

Mechanical Engineering - Bachelor 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):

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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 collect three different types of data for assessment: FCAR, capstone design projects, and NCEES exam results.

Faculty Course Assessment Reports (FCAR) are created for each required course in our major curriculum, and revised/updated every other time the course is taught. The FCAR has quantitative result in 4 levels for specific assessment tools corresponding to each relevant ABET student learning outcome; usually 2-3 per course. The FCAR then includes a narrative assessment by the instructor addressing future actions that can be taken to further improve outcomes achievement in a “closed loop, continuous improvement” fashion.

The 2-semester senior capstone design sequence culminates with a final oral presentation, a written report, and a 3-minute general audience video. Oral presentations and written reports are scored on individual rubrics with items in both technical content and presentation clarity. The video is aimed at a general audience (e.g. highschool student on Youtube) and summarizes the purpose, approach, and results on the project in an engaging and informative manner. Videos are scored on a 10-point scale.

All graduating students take the nationally-administered NCEES Fundamentals of Engineering exam; a 5-hour exam with 14 content areas covering the fundamental technical areas of Mechanical Engineering. Summary yearly exam results are used to assess student outcomes in those 14 areas, which are mapped to some of the specific outcomes in the SLOA as well as the ABET assessment report

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:

- 10/3/2019: proposed change in the prerequisite to the undergraduate elective ME409 Controls: use ME408 Vibrations (major requirement) as a new prerequisite because it will help students with the needed background in system dynamics.
- 10/3/2019: proposed change in the ME441 title from "Heat and Mass Transfer" to "Heat Transfer". Mass transfer topic is only marginally covered due to time constraints. The concept of mass transfer is not considered a fundamental content area for mechanical engineers (e.g. not assessed in the NCEES Fundamentals of Engineering exam)
- 10/3/2019: proposed change in the prerequisite to ME334 Materials Science: change the chemistry requirement from Chem106X to Chem105X. Reviewing those syllabi indicated that all the relevant material (e.g. crystal structure) is encapsulated in Chem105X.
- 3/4/2021: proposed change in the curriculum by removing ESM 450 "Economic Analysis and Operation". Motivated by senior exit survey results and confirmed after syllabus analysis and instructor discussion, many project management topics were not relevant, and the economic analysis topic could be accommodated in first semester capstone design course (ME486). This change results in a 3-credit reduction in the degree requirements.
- 3/4/2021: waive the requirement of the NCEES FE exam for the spring 2021 graduates because of Covid-19. Exam availability was significantly limited, and also unattractive to many students.
- 6/7/2021: change in the prerequisite to ME452 Astrodynamics: the numerical analysis course ES301 Engineering Analysis can now be taken concurrently. Review of the syllabus by the responsible ME452 instructor indicated that the relevant material is covered to be successful when taken concurrently.

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 SCH, Increase in degrees awarded, No change in majors, No change in pass rates, No change in persistence

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.

The gender equity gap data indicates a significant improvement over the past 4 years, albeit from a very inequitable starting point. Mechanical Engineering is traditionally [REDACTED] as the 7:1 ratio in 2018 indicates. However, the data shows a gradual decrease in this gap, with a 50% increase in [REDACTED] enrollment. Faculty discussion on this issue was not able to discern the source of this change.

Optional Data Explanation

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

Nothing more significant

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:

Undergraduate Research, Capstone Courses and Projects

Other or None of these (explain)

Submission

Submitter & Collaborator Names

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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)

Strong alignment with SLOA plan,"Clear, concise presentation of findings"

Student Learning Outcomes Assessment Feedback (narrative)

The program shows strong alignment between the plan, the results, and the analysis done by the program. The curricular changes made are directly tied to outcomes assessment and analysis. The program has a good mix of direct and indirect learning outcomes and assessments; such as ME 408 as an additional prerequisite to give students experience and skill prior to being expected to use it with more depth around system dynamics. The committee does encourage discussion about the actual assessment practices used by the program, though it is stated that there are several tools used for student assessment, it feels that added information regarding rubrics and how they are use for consistency would contribute nicely to the understanding of assuring students meet the SLOA plans.

Profile Feedback

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Financial Feedback

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Student Success & Equity Feedback

According to the information available to the committee, the PAIR Data shows that majors have declined from 256 in 2018 to 155 in 2022. The department should discuss this disparity between the years during the assessment period. The uptick in ██████ enrollments and a reduced gap is a trend that will be interesting to watch.

High-Impact Practices Feedback

The committee recognizes the high impact practices shared by the Mechanical Engineering BS program. Longer duration really does give students time to create a relevant project and then reflect upon its outcome. The committee would also like to commend you upon the acts of evaluating projects through the use of several rubrics that assess different sections is also thorough and commended upon.

UNIVERSITY OF ALASKA FAIRBANKS
Student Learning Outcomes Assessment Plan
BS – Mechanical Engineering
 College of Engineering and Mines (CEM)
 May 7, 2021

Expanded Statement of Institutional Purpose	Intended Objectives/Outcomes	Assessment Criteria and Procedures	Implementation (what, when, who)
MISSION STATEMENT: 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: - To offer a Mechanical Engineering program designed to prepare for its graduates for careers at the professional level; - To provide continuing educational opportunities for graduate engineers; - To serve as a resource of technical knowledge for the state as well as the nation.	<i>Students will be able to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (ABET Student Learning Outcome #1)</i>	<i>Faculty Course Assessment Reports (FCAR)</i> - FCAR are completed on a 2-year rotating cycle. - FCAR use targeted assessment tools (e.g. exam problems) to assess student performance. <i>Senior capstone design projects reports.</i>	<i>FCAR generated on a two-year rotating cycle by faculty responsible for the course and collected by the ABET coordinator.</i> <i>FCAR results evaluated by entire faculty in department meetings, and summarized by the ABET coordinator.</i> <i>Collect capstone projects each year by the instructor.</i>
	<i>Students will be able to communicate effectively, participate on multi-disciplinary teams, and design systems under realistic constraints.</i>	<i>Senior capstone design course.</i> <i>Each student must contribute to written progresses reports, and a final report.</i> <i>Each student must contribute to the final oral presentation to a public audience.</i> <i>Each senior capstone design team creates a 3-min video summarizing this project to a general audience (e.g. Youtube)</i>	<i>Final oral presentations assessed by the Mechanical Engineering faculty in charge of the course, and final reports are assessed by the design project faculty adviser/mentor.</i> <i>Videos are collected and assessed by the instructor of record for the design course</i>
	<i>Students will develop the skills necessary to compete in both the local and global engineering economy.</i>	<i>Senior exit survey.</i>	<i>Student exit surveys are conducted, collected, and summarized yearly by the department chair.</i>
	<i>Students will have an understanding of professional and ethical</i>	<i>Student assessment via FCAR.</i>	<i>FCAR generated on a two-year rotating cycle by faculty</i>

Submitted by:

	responsibility, and a knowledge of contemporary issues.	National Council of Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) Exam	responsible for the course. FCAR results evaluated by entire faculty in department meetings. FE exams results are initially compiled and analyzed by Prof. David Denkenberger (Mechanical Engr.) Summaries are then provided to, and discussed by the entire faculty at end-of-year accreditation meetings. Plans for initiating any changes (if necessary) or determined for the subsequent academic year
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Submitted by: