# SACS Assessment Report for Master of Engineering (ME) Program

| **Degree: Master of Engineering (ME)**<br>2023-2024 Assessment Report | | |
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| | **Student Learning Outcome #1** | Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. |
| **PLAN** | **Assessment Method(s)** | (1) Comprehensive Exam<br>(2) Student Survey<br><br>Assessment rubrics are provided in Appendix A, and student survey problems are shown in Appendix B. |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | For the reporting period, 71 students graduated and were assessed in the ME program.<br><br>All students were evaluated by a comprehensive exam committee consisting of three faculty members, based on specific outcomes using standardized rubrics found in Appendix A. The assessment instruments included performance in the comprehensive exam administered during the students' graduating semester.<br><br>Additionally, the students were asked to reflect on their abilities for each indicator related to SLO #1 by completing a survey found in Appendix B.<br><br>• Comprehensive Exam results: 85.4% proficiency, with an average score of 3.18 for SLO1.<br>• Student survey results: 99.3% proficiency, with an average score of 3.49 for SLO1.<br><br>Detailed results are listed below. |

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| **S T U D Y** | **Analysis of Results** | Overall, 85.4% of the students achieved proficiency through the direct assessment of the comprehensive exam, while 99.3% achieved proficiency through the indirect assessment of the student survey.<br><br>The majority of students scored well above the minimum acceptable proficiency level. The students reflected favorably in the self-assessment survey and expressed overall satisfaction with SLO1. |
| **ACT** | **Improvement Plan for 2024-2025** | With passing scores in all performance indicators, we do not anticipate major changes. However, to advance the program and meet the demand for improved learning, continuous improvement is essential to increase overall scores for PIs of the SLO. For the next academic year, the following improvement steps are proposed:<br><br>• Present findings to department faculty to ensure that all courses rigorously promote and evaluate students' abilities to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.<br>• Evaluate where in the ME curriculum more open-ended projects requiring the skills presented in SLO #1 can be incorporated for maximum impact and coverage.<br>• Provide clear language in the syllabi as to the student learning outcomes and expectations associated.<br>• Develop and offer more courses aligned with current industrial needs and advancements.<br>• Provide students with more opportunities to collaborate directly with industry through site visits and invited talks.<br><br>Refer to the individual department reports in the Appendix for the results and improvement plans of each department. |

| **Degree: Master of Engineering (ME)**<br>2023-2024 Assessment Report | | |
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| | **Student Learning Outcome #2** | Students will demonstrate an ability to apply engineering design to produce solutions appropriately. |
| **PLAN** | **Assessment Method(s)** | (1) Comprehensive Exam<br>(2) Student Survey<br><br>Assessment rubrics are provided in Appendix A, and student survey problems are shown in Appendix B. |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | For the reporting period, 71 students graduated and were assessed in the ME program.<br><br>All students were evaluated by a comprehensive exam committee consisting of at least three faculty members, based on specific outcomes using standardized rubrics found in Appendix A. The assessment instruments included performance in the comprehensive exam administered during the students' graduating semester.<br><br>Additionally, the students were asked to reflect on their abilities for each indicator related to SLO #2 by completing a survey found in Appendix B.<br><br>• Comprehensive Exam results: 86.4% proficiency, with an average score of 3.26 for SLO2.<br>• Student Survey results: 94.6% proficiency, with an average score of 3.26 for SLO2. |
| **S T U D Y** | **Analysis of Results** | Overall, 86.4% of the students achieved proficiency through the direct assessment of the comprehensive exam, while 94.6% achieved proficiency through the indirect assessment of the student survey.<br><br>The majority of students scored well above the minimum acceptable proficiency level. The students reflected favorably in the self-assessment survey and expressed overall satisfaction with SLO2. |

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| **ACT** | **Improvement Plan for 2024-2025** | With passing scores in all performance indicators, we do not anticipate major changes. However, to advance the program and meet the demand for improved learning, continuous improvement is essential to increase overall scores for PIs of the SLO. For the next academic year, the following improvement steps are proposed:<br>• Present findings to department faculty to ensure that all courses rigorously promote the ability to apply engineering design to produce solutions appropriately.<br>• Ensure efforts are made to clearly identify faculty and department expectations regarding good engineering design and clear presentation of results in a meaningful manner.<br>• Provide clear language in the syllabi as to the student learning outcomes and expectations associated.<br>• Develop and offer more courses aligned with current industrial needs and advancements.<br>• Provide students with more opportunities to collaborate directly with industry through site visits and invited talks.<br>Refer to the individual department reports in the Appendix for the results and improvement plans of each department. |

| **Degree: Master of Engineering (ME)**<br>2023-2024 Assessment Report | | |
|---|---|---|
| | **Student Learning Outcome #3** | Students will demonstrate an ability to use modern engineering tools to produce engineering analysis in a systematic manner. |
| **PLAN** | **Assessment Method(s)** | (1) Comprehensive Exam<br>(2) Student Survey<br><br>Assessment rubrics are provided in Appendix A, and student survey problems are shown in Appendix B. |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | For the reporting period, 71 students graduated and were assessed in the ME program.<br><br>All students were evaluated by a comprehensive exam committee consisting of at least three faculty members, based on specific outcomes using standardized rubrics found in Appendix A. The assessment instruments included performance in the comprehensive exam administered during the students' graduating semester.<br><br>Additionally, the students were asked to reflect on their abilities for each indicator related to SLO #3 by completing a survey found in Appendix B.<br><br>• Comprehensive Exam results: 83.4% proficiency, with an average score of 3.14 for SLO3.<br>• Student Survey results: 97.7% proficiency, with an average score of 3.14 for SLO3. |
| **S T U D Y** | **Analysis of Results** | Overall, 83.4% of the students achieved proficiency through the direct assessment of the comprehensive exam, while 97.7% achieved proficiency through the indirect assessment of the student survey.<br><br>The majority of students scored well above the minimum acceptable proficiency level. The students reflected favorably in the self-assessment survey and expressed overall satisfaction with SLO3. |

