

## Engineering Program Assessment Plan

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

| Course              | Outcome Assessed                                                                                                                                        | Assessment Method | Threshold                                                                      | Frequency        |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------|------------------|
| EGR2014<br>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 | Annually         |
| EGR2024<br>EGR2024L | 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 | Annually         |
| EGR3034<br>EGR3034L | Students will be able to set up a problem with the appropriate variables and solve the problem (ME)                                                     | Exam Question     | At least 80% of the students will score 2.5 or higher on the associated rubric | Alternating Year |
| EGR4063             | 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 | Alternating Year |
| EGR4103             | Students will be able to apply a theoretical model to calculate a solution to a problem using appropriate computational techniques/software (EE and CE) | Exam Question     | At least 80% of the students will score 2.5 or higher on the associated rubric | Alternating Year |
| 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 | Annually         |

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.**

| Course              | Outcome Assessed                                                                                                                                                                                                                                                                                                                          | Assessment Method                                          | Threshold                                                                   | Frequency        |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------|------------------|
| EGR1023<br>EGR1023L | 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 | Annually         |
| EGR2024<br>EGR2024L | 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)       | 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 | Annually         |
| EGR3093<br>EGR3093L | 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 | Alternating Year |

|         |                                                                                                                                                                                                                                                                                                                                           |                                                            |                                                                             |                  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------|------------------|
| EGR3113 | 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 | Alternating Year |
| EGR4072 | Student design teams will be able to successfully implement an engineering design process to identify a feasible solution to a problem (all)                                                                                                                                                                                              | 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 (all)                                       | 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 (all)                                                                                                                                                                                                                               | Faculty/Review Team Assessment of Project Proposal         | At least 80% of the teams will score 2.5 or higher on the associated rubric | Annually         |

3.

**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)**

| Course              | Outcome Assessed                                                                                                                                                | Assessment Method | Threshold                                                                      | Frequency        |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------|------------------|
| EGR2014<br>EGR2014L | (WC)<br>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 | Annually         |
| EGR2024<br>EGR2024L | (IL)<br>Students will be able to appropriately identify, locate, evaluate, and effectively and responsibly use and cite information for the final project (all) | Final Report      | At least 80% of the students will score 2.5 or higher on the associated rubric | Annually         |
| EGR2024<br>EGR2024L | (WC)<br>Students will be able to write a report with appropriate figures, tables, equations, and formatting (all)                                               | Final Report      | At least 80% of the students will score 2.5 or higher on the associated rubric | Annually         |
| EGR3034<br>EGR3034L | (WC)<br>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 | Alternating Year |
| EGR3053<br>EGR3053L | (WC)<br>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 | Alternating Year |

|         |                                                                                                                                                  |                                                            |                                                                                |                  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------|------------------|
| EGR3113 | (OC)<br>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 of Final Project (Open House Demo) | At least 80% of the students will score 2.5 or higher on the associated rubric | Alternating Year |
| EGR4082 | (OC)<br>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)<br>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)<br>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         |
| EGR4103 | (WC)<br>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 | Alternating Year |

**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**

| Course              | Outcome Assessed                                                                                                                                                                                                                | Assessment Method                                                | Threshold                                                                      | Frequency |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------|
| EGR1023<br>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) (all)       | Homework Assignment or Exam Question                             | At least 80% of the students will score 2.5 or higher on the associated rubric | Annually  |
| EGR2014<br>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) (ME and EE) | Homework Assignment or Exam Question                             | At least 80% of the students will score 2.5 or higher on the associated rubric | Annually  |
| EGR2024<br>EGR2024L | 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 | Annually  |
| EGR4072             | Students will be able to describe the role of engineering ethics, professional responsibility and the impact of contexts in their project (all)                                                                                 | Faculty/Review Team Assessment of Proposal                       | 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 (all)                                                                                                     | Senior Survey (Indirect Method)                                  | 80% of the respondents will say that they are satisfied or higher              | Annually  |
| EGR4092             | Students will be able to determine an ethical response to a hypothetical engineering problem, acknowledging the impact of their solutions in                                                                                    | 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 | Annually  |

|  |                                                                              |  |  |  |
|--|------------------------------------------------------------------------------|--|--|--|
|  | the context of the problem (global, economic, environmental, societal) (all) |  |  |  |
|--|------------------------------------------------------------------------------|--|--|--|

