

Electrical Engineering - Master of Science - Mid-Cycle Review & SLOA Year

Current Compliance Year: 2022-2023

Mid-Cycle review

Recent Recommendations

Feedback will include recommendations from the last Expedited Review or from your most recent review by your school or college. You may not see any feedback or recommendations until you have completed your first full or mid-cycle review.

Response to Previous Recommendations (if any):

There were no recommendations.

Student Learning Outcomes

The previous Student Learning Outcomes Assessment has been submitted as its own report. Going forward you will use the following prompts to discuss the success of your most recent SLOA plan and address your assessment activities since your last SLOA report (typically the past two years or since your last program review).

Learning outcomes feedback from last review:

Feedback will be provided once you have completed a full or mid-cycle review.

Discuss your SLOA findings, changes you are making and what you hope to see as a result:

We collected data using two direct assessment mechanisms during the academic year 2021-22 and tracked the time to graduation. During this period two students graduated and five students took the comprehensive exam.

1) Comprehensive Exam: Between Fall 2021 and Spring 2022, 5 students took the MS comprehensive exam.

(a) Pass rate:

(1) core topics: $3/5 = 60\%$

(2) Major option: $5/5 = 100\%$

(b) Breadth of knowledge (Comprehensive Exam Results on 1-5 scale): 3.40

2) Graduate Committee Evaluation Results (1-5 scale, academic year averages):
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The following averages are based on the scores of two students who graduated during the last academic year, 2021-22.

a. Math/Sci/Engr 3.93

b. Critical Thinking	3.93
c. Communication	4.25
d. Engineering Tools	3.93
e. Guided Research	4.00
Overall Average	4.00

3) Time to Graduation: These times to graduate for the two students who graduated in 2021-21 in number of semesters are: 4 and 13 (7 semesters inactive).

4) Faculty concluded that on the average student performance was marginal in core topics and excellent in major topics indicating a couple of students failed to brush up their undergraduate material. The performance of students who graduated was very good (4/5) and comparable to those of previous years. The time to graduate were reasonable and comparable to those of previous years.

5) Every faculty member of the department is involved in setting and grading of the comprehensive exam problems. The graduate committee evaluations are performed by the three members of the student's graduate advisory committee.

Discuss the curricular changes made based on assessing your SLO. If you haven't made any curricular changes, please explain why not and address what you did notice in the review, including strengths of your curriculum through the assessment of your outcomes:

With a small number of students, it is essential to exercise caution when drawing general conclusions, especially recommending curricular changes. Overall our program is strong, and the above assessment and conclusions did not lead to any significant curricular changes in our MSEE program. However, as in the past, graduate committee evaluations for individual students showed that international students possessed relatively poor communication skills. Faculty will continue to help international students improve their written reports and oral presentations by providing feedback on written and oral skills and related technical matters.

Are communication outcomes embedded in the SLOA Plan?

As of 2017 all Baccalaureate programs were required to embed the communication outcomes within their SLOA Plans, this is optional for non-Baccalaureate programs.

Embedded

Student Success

To access the Student Success Dashboard please sign into a UA computer with VPN connection (if not on campus). You will need your UA credentials and it is best accessed with the most updated version of Chrome, Edge, Firefox or Safari browsers; Internet Explorer is not supported. You will need to filter the data to see your programs. If you need assistance in finding the data for your programs, please contact your data liaison or [Julia Manfredini](#) in the PAIR office.

Data Liaisons

Each school or college has a team of Data Liaisons to help you analyze the data provided in the portal and may be able to help you see your data in multiple contexts. You can find a list of data liaisons on the resources page for Program Review.

The college or school level committee will also have access to this data with the goal that by providing these visualizations data availability will be increased.

Data supplied within the dashboard linked below is intended for Academic Program Review and not for any other purpose.

[Student Success Data Dashboard](#)

Previous Feedback

Feedback will be provided once you have completed a full or mid-cycle review.

