Assurance of Student Learning Reflection 2024-2025	
Ogden College of Science and Engineering	*School of Engineering & Applied Sciences*
Master of Science in Engineering Management 0447	
Assessment Coordinator: John Khouryieh	
Is this an online program? ☒ Yes ☐ No	Please make sure the Program Learning Outcomes listed match those in CourseLeaf. Indicate verification here ☒ Yes, they match! (If they don't match, explain on this page under **Evaluation)**

Instructions: For the 2024-25 assessment, we are asking you to reflect on the last three-year cycle rather than collect data. It's important to take time to look over the results from the last assessment cycle and really focus on a data-informed direction going forward. In collaboration with your assessment team and program faculty, review each submitted template from 2021-2024 and consider the following for each Program Learning Outcome, add your narrative to the template, and submit the draft to your ASL Rep by May 15, 2025.

Program Student Learning Outcome 1	
Program Student Learning Outcome	Demonstrate the knowledge and capacity to apply managerial/ leadership principles and practices to appropriate situations.
Evaluation	SLO1 is still relevant based on the last three assessment cycles. This outcome remains aligned with the goals of the program, particularly in preparing students for professional certification and practical leadership roles in engineering management. It is directly evaluated through the ATMAE Certified Technology Manager (CTM) Exam, a nationally recognized and standardized assessment tool. The CTM exam provides objective, quantifiable data on student performance across key managerial domains. Measurement Instruments Used: • Instrument 1: CTM exam questions in Leadership and Self-Management • Instrument 2: CTM exam questions in People • Instrument 3: CTM exam questions in Quality and Risk These instruments collectively assess the students' ability to apply leadership and management principles in diverse operational contexts. The outcome uses a measurable verb ("Demonstrate"), which aligns with Bloom's Taxonomy (application level). The phrase "apply managerial/leadership principles" emphasizes higher-order thinking and practical skill deployment. The outcome is not double or triple-barreled, though it integrates both "managerial" and "leadership" aspects—these are often overlapping in practice and thus considered part of a coherent construct in this context. The program maintains a manageable number of SLOs that can be assessed regularly and meaningfully. SLO1 is a core and essential outcome that underpins the professional readiness of graduates and is therefore a priority in assessment cycles.
Measurement Instruments	Yes, the instruments currently used—Certified Technology Manager (CTM) exam questions in the categories of *Leadership*, *Self-Management*, *People*, *Quality*, and *Risk*—directly assess the application of managerial and leadership knowledge**.** These categories are mapped closely to the outcome's intent and are validated by a nationally recognized certification exam, lending credibility and alignment. This is a direct measure, as students' responses on the CTM exam questions provide tangible evidence of their ability to apply leadership and managerial principles. The CTM exam is an appropriate artifact because it offers standardized assessment of applied knowledge in a real-world context. It also provides comparative national benchmarks. The CTM exam, as a proctored and standardized test, is relatively insulated from the misuse of AI tools like ChatGPT. Currently, the CTM exam does not use a rubric per se, as it is a multiple-choice exam with objective scoring. So, there is no rubrics used for SLO1.
Criteria & Targets	The Criteria for Success for SLO1 currently states that graduate students must achieve an average performance in each Certified Technology Manager (CTM) exam category (e.g., Leadership, Self-Management, People, Quality, Risk) that exceeds the established passing threshold of