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| **ACT** | **Improvement Plan for 2024-2025** | With passing scores in all three PI categories for SLO1, we don't anticipate major changes. However, to keep with the advancement in the industry and demand for improved learning, it is important the program maintain continuous improvement to increase the overall scores for PIs and for SLO3. For the next academic year, the following improvement steps are proposed:<br>• Present findings to department faculty to ensure that all courses rigorously promote the ability to apply engineering design to produce solutions appropriately.<br>• Provide clear language in the syllabi as to the student learning outcomes and expectations associated.<br>• Provide access and utilization of modern tools/techniques in internally offered courses to ensure effective student coverage.<br>• Develop and offer more courses aligned with the current industrial needs and advancements.<br>• The College of Engineering planed a $1M remodel of Cherry building classrooms to unify technology for improved teaching in Spring 2024.<br><br>Refer to the individual department reports in the Appendix for the results and improvement plans of each department. |

# Detailed ME Program Data

| Comp Exam | | COE Average | COE Prof % |
|---|---|---|---|
| Outcome 1 | a | 3.22 | 85.4% |
| | b | 3.14 | 83.9% |
| | c | 3.20 | 86.9% |
| | **Overall** | **3.18** | **85.4%** |
| Outcome 2 | a | 3.29 | 88.1% |
| | b | 3.33 | 89.4% |
| | c | 3.18 | 81.6% |
| | **Overall** | **3.26** | **86.4%** |
| Outcome 3 | a | 3.14 | 83.9% |
| | b | 3.14 | 82.8% |
| | **Overall** | **3.14** | **83.4%** |

| Student Survey | | COE Average | COE Prof % |
|---|---|---|---|
| Outcome 1 | a | 3.51 | 100.0% |
| | b | 3.43 | 97.8% |
| | c | 3.51 | 100.0% |
| | **Overall** | **3.49** | **99.3%** |
| Outcome 2 | a | 3.29 | 90.0% |
| | b | 3.33 | 97.8% |
| | c | 3.18 | 96.0% |
| | **Overall** | **3.26** | **94.6%** |
| Outcome 3 | a | 3.14 | 97.7% |
| | b | 3.14 | 97.7% |
| | **Overall** | **3.14** | **97.7%** |

# Appendix A
# Faculty Evaluation Rubrics

**Performance Indicators and Rubrics for Outcome #1:**

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

| **Performance Indicator** | **Excellent**<br><br>**4** | **Good**<br><br>**3** | **Satisfactory**<br><br>**2** | **Unsatisfactory**<br><br>**1** |
|---|---|---|---|---|
| **(a) Identify complex engineering problems by applying proper engineering, science, and mathematical principles.** | Identify and fully describe complex engineering problems using correct specifications, design variables, and proper constraints. | Identify and describe complex engineering problems but may have missing specifications, design variables, and proper constraints | Partially identify and describe complex engineering problems missing some specifications/design variables/proper constraints | Cannot Identify and describe complex engineering problems using specifications, design variables, and proper constraints |
| **(b) Formulate the complex engineering problem by applying proper engineering, science, and mathematical principles.** | Formulate the complex problem *mathematically by application of* engineering and science theories and principles without mistakes. | Formulate the problems *mathematically by application of* engineering and science theories and principles with minor mistakes. | Model the problems *mathematically by application of* engineering and science theories and principles with mistakes and errors. | Cannot formulate the problem *mathematically by application of* engineering and science theories and principles |
| **(c) Solve the problem by applying proper engineering, science, and mathematical principles.** | Effectively apply the engineering problem solving procedure: mathematical modeling, solution method, interpretation of results | Essentially apply the engineering problem solving procedure: mathematical modeling, solution method, interpretation of results | Reasonably apply the engineering problem solving procedure: mathematical modeling, solution method, interpretation of results | Cannot follow correctly the engineering problem solving procedures at all. |

**Performance Indicators and Rubrics for Outcome #2:**

An ability to apply engineering design to produce solutions appropriately.

| Performance Indicator | Excellent<br>4 | Good<br>3 | Satisfactory<br>2 | Unsatisfactory<br>1 |
|---|---|---|---|---|
| **(a) Identify the requirement and constraints in the design of the system** | Include a complete analysis on the needs of customer and end-users. Engineering specifications and realistic constraints are completely listed. | The needs of customer and end-users are included. The engineering and realistic constraints are listed without missing the critical ones. | The essential needs of customer and end-users are included. The engineering and realistic constraints are listed but not completely. | The needs of customer and end-users are not considered. The engineering and realistic constraints are not specified. |
| **(b) Application of the detailed processes and skills in design** | Apply effectively the engineering design process, explore the alternative design options, evaluate the design alternatives, identify and choose the final design. | Reasonably address all the following items: engineering design process, alternative designs, evaluation of design alternatives, and identification of final design. | May not address one of the following items: engineering design process, alternative designs, evaluation of design alternatives, and identification of final design. | Many of the following items are not included: engineering design process, alternative designs, evaluation of design alternatives, and identification of final design. |
| **(c) Finalize designs based on the need, constraints and economic analyses** | Demonstrate effective use of engineering and economic analyses, standards and codes to satisfy design objectives and real-world constraints. | Include all the following items: engineering analysis, economic analysis, standards and codes. | May not include one of the following items: engineering analysis, economic analysis, standards and codes. | Do not include many of the followings: engineering analysis, economic analysis, standards and codes. |