Student Success Data Trends:

No change in majors, Decline in degrees awarded, No change in SCH, No change in persistence, Decrease in pass rates

If equity gaps were found in any of your disaggregated student success data, please explain how you plan to address those gaps. Please contact your data liaison or make an appointment with [Julia Manfredini](#) to learn more about analyzing your data.

From the academic year 2020-21 to 2021-22, we noticed the following:

- (1) Pass rate increased for [REDACTED] students, but slightly decreased for [REDACTED] students.
- (2) Pass rate increased for [REDACTED] students, but dramatically decreased for [REDACTED] students.
- (3) The degrees awarded to [REDACTED] students increased in number whereas that for the [REDACTED] students decreased. This statistics was given for the department as a whole and not specifically for the MS program.

The department decided to monitor these trends over the next few years before coming to any general conclusions or recommending changes to the program.

Optional Data Explanation

Feel free to share more of your thoughts on the data provided.

The institutional research data provided can be improved. When small number of students are involved it is better to provide numbers rather than percentages. In some categories the data is provided for the department as a whole and not for the individual program. It is difficult to draw conclusions about a specific program bases on such data.

High Impact Practices

According to the AAC&U, High-Impact Educational Practices “have been widely tested and have been shown to be beneficial to college students from many backgrounds.” UAF is particularly interested in Undergraduate Research and/or Scholarly Activity because it is one of our mission fulfillment indicators, but all of these researched High-Impact Educational Practices should be reflected in your program’s student learning outcomes and curriculum.

Previous Feedback

Feedback will be provided once you have completed a full or mid-cycle review.

High-Impact Practices Used in this Program

Please use the following fields to discuss how your program is using the high-impact practices, successes and known issues and solutions, or ways you are considering incorporating them in the future. If you are not using any of the high-impact practices listed, please use the "Other or None of These," field to share what your program is doing to help students be successful.

High Impact Practices that currently apply to your program:

Collaborative Assignments and Projects
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Other or None of these (explain)

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Submission

Submitter & Collaborator Names

Vikas Sonwalkar Maher Al-Badri Dejan Raskovic Amani Reddy Michael Roddewig Stephen Stephens Denise Thorsen Richard Wies
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Submitter Email

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College or School Review Committee

The college or school committees set the tone for helping each program feel seen during this process. We have provided you with strength-based feedback tags to attach to this program review. Please select as many as applicable.

Overall Recommendations

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Explanation of Recommendations

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Student Learning Outcomes Assessment Feedback (tags)

"Clear, concise presentation of findings", Strong alignment with SLOA plan
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Student Learning Outcomes Assessment Feedback (narrative)

The program has clearly given thought to the plan and report. You have a standard rubric that is nicely aligned with the 6-direct learning outcomes that have been described and included the rubric with SLOA. Also, you indicated the concerns on international students' communication skills and how to help them improve. A few comments and observations: Time to degree is useful to monitor, but not a learning outcome. The committee agrees that the small number of students makes identification of trends difficult, however the numbers are available, as are the program counts.

Profile Feedback

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Financial Feedback

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Student Success & Equity Feedback

The committee agrees that the small number of students makes identification of trends difficult, however, there does seem to have been a decrease in majors, which is negative. Also the committee agrees that the trends that showed in 2021-2022 review would be monitored with general conclusions used to recommend possible need for the program changes. A few comments and observations: There will be some ways to address those gaps. For example, you might think about the relationships between an increase in majors and a decrease in pass rate for [REDACTED] students.
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High-Impact Practices Feedback

You described many research opportunities through grant programs, faculty joint appointments, or collaborations. but the committee recommends the program to describe more discussion of these high impact practices, such as how are the research opportunities provided to the students? It would be useful to know how programs are using these practices so we can guide others.
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UNIVERSITY OF ALASKA FAIRBANKS
Student Learning Outcomes Assessment Plan
Master of Science in Electrical Engineering
College of Engineering and Mines