	60%. Our target is ≥60% average in each domain for at least 70% of students. This benchmark is derived from the national average across more than 100 ATMAE-accredited programs and reflects expectations aligned with industry-recognized certification standards.
Results & Conclusion	The results were generally in line with expectations. Graduate students consistently achieved average scores at or above the 60% passing threshold in the relevant Certified Technology Manager (CTM) exam categories, including *Leadership*, *Self-Management*, *People*, *Quality*, and *Risk*. This indicates that students are effectively acquiring and applying the managerial and leadership principles targeted by SLO1. One notable outcome was the consistency of student performance across multiple CTM domains, particularly in *Leadership* and *self Management*. Conclusions: The curriculum remained well-aligned with the Certified Technology Manager (CTM) exam domains, particularly in *Leadership*, *Self-Management*, and *Quality*. This alignment ensured that students were adequately prepared for the national certification exam and contributed to consistent pass rates above the 60% benchmark. The use of case studies, project-based assignments, and applied leadership scenarios in core courses helped reinforce real-world application of managerial principles, which directly supports the learning outcome.
****IMPORTANT - Plans for Next Assessment Cycle**:	As we work hard to improve our assessment practices and make them more meaningful and effective, it's important each program craft a three-year plan for the following assessment cycle (2025-26, 2026-27, 2027-28) – this process assists in "closing the loop." For example, you may decide to: • collect a more appropriate artifact • create new program outcomes • adjust targets because they are consistently exceeded or not met • need to reconstruct your curriculum map • sequencing of classes might need to be adjusted, or additional class(es) provided Whatever your plan is, provide a narrative, in future tense, that indicates how you will approach future assessments. You will be expected to implement any needed changes before the next assessment cycle. Three-Year Assessment Plan for SLO1 (2025–2028): Over the next three assessment cycles, we will implement a structured plan to enhance the assessment and instructional effectiveness related to SLO1: Demonstrate the knowledge and capacity to apply managerial/leadership principles and practices to appropriate situations. Our plan focuses on refining measurement, enriching instruction, and ensuring continued alignment with industry expectations and national benchmarks. Based on data gathered from the previous year, we will adjust course sequencing to better scaffold leadership competencies. For example, foundational leadership and self-management principles will be taught earlier in the program. We will also review and possibly adjust performance targets, raising them where appropriate if students continue to consistently exceed the current benchmark of 60%. We will conduct a comprehensive review of student performance data, comparing CTM scores, in-course assessments, and course grades to evaluate the impact of our curriculum on SLO1. Results will be used to determine whether additional adjustments are needed and to inform the next three-year cycle.

Program Student Learning Outcome 2	
Program Student Learning Outcome	Graduates will possess/ demonstrate the ability to identify, formulate, and solve technical problems

Evaluation	Using the last three assessment cycles, is this program learning outcome still relevant, or should it be changed? Other things to examine: Is the outcome measurable? Is it double or triple barreled? Does it include measurable verbs following Bloom's Taxonomy? SLO2 is highly relevant and continues to align with both the academic goals of the Engineering Management program and the expectations of industry. The ability to identify, formulate, and solve technical problems is a core competency for graduates entering management roles in technical environments. This outcome also aligns with ATMAE standards and the essential functions of a Certified Technology Manager. SLO2 is evaluated using three direct measurement instruments from the Certified Technology Manager (CTM) Exam: • **Instrument 1:** CTM *"Systems"* category (18 questions) – Assesses the ability to manage integrated technological systems across disciplines. • **Instrument 2:** CTM *"Processes"* category (19 questions) – Evaluates understanding and application of technical process management and optimization. • **Instrument 3:** CTM *"Operations"* and *"Projects"* categories (19 questions each) – Measures capability to manage and solve problems related to operational and project-based technological challenges. While SLO2 includes three actions—*identify*, *formulate*, and *solve*—these components are not arbitrarily combined. They reflect an integrated engineering problem-solving methodology, consistent with frameworks such as: • PDSA (Plan-Do-Study-Act) Cycle • Six Sigma DMAIC (Define-Measure-Analyze-Improve-Control) Methodology These methodologies inherently require the sequential ability to identify problems, formulate them analytically, and implement solutions. These skills are taught cohesively across multiple courses in the program, including: • Lean Systems • Six Sigma • Quality Management Therefore, this outcome should not be separated, as doing so would compromise its alignment with industry-standard practices and instructional methodology. The verbs identify, formulate, and solve align with Bloom's cognitive levels: • Identify → Analysis • Formulate → Synthesis • Solve → Application/Evaluation These verbs are appropriate for graduate-level education and support authentic, performance-based assessment.
Measurement Instruments	The current instruments effectively measure the learning outcome. The CTM Exam categories—Systems, Processes, Operations, and Projects—are directly aligned with the cognitive and practical skills embedded in technical problem-solving. Each category assesses distinct stages of problem identification, formulation, and resolution, consistent with engineering methodologies like Six Sigma DMAIC and PDSA cycles, which are taught in core courses. For example: • The "Processes" category evaluates process analysis and formulation—key to problem identification and definition. • The "Projects" and "Operations" categories assess the ability to implement and manage technical solutions. • The "Systems" category gauges the student's ability to understand and integrate multiple elements of a technical problem in a business or enterprise context. These exam categories act as valid, nationally normed direct measures, providing quantitative data that informs both instructional success and curriculum alignment. This is a direct measure. The CTM exam quantitatively assesses student performance on technical knowledge and problem-solving through