**Performance Indicators and Rubrics for Outcome #3:**

An ability to use modern engineering tools to produce engineering analysis in a systematic manner.

| Performance Indicator | Excellent<br>4 | Good<br>3 | Satisfactory<br>2 | Unsatisfactory<br>1 |
|---|---|---|---|---|
| **(a) Ability of using modern engineering tools** | Clearly demonstrated ability to use modern engineering tools | Demonstrated some ability to use modern engineering tools | Demonstrated minimal ability to use modern engineering tools | Does not demonstrate ability to use modern engineering tools |
| **(b) Quality of analysis** | Clearly demonstrates ability to show results of engineering analysis in a high-quality fashion | Demonstrates ability to show results of engineering analysis in generally good quality | Demonstrates minimal ability to show results of engineering analysis, quality compromised | Does not demonstrate ability to show results of engineering analysis in an acceptable quality |

# Appendix B
# Student Surveys

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

**Survey Questions:**

1. **Problem Identification (1a):** How confident are you in your ability to identify complex engineering problems within a given scenario?
    - Very Confident
    - Confident
    - Not Very Confident
    - Not Confident at All
2. **Problem Formulation (1b)**: How confident are you in your ability to identify complex engineering problems within a given scenario?
    - Very Comfortable
    - Comfortable
    - Uncomfortable
    - Very Uncomfortable
3. **Problem Solving (1c):** How well do you think you can solve complex engineering problems using the principles of engineering, science, and mathematics?
    - Very Well
    - Well
    - Poorly
    - Very Poorly
4. **Application of Principles:** To what degree do you believe you apply engineering, science, and mathematical principles effectively when solving complex problems?
    - To a Great Degree
    - To a Moderate Degree
    - Rarely
    - Never
5. **Suggestions for Improvement:** Do you have any suggestions for how the curriculum or teaching methods could be improved to enhance your ability to identify, formulate, and solve complex engineering problems?

**Outcome 2**: An ability to apply engineering design to produce solutions appropriately.

**Survey Questions:**

1. **Consideration of Requirement and Constraints (2a):** In your design projects, how well do you consider constraints such as code and standards, budget, time, and resources?
    - Very Well
    - Well
    - Poorly
    - Very Poorly
2. **Application of Design Process (2b):** To what extent have you applied the engineering design process to produce solutions in your coursework or projects?
    - Extensively
    - Moderately
    - Minimally
    - Not at All
3. **Satisfaction with Design Outcomes (2c):** How satisfied are you with the outcomes of your engineering design projects?
    - Very Satisfied
    - Satisfied
    - Neutral
4. **Suggestions for Improvement:** Do you have any suggestions for how the curriculum or teaching methods could be improved to enhance your ability to apply engineering design to produce solutions?

**Outcome 3**: An ability to use modern engineering tools to produce engineering analysis in a systematic manner.

**Survey Questions:**

1. **Proficiency with Modern Engineering Tools and Software (3a):** How proficient do you consider yourself in using modern engineering tools and software for analysis?
    - Very Proficient
    - Proficient
    - Somewhat Proficient
    - Not Proficient
2. **Application of Tools (3b):** To what extent have you applied modern engineering tools to conduct systematic engineering analyses in your coursework or projects?
    - Extensively
    - Moderately
    - Minimally
    - Not at All
3. **Suggestions for Improvement:** Do you have any suggestions for how the curriculum or teaching methods could be improved to enhance your ability to use modern engineering tools for systematic engineering analysis?

# Appendix C
# Individual Department Reports

# SACS Assessment Plan for Master of Engineering (ME) Program- Chemical Engineering

| **Degree: Master of Engineering (ME) – Chemical Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #1** | Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. |
| **PLAN** | **Assessment Method(s)** | (3) Comprehensive Exam<br>(4) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | SEE BELOW |
| **STUDY** | **Analysis of Results** | SEE BELOW |
| **ACT** | **Improvement Plan for 2024-2025** | SEE BELOW |

## Student Learning Outcome (SLO) #1

### Results of Assessment – SLO #1

Per the approved assessment plan, SLO #1 states the following:

> *Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*

As such, faculty administering a comprehensive exam were asked to evaluate each tested student on the SLO based the rubric found in Appendix A. The results of the faculty evaluations are below:

| **Faculty Evaluations (Comprehensive Exam)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 1a | 94.1% | 5.9% | 3.41 |
| 1b | 85.3% | 14.7% | 3.24 |
| 1c | 85.3% | 14.7% | 3.29 |
| **Overall** | **76.5%** | **23.5%** | **3.31** |

All students were evaluated 1 to 3 times in each indicator, depending on each faculty member's ability to provide reasonable and useful performance evaluation on each topic. The numbers presented are summary statistics.

