent	3 – Good	2 – Fair	1 – Poor
6. Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources of error.	No mistakes	Few mistakes, mostly clear and organized	Some mistakes, some ambiguity	Many mistakes, writing is ambiguous and not organized

### EGR 3123 Assessment Method: Lab Report

6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CC: QR)

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>6.2 Develop an experiment plan</b>	All relevant variables and externalities are identified. A data collection procedure is formulated and explained in detail without being unnecessarily complicated.	Almost all variables are identified. Data collection procedures are formulated adequately, but do not account for all externalities.	Some variables are identified, but some key variables are missing. A data collection procedure is described, but details required to accurately reproduce the experiment are missing.	The majority of key variables are not identified. A data collection procedure is incomplete, unclear, or not documented.
<b>6.3 Acquire data according to the experiment plan</b>	Procedures were followed and any procedural changes required are justified and explained.	Procedures were mostly followed and any procedural changes required are noted.	Procedures were mostly followed, but changes made are not clearly described and explained.	Procedures were not followed.
<b>6.4 Analyze and interpret data</b>	Analysis is thorough and there are no errors. Analysis goes above and beyond the experiment plan.	Analysis is mostly complete and follows experiment plan. Many methods for analysis are used with only a few errors.	Analysis is incomplete. A few methods for analysis are used, but there are many errors.	Analysis is poorly performed or missing.
<b>6.5 Use engineering judgement to draw conclusions</b>	Thorough consideration given from an engineering perspective to draw the most probable outcome and conclusion	Reasonable conclusion provided	Incomplete conclusions; not well thought out.	No conclusion or probable outcome provided

## Physics and Engineering

**Learning Outcome:** ABET #7: Students will demonstrate an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

### Outcome Measures and Criteria for Success:

Course	Outcome Assessed	Assessment Method	Threshold	Frequency
EGR1023 EGR1023L	Students will be able to analyze the quality of information found using an online search.	Homework Assignment	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR3083	Students will be able to acquire and use knowledge not in a textbook for the development of their project (EE)	Faculty Team Assessment of Final Project (Open House Demo)	At least 80% of the students will score 2.5 or higher on the associated rubric	Odd Fall
EGR4043 (New Assessment beginning 2026-27)	Students will be able to acquire and use knowledge not in a textbook for the development of their project (ME and EE)	Faculty Team Assessment of Final Project (Open House Demo)	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall
EGR4072	Students will be able to acquire and use knowledge not in a textbook for the development of their project.	Faculty/Review Team Assessment of Project Proposal	At least 80% of the teams will score 2.5 or higher on the associated rubric	Annually
EGR4082	Student reflection on preparation to acquire and apply new knowledge.	Senior Survey (Indirect Method)	80% of the respondents will say that they are satisfied or higher	Annually
EGR4092 (New Assessment beginning 2026-27)	Students will be able to articulate and reflect on what new skills they developed during their internship (all)	Internship Report	At least 80% of the students will score 2.5 or higher on the associated rubric	Even Fall

### Longitudinal Data:

Note that the PHE department changed assessment processes to align with ABET expectations for engineering curriculum. This includes the collection of both formative and summative data which is included here.

EGR1023 (Formative)	Percent of Students at 2.5 or Higher		
	2025-26		
7.1 Identify knowledge gaps	100%		
7.2 Students will be able to select appropriate resources for learning	100%		
7.4 Students will be able to apply new knowledge effectively	67%		

EGR1023 (Formative)	Percent of Students at 2.5 or Higher		
	2022-23	2023-24	2024-25
<i>Students will be able to analyze the quality of information found using an online search.</i>	79%	100%	75%

EGR3083 (Summative)	Percent of Students at 2.5 or Higher		
	2025-26		
7.1 Identify knowledge gaps	94%		
7.2 Students will be able to select appropriate resources for learning	78%		
7.4 Students will be able to apply new knowledge effectively	89%		

EGR4072 (Summative)	Percent of Students at 2.5 or Higher						
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Students will be able to acquire and use knowledge not in a textbook for the development of their project.	54%	40%	91%	100%	100%	100%	100%

EGR4082 (Student Survey)	Percentage of Students Indicating Satisfied or Higher			
	2022-23	2023-24	2024-25	2025-26
How well do you feel that you have been prepared to: [Acquire and apply new knowledge as needed, using appropriate learning strategies.]	N/A	100%	86%	75%

**Conclusions Drawn from Data:**

EGR1023 did well in identifying knowledge gaps and finding appropriate resources for learning, however they struggled to effectively implement this into their final project design.  
 EGR3083 did well in identifying knowledge gaps and applying new learning, however were struggling to distinguish professional from rudimentary sources for research.  
 EGR4082 self-reported data is under our expected threshold. This is surprising since the entire class is a year long project on a topic entirely new and outside of common textbooks.