	standardized, discipline-specific questions validated by industry and academic experts. The CTM exam is an appropriate and externally validated artifact. It benchmarks students against a national sample across over 100 accredited programs and reflects real-world engineering management competencies. The CTM exam is a proctored exam, so it is not vulnerable to AI misuse. Currently, the CTM exam does not use a rubric per se, as it is a multiple-choice exam with objective scoring. So, there is no rubrics used for SLO2.
Criteria & Targets	The current benchmark for success is that graduate students achieve an average score of 60% or higher in the relevant CTM Exam categories: Systems, Processes, Operations, and Projects. This threshold aligns with the national passing standard for the CTM exam, which is used by over 100 accredited programs across the U.S. At this time, no change is required to the criteria for success. The 60% benchmark is externally validated and reflects the minimum competency required for entry-level certification in technology management. Maintaining this threshold ensures consistency and comparability with peer institutions and industry expectations. However, we recognize that the average performance of our students over the last three cycles has met or exceeded this threshold consistently, which suggests that program-level targets may be reevaluated in the future to reflect continuous improvement.
Results & Conclusion	**Results**: Yes, the results over the past three assessment cycles were consistent with expectations. Students consistently met or exceeded the minimum benchmark of 60% across the assessed CTM exam categories (*Systems, Processes, Operations, and Projects*). This indicates that the program is effectively preparing students to demonstrate core competencies in technical problem-solving. Students showed strong and steady performance in the *Processes* and *Projects* categories, indicating a solid grasp of structured methodologies such as Six Sigma and project-based problem-solving taught in the Lean Systems, Six Sigma, and Quality Management courses. Our evaluation showed that our students consistently perform at or above national averages in all relevant CTM exam domains, confirming the strength of our technical curriculum and instruction. **Conclusions**: The integration of real-world case studies, Lean Six Sigma projects, and team-based assignments in courses such as *Lean Systems*, *Quality Management*, and *Six Sigma* has significantly enhanced students' ability to apply structured problem-solving methods like DMAIC and PDSA. The continued focus on project-based learning helped students bridge theory and practice more effectively. Continued use of the Certified Technology Manager (CTM) Exam provided a valid, reliable, and nationally benchmarked tool to measure learning outcomes consistently.
****IMPORTANT - Plans for Next Assessment Cycle**:	As we work hard to improve our assessment practices and make them more meaningful and effective, it's important each program craft a three-year plan for the following assessment cycle (2025-26, 2026-27, 2027-28) – this process assists in "closing the loop." For example, you may decide to: • collect a more appropriate artifact • create new program outcomes • adjust targets because they are consistently exceeded or not met • need to reconstruct your curriculum map • sequencing of classes might need to be adjusted, or additional class(es) provided Whatever your plan is, provide a narrative, in future tense, that indicates how you will approach future assessments. You will be expected to implement any needed changes before the next assessment cycle.

	With three years of detailed data from the CTM assessment, we will evaluate the appropriateness of our performance targets. If students consistently exceed the 60% CTM benchmark, we will raise internal targets (e.g., aiming for 70% or higher).

