

### **Summary of Continuous Improvement Efforts since Last Report**

The department conducted assessments for the three student learning outcomes listed in the table below and the results are listed here. SLO#1 was assessed in MEEN3311, Fluid Mechanics, MEEN4313, Thermal Systems Design, and MEEN4316, and Engineering Design Projects. Similarly, SLO#2 was assessed in MEEN 3310, Heat Transfer, MEEN4323, Mechanical Design 2, and MEEN4316. Finally, SLO#3 was assessed in MEEN3311, MEEN4110, Seminar, and MEEN 4316. Continuous improvement triggers have been found and plans have been devised by the faculty to address low scoring performance indicators. Previous year's assessments have shown some shortcomings in the performance of the students especially on SLO#2. Three rubrics (see Appendix) are used to assess the outcomes and are attached at the end of this document. Following is an example of our assessment findings. The students' average performance was found to be 86% on SLO#1, 83% on SLO# 2, and 95% on SLO#3 which are well above the targeted threshold of 75%.

### **Program Highlights Since Last Report**

Starting Fall 2024, a new curriculum will be implemented where 2 new courses are introduced to teach students design and programming skills during the sophomore year. The two courses, MEEN 2112 (Intro to programming) and MEEN 2213 (Intro to design), will be taken during the first semester of the sophomore year. Three new labs have been created and furnished with state-of-the-art equipment to support these courses and other courses in the curriculum.

**Degree: Bachelor Science in Mechanical Engineering**  
2023-2024 Assessment Plan

	<b>Student Learning Outcome #1</b>	Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
<b>PLAN</b>	<b>Assessment Method(s)</b>	Assessment of this outcome was conducted in MEEN 3311 and 4313 in Fall 2023 and in MEEN 4316 in Spring 2024. This outcome is assessed using project reports in MEEN 3311 and 4313, and senior design reports and presentations in MEEN 4316. The following 3 performance indicators are used in the assessment of SLO #1: (a) Identify complex engineering problems by applying proper engineering, science, and mathematical principles, (b) Formulate the complex engineering problem by applying proper engineering, science, and mathematical principles, (c) Solve the problem by applying proper engineering, science, and mathematical principles.
	<b>Proficiency</b>	Students must score 75% or above on the selected assignments/reports/exams or a 2 on a 1-4 Likert scale. Rubrics are designed for this outcome which uses both a percentage and a Likert Scale (see Appendix).
<b>DO</b>	<b>Benchmark</b>	80% of the students must receive a score at or above the proficiency.
	<b>Results of Assessment</b>	In MEEN 3311, the students performed well on all performance indicator with an average of 93% which is well above the threshold of 75%. In MEEN 4313, the students performed well on performance indicators “a” and “b” (success rate was (83%), but not as well on “c” (success rate was 77%); i.e., barely above the threshold of 75%. Finally, the students’ performance on SLO#1 in MEEN 4316 was very good with an average success rate of 96%.

S T U D Y	<b>Analysis of Results</b>	The data show that the students performed well on all performance indicators associated with SLO #1 in all three courses and on all performance indicators.
<b>ACT</b>	<b>Improvement Plan for 2024-2025</b>	

**Degree: Bachelor Science in Mechanical Engineering**  
2023-2024 Assessment Plan

	<b>Student Learning Outcome #2</b>	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
<b>PLAN</b>	<b>Assessment Method(s)</b>	This outcome is assessed using project reports in MEEN 3310, final exam in MEEN4323 and final reports in MEEN4316. The following 3 performance indicators were used in the assessment of SLO #2: (a) Identify the requirement and constraints in the design of the system, (b) Application of the detailed processes and skills in design, (c) Finalize designs based on the need, constraints and economic analyses.
	<b>Proficiency</b>	Students must score 75% or above on the selected assignments/reports/exams or a 2 on a 1-4 Likert scale. Rubrics are designed for this outcome which uses both a percentage and a Likert Scale (see Appendix).
<b>DO</b>	<b>Benchmark</b>	80% of the students must receive a score at or above the proficiency level or above.
	<b>Results of Assessment</b>	This outcome is assessed using project reports in MEEN 3310, final exam in MEEN4323 and final reports in MEEN4316. See Table 1 for assessment results.
<b>S T U D Y</b>	<b>Analysis of Results</b>	Based on the assessment results from MEEN 4323 in Fall 2023, it was observed that students performed slightly below the expected threshold of 75% on performance indicator “c” for SLO #2: “Finalize designs based on the need, constraints and economic analyses.” The success rate was 74% and therefore, the faculty was requested to discuss these results in a department meeting to assess if there is a trend or simply data noise. In addition, the faculty was required to propose possible solutions to the low performance which are described in the “Actions” section.