Additionally, the students were asked to reflect on their own abilities on the for each indicator related to SLO #1 by completing a survey found in Appendix B. The results of the student self-assessments are below:

| **Student Self-Evaluations (Survey)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 1a | 100.0% | 0.0% | 3.35 |
| 1b | 92.9% | 7.1% | 3.29 |
| 1c | 100.0% | 0.0% | 3.36 |
| **Overall** | **92.9%** | **7.1%** | **3.33** |

All students were evaluated in each indicator. The numbers presented are summary statistics.

The two evaluation methods were combined to determine the result below:

| **Student Learning Outcome #1 – Combined Result** | | |
|---|---|---|
| Proficiency % | Non-Proficiency % | Average Score |
| 81.2% | 18.8% | 3.32 |

**Analysis of Results – SLO #1**

Per above section, proficiency as indicated by the combined results is 81.2%. This indicates an acceptable level of proficiency overall for the students completing the ME degree in chemical engineering.

Not unexpectedly, the students considered their preparation and overall performance to be higher than the faculty indicated. However, when looking at the average PI score, the difference is significantly less. This indicates that misalignment between faculty and student scoring was occurring on an individual basis. This likely arises from the individual desire not to give themselves an unsatisfactory score.

Looking deeper into the PI scores individually, there is room to improve in all three categories.

**Improvement Plan – SLO #1**

With passing scores in all three PI categories, there are likely to be few if any paradigm shifts in how to present the SLO #1 related materials. That being said, it is necessary that the program maintain continuous improvement to increase the overall proficiency rates and overall PI scores for the SLO. To that end, the following improvement steps are proposed:

- Present findings to department faculty to ensure that all courses internally (required or elective) rigorously promote and evaluate students' abilities to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Evaluate where in the ME internal curriculum that more open-ended projects requiring the skills presented in SLO #1 can be incorporated for maximum impact and coverage.
- Evaluate that classes taken externally to the department meet the demands of SLO #1
- Work with College of Engineering partners to ensure acceptable rigor related to SLO #1 across all disciplines associated with the shared degree.

| **Degree: Master of Engineering (ME) – Chemical Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #2** | Students will demonstrate an ability to apply engineering design to produce solutions appropriately. |
| **PLAN** | **Assessment Method(s)** | (3) Comprehensive Exam<br>(4) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | SEE BELOW |
| **S T U D Y** | **Analysis of Results** | SEE BELOW |
| **ACT** | **Improvement Plan for 2024-2025** | SEE BELOW |

## Student Learning Outcome (SLO) #2

### Results of Assessment – SLO #2

Per the approved assessment plan, SLO #2 states the following:

> *Students will demonstrate an ability to apply engineering design to produce solutions appropriately.*

As such, faculty administering a comprehensive exam were asked to evaluate each tested student on the SLO based the rubric found in Appendix A. The results of the faculty evaluations are below:

| Faculty Evaluations (Comprehensive Exam) | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 2a | 90.6% | 9.4% | 3.22 |
| 2b | 78.6% | 21.4% | 3.14 |
| 2c | 81.8% | 18.2% | 3.05 |
| **Overall** | **75.0%** | **25.0%** | **3.13** |

All students were evaluated 1 to 3 times in each indicator, depending on each faculty member's ability to provide reasonable and useful performance evaluation on each topic. The numbers presented are summary statistics.

Additionally, the students were asked to reflect on their own abilities on the for each indicator related to SLO #2 by completing a survey found in Appendix B. The results of the student self-assessments are below:

| Student Self-Evaluations (Survey) | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 2a | 100.0% | 0.0% | 3.50 |
| 2b | 92.9% | 7.1% | 3.43 |
| 2c | 100.0% | 0.0% | 3.29 |
| **Overall** | **92.9%** | **7.1%** | **3.40** |

All students were evaluated in each indicator. The numbers presented are summary statistics.

The two evaluation methods were combined to determine the result below:

| Student Learning Outcome #2 – Combined Result | | |
|---|---|---|
| Proficiency % | Non-Proficiency % | Average Score |
| 80.4% | 19.6% | 3.08 |

**Analysis of Results – SLO #2**

Per above section, proficiency as indicated by the combined results is 80.4%. This indicates an acceptable level of proficiency overall for the students completing the ME degree in chemical engineering.

Not unexpectedly, the students considered their preparation and overall performance to be higher than the faculty indicated. The difference becomes even more pronounced when looking at the average PI score. This indicates an overall lack of student understanding of department and faculty expectations related to SLO #2. A lack of clear communications related to the outcomes are a potential cause, indicating a need for better presentation of faculty expectations.

Looking deeper into the PI scores individually, there is significant room for improvement and need to ensure scores do not decrease in future semesters.

**Improvement Plan – SLO #2**

With passing scores in all three PI categories, instinct is to not make significant changes in the curriculum. However, with the severe misalignment in student and faculty evaluations indicates that changes need to be made. These changes are likely to go beyond material presented in courses and lean more heavily on how materials are presented to ensure students understand fully the importance of the material and expectations as to their competency and proficiency beyond just grades. It is necessary that the program maintain continuous improvement to increase the overall proficiency rates and overall PI scores for the SLO. To that end, the following improvement steps are proposed:

- Present findings to department faculty to ensure that all courses internally (required or elective) rigorously promote the ability to apply engineering design to produce solutions appropriately.
- Ensure efforts are made to clearly identify faculty and department expectations as to good engineering design, linear solution development, and clear presentation of results in a meaningful manner.
- Evaluate that classes taken externally to the department meet the demands associated with good engineering design.
- Work with College of Engineering partners to ensure acceptable rigor related to SLO #2 across all disciplines associated with the shared degree.