**Changes to be Made Based on Data:**

None. Continue to monitor progress.

**Rubrics:**

EGR1023 – Attached

EGR3083 -- Attached

EGR4072 – This is one component of the survey used by the group of faculty and working professionals who review students’ projects.

EGR4082 – This data will come from an exit survey given to seniors. This question was not asked in the 2022-23 survey but has been added for the 2023-24 survey.

**EGR 1023 Assessment Method: Homework Assignment**

7. Students will demonstrate an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>7.1</b> Identify knowledge gaps	Independently identifies specific knowledge gaps with comprehensive self-awareness. Precisely articulates what needs to be learned and why.	Identifies most relevant knowledge gaps with reasonable self-awareness. Can articulate what needs to be learned.	Identifies some knowledge gaps but may miss important areas. Limited self-awareness of learning needs.	Fails to identify significant knowledge gaps or demonstrates poor awareness of learning needs.
<b>7.2</b> Students will be able to select appropriate resources for learning	Consistently selects optimal resources for acquiring knowledge. Demonstrates excellent judgment in resource selection.	Selects appropriate resources for most learning tasks. Shows good judgment in resource selection.	Selects basic resources but may miss more effective options.	Consistently selects inappropriate or inadequate resources.
<b>7.4</b> Students will be able to apply new knowledge effectively	Expertly applies newly acquired knowledge to solve problems or improve processes. Demonstrates deep understanding through integration with existing knowledge.	Effectively applies new knowledge to address engineering problems or tasks. Shows good integration with existing knowledge.	Application of new knowledge is basic or partially effective. Limited integration with existing knowledge.	Unable to effectively apply new knowledge to relevant tasks or problems.

**EGR 1023 Assessment Method: Homework Assignment (Past)**

PLO7: Students will demonstrate an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Outcome Assessed	Excellent (4)	Good (3)	Fair (2)	Poor (1)
Students will be able to analyze the quality of information found using an online search.	The student clearly and accurately differentiated between high-quality and low-quality information.	The student made one small error in discerning the quality of the information.	The student struggled with discerning the quality of the information.	The student is unable to differentiate between high-quality and low-quality information.

**EGR 3083 Assessment Method: Faculty Team Assessment of Final Project**

**7.** Students will demonstrate an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Outcome Assessed	Exemplary (4)	Satisfactory (3)	Developing (2)	Unsatisfactory (1)
<b>7.1</b> Identify knowledge gaps	Independently identifies specific knowledge gaps with comprehensive self-awareness. Precisely articulates what needs to be learned and why.	Identifies most relevant knowledge gaps with reasonable self-awareness. Can articulate what needs to be learned.	Identifies some knowledge gaps but may miss important areas. Limited self-awareness of learning needs.	Fails to identify significant knowledge gaps or demonstrates poor awareness of learning needs.
<b>7.2</b> Students will be able to select appropriate resources for learning	Consistently selects optimal resources for acquiring knowledge. Demonstrates excellent judgment in resource selection.	Selects appropriate resources for most learning tasks. Shows good judgment in resource selection.	Selects basic resources but may miss more effective options.	Consistently selects inappropriate or inadequate resources.
<b>7.4</b> Students will be able to apply new knowledge effectively	Expertly applies newly acquired knowledge to solve problems or improve processes. Demonstrates deep understanding through integration with existing knowledge.	Effectively applies new knowledge to address engineering problems or tasks. Shows good integration with existing knowledge.	Application of new knowledge is basic or partially effective. Limited integration with existing knowledge.	Unable to effectively apply new knowledge to relevant tasks or problems.