Program Student Learning Outcome 3	
Program Student Learning Outcome	Graduates will demonstrate an ability to communicate effectively in pertinent areas, both written and oral
Evaluation	SLO3 remains highly relevant to the program's mission and graduate-level expectations. Effective communication—both written (e.g., technical reports, proposals, theses) and oral (e.g., presentations, defenses)—is a critical skill for professionals in technology, engineering, and management fields. The ability to clearly articulate technical ideas, justify decisions, and engage with diverse stakeholders is essential in both academic and industry settings. SLO3 is clearly measurable. It is assessed using three direct instruments: • Instrument 1: Proposal Score – Evaluates the structure, clarity, technical writing, and logic of the student's written project proposal. • Instrument 2: Thesis/Capstone Oral Presentation Score – Assesses the student's ability to convey complex content clearly and professionally through oral communication. • Instrument 3: Thesis/Capstone Report Score – Provides a summative measure of both content mastery and written communication quality. While it technically contains two dimensions—written and oral communication—they are both components of the broader competency of professional communication. In this context, the outcome is justifiably double-barreled, as these two forms of communication are inseparable in most graduate-level deliverables (e.g., proposal + defense). The use of the verb "demonstrate" is appropriate and aligns with Bloom's Taxonomy at the application and evaluation levels, particularly when students are expected to synthesize technical ideas and present them coherently.
Measurement Instruments	The current measurement instruments directly and effectively measure the outcome. The combination of the proposal, oral presentation, and thesis document provides comprehensive, authentic assessments of both written and oral communication skills in a graduate-level context. • Instrument 1 (Proposal Score) focuses on the student's ability to plan and articulate a technical project in writing, demonstrating clarity, structure, and technical language proficiency. • Instrument 2 (Thesis Oral Presentation Scores) assesses verbal communication skills, including clarity, audience engagement, organization, and the ability to respond to questions—all critical indicators of oral communication effectiveness. • Instrument 3 (Thesis Score) provides a holistic measure of written communication, incorporating feedback on formatting, logic, flow, and professional tone in a substantial academic document. If the SLO is revised to further specify communication contexts, these instruments would still be appropriate. However, adding a short technical report or industry-oriented presentation (such as in a capstone) might be considered to reflect more diverse communication settings beyond academic research. All three instruments are direct measures, as they involve actual student work evaluated using structured criteria, rather than perceptions or self-reports. The artifacts (proposal, oral presentation, thesis) are appropriate and authentic. They represent rigorous, high-stakes assignments that require the integration of technical knowledge and communication proficiency. The increasing availability and use of AI tools (e.g., ChatGPT, Grammarly, Copilot) may affect how students approach writing tasks. Rubrics are functioning well overall, but periodic updates will ensure they continue to capture the nuanced performance expected of graduate students in a dynamic communication landscape.

Criteria & Targets	The criterion for success is that 60% of graduate students will meet or exceed the "Competent" level (4 out of 5) on the grading rubric used to assess written and oral communication in the proposal, thesis, and thesis presentation. The rubric ranges are: • Mastery (5 points) • Competent (4 points) • Marginal (3 points) • Deficient (2 points) • Unacceptable (1 point) The rubric scale is appropriate and detailed, allowing for nuanced evaluation of student performance across communication dimensions. The "Competent" benchmark is reasonable, representing solid, professional-level performance expected at the graduate level. However, the 60% threshold is conservative—especially the data from the last three assessment cycles show that most students are consistently exceeding this mark.
Results & Conclusion	**Results**: Over the past three assessment cycles, the results for SLO3—which assesses students' ability to communicate effectively in both written and oral forms—met or exceeded expectations. A majority of students consistently scored at or above the "Competent" (4 out of 5) level on the standardized rubrics used for the proposal, thesis, and thesis oral presentation. **Conclusions**: • Use of detailed rubrics across all three artifacts helped standardize assessment. • Emphasis on communication throughout multiple courses (e.g., proposal development in research methods, presentation skills in seminar courses) reinforced learning.
****IMPORTANT - Plans for Next Assessment Cycle**:	As part of our commitment to continuous improvement and effective assessment practices, we will implement the following actions over the next three assessment cycles to enhance the measurement and development of students' written and oral communication skills: we will raise the performance target from 60% to 70% of students achieving a score of "Competent" or higher on all three instruments. we will review the sequencing of courses to ensure that writing-intensive and presentation-intensive learning opportunities are scaffolded logically.

To add more outcomes, if needed, select the table above and copy & paste below.