| **Degree: Master of Engineering (ME) – Chemical Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #3** | Students will demonstrate an ability to use modern engineering tools to produce engineering analysis in a systematic manner. |
| **PLAN** | **Assessment Method(s)** | (1) Comprehensive Exam<br>(2) Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | SEE BELOW |
| **S T U D Y** | **Analysis of Results** | SEE BELOW |
| **ACT** | **Improvement Plan for 2024-2025** | SEE BELOW |

## Student Learning Outcome (SLO) #3

### Results of Assessment – SLO #3

Per the approved assessment plan, SLO #3 states the following:

> *Students will demonstrate an ability to use modern engineering tools to produce engineering analysis in a systematic manner.*

As such, faculty administering a comprehensive exam were asked to evaluate each tested student on the SLO based the rubric found in Appendix A. The results of the faculty evaluations are below:

| Faculty Evaluations (Comprehensive Exam) | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 3a | 81.8% | 18.2% | 3.15 |
| 3b | 84.4% | 15.6% | 3.09 |
| **Overall** | **78.8%** | **21.2%** | **3.13** |

All students were evaluated 1 to 3 times in each indicator, depending on each faculty member's ability to provide reasonable and useful performance evaluation on each topic. The numbers presented are summary statistics.

Additionally, the students were asked to reflect on their own abilities on the for each indicator related to SLO #3 by completing a survey found in Appendix B. The results of the student self-assessments are below:

| Student Self-Evaluations (Survey) | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 3a | 92.3% | 7.7% | 3.38 |
| 3b | 92.3% | 7.7% | 3.46 |
| **Overall** | **84.6%** | **15.4%** | **3.42** |

All students were evaluated in each indicator. The numbers presented are summary statistics.

The two evaluation methods were combined to determine the result below:

| Student Learning Outcome #3 – Combined Result | | |
|---|---|---|
| Proficiency % | Non-Proficiency % | Average Score |
| 80.4% | 19.6% | 3.15 |

### Analysis of Results – SLO #3

Per above section, proficiency as indicated by the combined results is 80.4%. This indicates an acceptable level of proficiency overall for the students completing the ME degree in chemical engineering.

Not unexpectedly, the students considered their preparation and overall performance to be higher than the faculty indicated. The difference becomes even more pronounced when looking at the average PI score. This indicates not only an overall lack of student understanding of department and faculty expectations related to SLO #3, but also a potential disconnect in what is considered modern tools and systematic method of solving a problem. When taken into consideration with the results of SLO #2, a lack of understanding of what a good engineering design and systematic solution may be the issue. This reflects again on a potential lack of clear communications related to the outcomes, thus indicating a need for better presentation of faculty expectations and modern tool utilization.

Looking deeper into the PI scores individually, there is significant room for improvement and need to ensure scores do not decrease in future semesters.

**Improvement Plan – SLO #3**

As with previous SLOs, passing scores in all three PI categories tends to promote a degree of complacency. However, we again see the severe misalignment in student and faculty evaluations. This indicates that changes need to be made either in what is being utilized and presented or in how we communicate those expectations to students. These changes are likely to go beyond not just material presented in courses but also on how materials are presented to ensure students understand fully the importance of the modern techniques/tools and expectations as to their competency and proficiency. It is necessary that the program maintain continuous improvement to increase the overall proficiency rates and overall PI scores for the SLO. To that end, the following improvement steps are proposed:

- Present findings to department faculty to ensure that all courses internally (required or elective) rigorously promote the ability to apply engineering design to produce solutions appropriately.
- Provide clear language in the syllabi of internal courses as to the student learning outcomes and expectations associated.
- Provide access and utilization of modern tools/techniques in internally offered courses to ensure effective student coverage.
- Evaluate that classes taken externally to the department to see what modern tools and techniques are being used. If a course appears to not meet the needs of SLO #3, then internal coverage becomes even more critical.
- Work with College of Engineering partners to ensure acceptable rigor related to SLO #3 across all disciplines associated with the shared degree.

# SACS Assessment Plan for Master of Engineering (ME) Program- Civil Engineering

| **Degree: Master of Engineering (ME) – Civil Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #1** | Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. |
| **PLAN** | **Assessment Method(s)** | (5) Comprehensive Exam<br>(6) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | For the reporting period 8 students graduated in the Civil Engineering ME program.<br>Average comprehensive score for SLO 1 is **3.48** (Appendix A_ Assessment rubric)<br>Average student survey score for SLO 1 is **3.58**<br>(Appendix B_ Student Survey)<br>All students were evaluated 2 times in each indicator, by committee of a minimum two faculty members. Assessment instruments are the performance in comprehensive exam.<br>Additionally, the students were asked to reflect on their own abilities on the for each indicator related to SLO #1 by completing a survey found in Appendix B. |

| | | |
|---|---|---|
| **S T U D Y** | **Analysis of Results** | 100% of the students achieved the proficiency mentioned above.<br><br>Majority of the students scored well above the minimum acceptable proficiency level. The student reflected favorably to the self-assessment in the survey. Overall, the students expressed satisfaction for SLO1. |
| **ACT** | **Improvement Plan for 2024-2025** | With passing scores in all three PI categories for SLO1, we don't anticipate major changes. However, to keep with the advancement in the industry and demand for improved learning, it is important the program maintain continuous improvement to increase the overall scores for PIs and for SLO. For the next academic year, the following improvement steps are proposed:<br><br>• Present the findings to the department faculty and maintain and ensure the rigor of all courses.<br>• Develop and offer more courses aligned with the current industrial needs and advancements.<br>• Provide wide variety of courses using adjuncts.<br>• Improve the curriculum using more interdisciplinary project-based modules (based on student surveys) |

| **Degree: Master of Engineering (ME) – Civil Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #2** | Students will demonstrate an ability to apply engineering design to produce solutions appropriately. |
| **PLAN** | **Assessment Method(s)** | (5) Comprehensive Exam<br>(6) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | For the reporting period 8 students graduated in the Civil Engineering ME program.<br>Average comprehensive score for SLO 2 is **3.54** (Appendix A_ Assessment rubric)<br>Average student survey score for SLO 2 is **3.50**<br>(Appendix B_ Student Survey)<br>All students were evaluated 2 times in each indicator, by committee of a minimum two faculty members. Assessment instruments are the performance in comprehensive exam.<br>Additionally, the students were asked to reflect on their own abilities on the for each indicator related to SLO #2 by completing a survey found in Appendix B. |
| **S T U D Y** | **Analysis of Results** | **Analysis of Results – SLO #2**<br>100% of the students achieved the proficiency mentioned above.<br>Majority of the students scored well above the minimum acceptable proficiency level. The student reflected favorably to the self-assessment in the survey. Overall, the students expressed satisfaction for SLO2.related to the outcomes are a potential cause, indicating a need for better presentation of faculty expectations. |

| | | |
|---|---|---|
| **ACT** | **Improvement Plan for 2024-2025** | **Improvement Plan – SLO #2**<br><br>With passing scores in all three PI categories for SLO2, we don't anticipate major changes. However, to keep with the advancement in the industry and demand for improved learning, it is important the program maintain continuous improvement to increase the overall scores for PIs and for SLO. For the next academic year, the following improvement steps are proposed:<br><br>• Present the findings to the department faculty and maintain and ensure the rigor of all courses.<br>• Develop and offer more courses aligned with the current industrial needs and advancements.<br>• Provide wide variety of courses using adjuncts.<br>• Improve the curriculum using more interdisciplinary project-based modules (based on student surveys)<br>• Provide the students more opportunity to collaborate directly with the industry through site visits and invited talks (based on student surveys). |

| **Degree: Master of Engineering (ME) – Civil Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #3** | Students will demonstrate an ability to use modern engineering tools to produce engineering analysis in a systematic manner. |
| **PLAN** | **Assessment Method(s)** | (3) Comprehensive Exam<br>(4) Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | For the reporting period 8 students graduated in the Civil Engineering ME program.<br>Average comprehensive score for SLO 3 is **3.38** (Appendix A_ Assessment rubric)<br>Average student survey score for SLO 3 is **3.43**<br>(Appendix B_ Student Survey)<br>All students were evaluated 2 times in each indicator, by committee of a minimum two faculty members. Assessment instruments are the performance in comprehensive exam.<br>Additionally, the students were asked to reflect on their own abilities on the for each indicator related to SLO #1 by completing a survey found in Appendix B. |
| **S T U D Y** | **Analysis of Results** | 100% of the students achieved the proficiency mentioned above.<br>Majority of the students scored well above the minimum acceptable proficiency level. The student reflected favorably to the self-assessment in the survey. Overall, the students expressed satisfaction for SLO3.related to the outcomes are a potential cause, indicating a need for better presentation of faculty expectations. |
| **ACT** | **Improvement Plan for 2024-2025** | **Improvement Plan – SLO #3** |

| | | |
|---|---|---|
| | | With passing scores in all three PI categories for SLO1, we don't anticipate major changes. However, to keep with the advancement in the industry and demand for improved learning, it is important the program maintain continuous improvement to increase the overall scores for PIs and for SLO3. For the next academic year, the following improvement steps are proposed:<br>• Present the findings to the department faculty and maintain and ensure the rigor of all courses.<br>• Develop and offer more courses aligned with the current industrial needs and advancements.<br>• Provide wide variety of courses using adjuncts.<br>• Improve the curriculum using more interdisciplinary project-based modules (based on student surveys)<br>• Provide access and utilization of modern tools/techniques in internally offered courses to ensure effective student coverage. |

# SACS Assessment Plan for Master of Engineering (ME) Program-EE Department

| **Degree: Master of Engineering (ME)**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #1** | Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. |
| **PLAN** | **Assessment Method(s)** | (7) Comprehensive Exam<br>(8) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | Comprehensive Exam: 100%<br>Student Survey: 100% |
| **STUDY** | **Analysis of Results** | The results met the target for this SO. |
| **ACT** | **Improvement Plan for 2024-2025** | No actions are required.<br>General actions were implemented/proposed to further improve the program as described at the end. |

| **Degree: Master of Engineering (ME)**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #2** | Students will demonstrate an ability to apply engineering design to produce solutions appropriately. |

| | | |
|---|---|---|
| **PLAN** | **Assessment Method(s)** | (1) Comprehensive Exam<br>(2) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | Comprehensive Exam: 100%<br>Student Survey: 100% |
| **STUDY** | **Analysis of Results** | The results met the target for this SO. |
| **ACT** | **Improvement Plan for 2024-2025** | No actions are required.<br>General actions were implemented/proposed to further improve the program as described at the end. |

| **Degree: Master of Engineering (ME)**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #3** | Students will demonstrate an ability to use modern engineering tools to produce engineering analysis in a systematic manner. |
| **PLAN** | **Assessment Method(s)** | (1) Comprehensive Exam<br>(2) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | Comprehensive Exam: 100%<br>Student Survey: 100% |

| | | |
|---|---|---|
| **S T U D Y** | **Analysis of Results** | The results met the target for this SO. |
| **ACT** | **Improvement Plan for 2024-2025** | No actions are required.<br>General actions were implemented/proposed to further improve the program as described at the end. |

***General Actions for Improvement for the Overall Program:***

- In October 2023, a proposal was submitted to the Texas Higher Education Coordinating Board to establish a new Bachelor of Science Degree in Computer Engineering program in the Department of Electrical Engineering, and consequently change the name of the Department to "Department of Electrical and Computer Engineering." These requests were approved on December 20, 2023, to be effective January 1, 2024. We have ME/MES and DE in Engineering with an emphasis in Computer Engineering. We expect that having undergraduate program will also benefit the graduate program by increasing the enrollment, and also having new faculty with degrees and research expertise Computer Engineering. Therefore, we propose to have more MES thesis and DE dissertation projects started for 2024-2025.

- Multiple graduate students requested that more courses related to the subjects of computer engineering, the emerging AI and Machine Learning. With one or two new faculty in Computer Engineering program are being hired in the ECE department, we expect to offer some new graduate-level courses in the computer engineering for 2024-2025, especially related to AI and machine learning available. By this, more choices in graduate courses are available for the students to make them more prepared for the job market.

- In Spring 2024, the college of engineering planned significant remodeling of all classrooms in Cherry building with an approximate budget close about $1M. The purpose is to unify the technology used in the classrooms to allow for the best teaching method for on-campus and online students and make it easy for the faculty to move from one classroom to another. Taking this opportunity, we plan to further enhance the ECE classrooms by purchasing more advanced equipment such as larger touch screens, wireless microphones, presentation remote clickers.

# SACS Assessment Plan for Master of Engineering (ME) Program- Industrial Engineering

| **Degree: Master of Engineering (ME) – Chemical Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #1** | Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. |
| **PLAN** | **Assessment Method(s)** | (9) Comprehensive Exam<br>(10) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | SEE BELOW |
| **S T U D Y** | **Analysis of Results** | SEE BELOW |
| **ACT** | **Improvement Plan for 2024-2025** | SEE BELOW |

## Student Learning Outcome (SLO) #1

### Results of Assessment – SLO #1

Per the approved assessment plan, SLO #1 states the following:

> *Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*

As such, faculty administering a comprehensive exam were asked to evaluate each tested student on the SLO based the rubric found in Appendix A. The results of the faculty evaluations are below:

| **Faculty Evaluations (Comprehensive Exam)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 1a | 80% | 20% | 3.2 |
| 1b | 86.7% | 13.3% | 3.0 |
| 1c | 86.7% | 13.3% | 3.07 |
| **Overall** | **80.0%** | **20.0%** | **3.09** |

All students were evaluated 1 to 3 times in each indicator, depending on each faculty member's ability to provide reasonable and useful performance evaluation on each topic. The numbers presented are summary statistics.

Additionally, the students were supposed to asked to reflect on their own abilities on the for each indicator related to SLO #1 by completing a survey found in Appendix B. We did not collect the student self-assessments data this year.

| **Student Self-Evaluations (Survey)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 1a | | | |
| 1b | | | |
| 1c | | | |
| **Overall** | | | |

All students were evaluated in each indicator. The numbers presented are summary statistics.

The two evaluation methods were combined to determine the result below:

| **Student Learning Outcome #1 – Combined Result** | | |
|---|---|---|
| Proficiency % | Non-Proficiency % | Average Score |
| 80% | 20% | 3.09 |

**Analysis of Results – SLO #1**

Per above section, proficiency as indicated by the combined results is 80%. This indicates an acceptable level of proficiency overall for the students completing the ME degree in Industrial engineering.

Looking deeper into the PI scores individually, there is room to improve in all three categories.

**Improvement Plan – SLO #1**

With passing scores in all three PI categories, there are likely to be few if any paradigm shifts in how to present the SLO #1 related materials. That being said, it is necessary that the program maintain continuous improvement to increase the overall proficiency rates and overall PI scores for the SLO. To that end, the following improvement steps are proposed:

- Present findings to department faculty to ensure that all courses internally (required or elective) rigorously promote and evaluate students' abilities to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Evaluate where in the ME internal curriculum that more open-ended projects requiring the skills presented in SLO #1 can be incorporated for maximum impact and coverage.
- Work with College of Engineering partners to ensure acceptable rigor related to SLO #1 across all disciplines associated with the shared degree.

| **Degree: Master of Engineering (ME) – Industrial Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #2** | Students will demonstrate an ability to apply engineering design to produce solutions appropriately. |
| **PLAN** | **Assessment Method(s)** | (7) Comprehensive Exam<br>(8) Student Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | SEE BELOW |
| **S T U D Y** | **Analysis of Results** | SEE BELOW |
| **ACT** | **Improvement Plan for 2024-2025** | SEE BELOW |

**Student Learning Outcome (SLO) #2**

**Results of Assessment – SLO #2**

Per the approved assessment plan, SLO #2 states the following:

> *Students will demonstrate an ability to apply engineering design to produce solutions appropriately.*

As such, faculty administering a comprehensive exam were asked to evaluate each tested student on the SLO based the rubric found in Appendix A. The results of the faculty evaluations are below:

| **Faculty Evaluations (Comprehensive Exam)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 2a | 86.7% | 13.3% | 3.2 |
| 2b | 93.3% | 6.7% | 3.33 |
| 2c | 80% | 20% | 3.07 |
| **Overall** | **86.7%** | **13.3%** | **3.2** |

All students were evaluated 1 to 3 times in each indicator, depending on each faculty member's ability to provide reasonable and useful performance evaluation on each topic. The numbers presented are summary statistics.