Submitted 05/11/21 by Vikas Sonwalkar

Expanded Statement of Institutional Purpose	Intended Objectives/Outcomes	Assessment Criteria and Procedures	Implementation (what, when, who)
MISSION STATEMENT: The Mission of the UAF Electrical and Computer Engineering Department is to offer the highest quality, contemporary education at the undergraduate and graduate levels and to perform research appropriate to the technical needs of the state of Alaska, the nation, and the world. GOAL STATEMENT: Prepare students to be effective researchers or faculty members or to have leading roles in electrical engineering.	An ability to apply knowledge of mathematics, science and engineering	Thesis and body of graduate work evaluated according to standard rubric	Graduate committee evaluation at time of graduation
	An ability to identify, formulate and solve engineering problems and develop critical thinking skills	Thesis and body of graduate work evaluated according to standard rubric	Graduate committee evaluation at time of graduation
	An ability to communicate effectively in oral and written form.	Thesis, oral defense and body of graduate work evaluated according to standard rubric	Graduate committee evaluation at time of graduation
	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Thesis and body of graduate work evaluated according to standard rubric	Graduate committee evaluation at time of graduation
	An ability to perform guided research	Thesis and body of graduate work evaluated according to standard rubric	Graduate committee evaluation at time of graduation
	Broad expert knowledge in field of electrical engineering and depth expert knowledge in a discipline of electrical engineering	Written comprehensive exam evaluated according to rubric	Department comprehensive exam given every semester by department faculty
	Students attain degree in a reasonable timeframe	Time to complete MSEE degree	Department tracks time for student to graduate

Evaluation and Use of Assessment Results: The assessment results are annually analyzed and evaluated by the entire ECE faculty in a department meeting held in the first or second week of May. The results of this evaluation are then used to recommend specific improvements in courses that reinforce the skills related to a particular outcome. Reasons for delays in graduation time in the case of individual graduate student are also discussed and remedy recommended. This approach provides a continuous assessment and improvement of the entire MSEE program.

Performance Rubrics for MSEE SLOA Outcomes

Performance Levels 1 - 5 (very weak, weak, average, strong, very strong)

Program Outcomes	1 = very weak	3 = average	5 = very strong
An ability to apply knowledge of mathematics, science and engineering	Does not appear to grasp the connection between theory and the problem; Calculations are not performed or performed incorrectly; Quantities are generally listed without units; Does not understand the connection between mathematical models and engineering systems.	Some gaps in understanding the application of theory to the problem and expects theory to predict reality; Minor errors in calculations; Most quantities are listed with units; Chooses a mathematical model or scientific principle that applies to an engineering problem, but has some trouble in model development.	Translates academic theory into engineering applications and accepts limitations of mathematical models of physical reality; Executes calculations correctly; Expresses quantities using correct and preferred units; Combines mathematical and/or scientific principles to formulate models relevant to electrical engineering
An ability to identify, formulate and solve engineering problems and develop critical thinking skills	Demonstrates solutions implementing simple applications of one formula or equation with close analogies to class/lecture problems; Does not realize when major components of the problem are missing; Does not appear to grasp the connection between theory and the problem; Has no coherent strategies for problem solving; No attempt at checking the obviously incorrect solution--no commentary; Unable to visualize the important concepts of problems, and unable to understand which are the critical components to solve.	Demonstrates solution with integration of diverse concepts or derivation of useful relationships involving ideas covered in course concepts, however, no alternative solutions are generated; Is missing some of the pieces of the whole problem; Some gaps in understanding the application of theory to the problem and expects theory to predict reality; Has some strategies for problem-solving, but does not always apply them consistently; The solution is correct, but not checked in other ways; Able to visualize some of the important concepts of problems, identifying a few of the critical components to solve.	Demonstrates creative synthesis of solutions and creates new alternatives by combining knowledge and information; Demonstrates understanding of how various pieces of the problem relate to each other and the whole; Translates academic theory into engineering applications and accepts limitation of mathematical models of physical reality; Formulates strategies for solving problems; The solution is correct and checked in other ways when it can be, the interpretation is appropriate and makes sense; Able to visualize the important concepts of problems, finding the critical components to solve.