**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**

| Course              | Outcome Assessed                                                                                                                                                                                                                 | Assessment Method                                              | Threshold                                                                      | Frequency        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------|------------------|
| EGR1023<br>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 (all)       | 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<br>EGR3034L | 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 (ME)        | 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 |
| EGR3093<br>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 (EE and CE) | 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 |
| EGR3113             | 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 (ME and EE) | 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                                                                                     | Homework Assignment to Complete                                | At least 80% of the students will score 2.5 or higher on the associated        | Annually         |

|         |                                                                                                                                                                                                                            |                                                                |                                                                                |          |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------|----------|
|         | inclusive environment, establish goals, plan tasks, and meet objectives (all)                                                                                                                                              | Evaluation of Each Team Member                                 | rubric                                                                         |          |
| 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 (all) | 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 (all)                                                                                                                                                               | Senior Survey (Indirect Method)                                | 80% of the respondents will say that they are satisfied or higher              | Annually |

**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)**

| Course              | Outcome Assessed                                                                                                                                                    | Assessment Method   | Threshold                                                                      | Frequency        |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------|------------------|
| EGR2014<br>EGR2014L | Students will be able to carry out an experiment based on instructions and accurately record data (ME and EE)                                                       | Procedures Document | At least 80% of the students will score 2.5 or higher on the associated rubric | Annually         |
| EGR2014<br>EGR2014L | Students will be able to analyze experimental data and draw conclusions (ME and EE)                                                                                 | Lab Report          | At least 80% of the students will score 2.5 or higher on the associated rubric | Annually         |
| EGR3113             | 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          | At least 80% of the students will score 2.5 or higher on the associated rubric | Alternating Year |

|                     |                                                                                                                                                              |                                 |                                                                                |                  |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------|------------------|
| EGR3123<br>EGR3123L | Students will be able to compare experimental results to appropriate theoretical models and explain differences, including quantifying sources or error (ME) | Lab Worksheet                   | At least 80% of the students will score 2.5 or higher on the associated rubric | Alternating Year |
| EGR4082             | Student reflection on preparation to conduct experiments and interpret data (all)                                                                            | Senior Survey (Indirect Method) | 80% of the respondents will say that they are satisfied or higher              | Annually         |

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

| Course              | Outcome Assessed                                                                                                      | Assessment Method                                          | Threshold                                                                      | Frequency        |
|---------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------|------------------|
| EGR1023<br>EGR1023L | Students will be able to acquire and use knowledge not in a textbook for the development of their project (all)       | Homework Assignment                                        | At least 80% of the students will score 2.5 or higher on the associated rubric | Annually         |
| 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 | Alternating Year |
| EGR4043<br>EGR4043L | 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 | Alternating Year |
| EGR4072             | Students will be able to acquire and use knowledge not in a textbook for the development of their project (all)       | 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 (all)                                            | Senior Survey (Indirect Method)                            | 80% of the respondents will say that they are satisfied or higher              | Annually         |
| EGR4092             | Students will be able to articulate and reflect on what new skills they                                               | Internship Report                                          | At least 80% of the teams will score 2.5 or higher on                          | Annually         |

|  |                                         |  |                       |  |
|--|-----------------------------------------|--|-----------------------|--|
|  | developed during their internship (all) |  | the associated rubric |  |
|--|-----------------------------------------|--|-----------------------|--|

PLNU is thankful for the assistance from Calvin University and Olivet Nazarene University in providing models for constructing an assessment plan that meets ABET standards. Our task was made easier by reviewing the good work of these two schools.