Additionally, the students were supposed to asked to reflect on their own abilities on the for each indicator related to SLO #1 by completing a survey found in Appendix B. We did not collect the student self-assessments data this year.

| **Student Self-Evaluations (Survey)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 2a | | | |
| 2b | | | |
| 2c | | | |
| **Overall** | | | |

All students were evaluated in each indicator. The numbers presented are summary statistics.

The two evaluation methods were combined to determine the result below:

| **Student Learning Outcome #2 – Combined Result** | | |
|---|---|---|
| Proficiency % | Non-Proficiency % | Average Score |
| 86.7% | 13.3% | 3.2 |

**Analysis of Results – SLO #2**

Per above section, proficiency as indicated by the combined results is 86.7%. This indicates an acceptable level of proficiency overall for the students completing the ME degree in Industrial engineering.

Looking deeper into the PI scores individually, there is significant room for improvement and need to ensure scores do not decrease in future semesters.

**Improvement Plan – SLO #2**

With passing scores in all three PI categories, instinct is to not make significant changes in the curriculum. It is necessary that the program maintain continuous improvement to increase the overall proficiency rates and overall PI scores for the SLO. To that end, the following improvement steps are proposed:

- Present findings to department faculty to ensure that all courses internally (required or elective) rigorously promote the ability to apply engineering design to produce solutions appropriately. Ensure efforts are made to clearly identify faculty and department expectations as to good engineering design, linear solution development, and clear presentation of results in a meaningful manner.
- Evaluate that classes taken externally to the department meet the demands associated with good engineering design.
- Work with College of Engineering partners to ensure acceptable rigor related to SLO #2 across all disciplines associated with the shared degree.

| **Degree: Master of Engineering (ME) – Industrial Engineering**<br>2023-2024 Assessment Plan | | |
|---|---|---|
| | **Student Learning Outcome #3** | Students will demonstrate an ability to use modern engineering tools to produce engineering analysis in a systematic manner. |
| **PLAN** | **Assessment Method(s)** | (5) Comprehensive Exam<br>(6) Survey |
| | **Proficiency** | Minimum acceptable is 3 out of 4 |
| **DO** | **Benchmark** | 75% of students achieve the proficiency mentioned above |
| | **Results of Assessment** | SEE BELOW |
| **S T U D Y** | **Analysis of Results** | SEE BELOW |
| **ACT** | **Improvement Plan for 2024-2025** | SEE BELOW |

**Student Learning Outcome (SLO) #3**

**Results of Assessment – SLO #3**

Per the approved assessment plan, SLO #3 states the following:

> *Students will demonstrate an ability to use modern engineering tools to produce engineering analysis in a systematic manner.*

As such, faculty administering a comprehensive exam were asked to evaluate each tested student on the SLO based the rubric found in Appendix A. The results of the faculty evaluations are below:

| **Faculty Evaluations (Comprehensive Exam)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 3a | 86.7% | 13.3% | 3.07 |
| 3b | 93.3% | 6.7% | 3.2 |
| **Overall** | **93.3%** | **7.7%** | **3.13** |

All students were evaluated 1 to 3 times in each indicator, depending on each faculty member's ability to provide reasonable and useful performance evaluation on each topic. The numbers presented are summary statistics.

Additionally, the students were supposed to asked to reflect on their own abilities on the for each indicator related to SLO #1 by completing a survey found in Appendix B. We did not collect the student self-assessments data this year.

| **Student Self-Evaluations (Survey)** | | | |
|---|---|---|---|
| Performance Indicator | Proficiency % | Non-Proficiency % | Average Score |
| 3a | | | |
| 3b | | | |
| **Overall** | | | |

All students were evaluated in each indicator. The numbers presented are summary statistics.

The two evaluation methods were combined to determine the result below:

| **Student Learning Outcome #3 – Combined Result** | | |
|---|---|---|
| Proficiency % | Non-Proficiency % | Average Score |
| 93.3% | 7.7% | 3.13 |

**Analysis of Results – SLO #3**

Per above section, proficiency as indicated by the combined results is 93.3%. This indicates an acceptable level of proficiency overall for the students completing the ME degree in Industrial engineering.

Looking deeper into the PI scores individually, there is significant room for improvement and need to ensure scores do not decrease in future semesters.

**Improvement Plan – SLO #3**

As with previous SLOs, passing scores in all three PI categories tends to promote a degree of complacency. It is necessary that the program maintain continuous improvement to increase the overall proficiency rates and overall PI scores for the SLO. To that end, the following improvement steps are proposed:

- Present findings to department faculty to ensure that all courses internally (required or elective) rigorously promote the ability to apply engineering design to produce solutions appropriately.
- Provide clear language in the syllabi of internal courses as to the student learning outcomes and expectations associated.
- Provide access and utilization of modern tools/techniques in internally offered courses to ensure effective student coverage.
- Evaluate that classes taken externally to the department to see what modern tools and techniques are being used. If a course appears to not meet the needs of SLO #3, then internal coverage becomes even more critical.
- Work with College of Engineering partners to ensure acceptable rigor related to SLO #3 across all disciplines associated with the shared degree.