An ability to communicate effectively in oral and written form	Talk is poorly organized, e.g. no clear introduction or summary of talk is presented; Extremely nervous delivery; Uses poor English; Multiple slides are unclear or incomprehensible, too much detail on text slides, tables are not legible; Text rambles, points made are only understood with repeated reading and key points are not organized; Little or no structure or organization, no subheadings or proper paragraph structure used; Graphs, tables or diagrams are used, but no reference is made to them.	Presents key elements of an oral presentation adequately; Slight appearance of stage fright; Occasionally uses an inappropriate style of English--too conversational; One or two slides are unclear, some text slides could be more succinct, could remove a table row/column here or there; Articulates ideas, but writing is somewhat disjointed, superfluous or difficult to follow; Materials are generally organized well, but paragraphs combine multiple thoughts or sections and sub-sections are not identified clearly; Uses graphs, tables and diagrams, but only in a few instances are they applied to support, explain or interpret information.	Well organized, Items discussed in a logical sequence that has been made clear to the audience; Excellent stage presence; Uses proper American English; Information on slides is always presented in a concise manner that can be quickly and easily digested; Articulates ideas clearly and concisely; Organizes written materials in a logical sequence to enhance the reader's comprehension (paragraphs, subheadings, etc.); Uses graphs, tables and diagrams to support points--to explain, interpret and assess information.
An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Struggles with simple tasks in PC use and struggles to use current software packages; Does not know how to use mathematical software; Uses simulation/modeling software without knowledge of assumptions inherent in its development; Does not operate most instrumentation and other equipment, and/or does so incorrectly or requires frequent supervision.	Can perform most tasks requiring PC use; Minor errors in applying mathematical software; Is aware of assumptions inherent in simulation/modeling software but is not clear on their impact on problem solution; Is somewhat tentative in operation of instrumentation and other equipment.	Maintains current, state-of-the-art abilities in PC use; Executes calculations correctly using mathematical software; Is aware of assumptions inherent in simulation/modeling software, and their impact on problem solution; Is able to comfortably operate instrumentation and other equipment.

An ability to perform guided research	Research topic described, perhaps minimally, but context is insufficient; Theoretical framework implied or non-existent; Insufficient and/or superficial literature review; Over-reliance on inappropriate sources; Type of study not specified; Research questions may not be appropriate for study type; Data collection and/or analysis processes not addressed; Data collection processes and/or instruments not provided; Issues of ethics and subjectivity not considered; Some findings mentioned, but there are no connections to data, research question(s), or existing research; Limitations and implications considered minimally or not at all. Usually not prepared for meetings and does little independent work.	Research topic and context described; Theoretical framework present but not well developed; Substantial literature review; Connections between literature review and research topic/question(s) present but not well developed; Explanation of research questions, approach, data collection and analysis processes and procedures, and issues of ethics and subjectivity present but not well developed; Key findings described and linked to data; Connection of findings to data, research question(s), and related literature present but not well developed; Some implications considered. Mostly prepared for meetings and does some independent work.	Clear and detailed description of research topic and context; Very effective discussion of theoretical framework; Extensive literature review that represents well the state of knowledge in the field; Very clear connections between literature review and inquiry topic/question(s); Research question(s), approach, sampling, methods of data collection and analysis, ethical issues, and the addressing of subjectivity appropriately described and justified with references to research texts and related studies; Key findings presented thoroughly and coherently; Findings clearly connected to data, research question(s), and related Literature; Implications for practice, policy, research, and/or other areas thoroughly considered; Always prepared for meetings and works well independently.
Broad expert knowledge in field of electrical engineering and depth expert knowledge in a discipline of electrical engineering	Score <60. Evaluated by score (x/100, with 50% breadth and 50% depth) on Department Comprehensive Exam. Student works 5 of 14 breadth problems and 3 of 9 depth problems.	Score >70 and <80. Evaluated by score (x/100, with 50% breadth and 50% depth) on Department Comprehensive Exam. Student works 5 of 14 breadth problems and 3 of 9 depth problems.	Score >90. Evaluated by score (x/100, with 50% breadth and 50% depth) on Department Comprehensive Exam. Student works 5 of 14 breadth problems and 3 of 9 depth problems.