<b>ACT</b>	<b>Improvement Plan for 2024-2025</b>	<p>Although the success rate of 74% was very close to the passing threshold in MEEN 4323, the faculty proposed the following to be implemented in the course during the 2024 Fall semester:</p> <ol style="list-style-type: none"><li>1. Give a course project which has no nontrivial solutions where engineering and scientific principles will be used in the decision-making process.</li><li>2. Give a help session to explain the requirements of the project with particular emphasis on performance indicator “c” requirements.</li></ol>
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**Degree: Bachelor Science in Mechanical Engineering**  
2023-2024 Assessment Plan

	<b>Student Learning Outcome #3</b>	Students will demonstrate an ability to communicate effectively with a range of audiences
<b>PLAN</b>	<b>Assessment Method(s)</b>	This outcome is assessed using reports/assignments in MEEN 4110, Seminar, and final reports in MEEN4316- Engineering Design Project. The following performance indicators will be used in the assessment of SLO #3: (a) Presentations are professional, clear, well-organized, free of language errors, (b) Presentations engage audiences with appropriate language and skillful use of visual aids, (c) Interact with audience in presentation, (d) Information is organized with well-constructed headings and paragraphs.
	<b>Proficiency</b>	Students must score 75% or above on the selected assignments/reports/exams or a 2 on a 1-4 Likert scale. Rubrics are designed for this outcome which uses both a percentage and a Likert Scale (see Appendix).
<b>DO</b>	<b>Benchmark</b>	80% of the students must receive a score at or above the proficiency level or above.
	<b>Results of Assessment</b>	Assessment was conducted in MEEN 3311 and 4110, Fall 2023 and in MEEN 4316 in Spring 2024. See Table 1 for assessment results.
<b>S T U D Y</b>	<b>Analysis of Results</b>	The average students' scores in all three courses were found to be above 90% on all performance indicators which indicates excellent performance by our students.

<b>ACT</b>	<b>Improvement Plan for 2024-2025</b>	
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Table 1: Assessment Results for AY2023-2024

		Fall 2023											Spring 2024						
		course 1			course 3			Course 4			course 5			course 6			Course 7		
		MEEN 3311			MEEN 4110			MEEN 4313			MEEN 4323			MEEN 3310			MEEN 4316		
		Fluid Mech.			Seminar			Therm. Sys			Mech. Desg. II			Heat Trans.			Senior Des. II		
Outcome #	PI #	<	=	>	<	=	>	<	=	>	<	=	>	<	=	>	<	=	>
1	a	2	7	49				9	8	34							0	34	20
	b	4	5	49				8	13	30							4	34	16
	d	4	6	48				12	5	34							4	38	12
2	a										9	25	16	12	18	22	0	31	23
	b										8	31	11	12	21	19	4	34	16
	c										7	24	19	12	20	20	4	20	30
3	a	6	1	51	0	4	25										0	21	33
	b	6	1	51	0	4	25										0	19	35
	c	7	0	51	0	4	25										0	14	40
	d	7	0	51	0	2	27										0	15	39

“< “: number of students less than threshold; "=": number of students at threshold, "<": number of students above threshold.



## Appendix A

### Performance Indicators for Outcome 1

SLO# 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics				
Performance Indicator	Excellent 4	Good 3	Satisfactory 2	Unsatisfactory 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 <i>mathematically by application of</i> engineering and science theories and principles without mistakes.	Formulate the problems <i>mathematically by application of</i> engineering and science theories and principles with minor mistakes.	Model the problems <i>mathematically by application of</i> engineering and science theories and principles with mistakes and errors.	Cannot formulate the problem <i>mathematically by application of</i> 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 for Outcome 2

SLO# 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				
Performance Indicator	Excellent 4	Good 3	Satisfactory 2	Unsatisfactory 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 for Outcome 3

SLO# 3: an ability to communicate effectively with a range of audiences				
Performance Indicator	Excellent 4	Good 3	Satisfactory 2	Unsatisfactory 1
(a) Deliver a professional presentation with proper format and style	Presentations are professional, clear, well-organized, free of language errors	Presentations are mostly professional, clear and organized. There could be some minor language errors.	Presentations are somewhat professional, not always clear and organized, some language errors	Presentations are not professional, difficult to follow, and main points are difficult to identify, many language errors
(b) Apply the proper skills and tools in presentation	Presentations engage audiences with appropriate language and skillful use of visual aids.	Properly using appropriate language and some use of visual aids.	Not always using appropriate language and some use of visual aids.	Inappropriate language are used and, no evidence of the use of visual aids.
(c) Interact with audience in presentation	Presentation demeanor and response to audience is consistently professional and respectful.	Presentation demeanor and response to audience is generally professional and respectful.	Presentation demeanor and response to audience is somewhat professional and respectful.	Presentation demeanor and response to audience is not at all professional and respectful.
(d) Organize the information in writing with proper format and style	Information is organized with well-constructed headings and paragraphs. Data are effectively presented in figures and tables. There are no grammatical, spelling or punctuation errors.	Information is organized with constructed headings and paragraphs. Figures and tables are used. There are some minor grammatical, spelling or punctuation errors.	Information is organized but not well constructed. Figures and tables are used but not very accurately. There are some grammatical, spelling or punctuation errors.	Information is not well organized. Figures and tables are missing or in a wrong format. There are many grammatical, spelling or punctuation errors.