Computer 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):

We have completed a major curricular revision of our Computer Engineering program, with the specific goals of decreasing time to graduation and increasing the number of students in upper division EE courses. The program was modernized while the number of credits required for graduation was decreased. This is expected to lead to an increase in the number of graduates. The new curriculum is being used for all students starting in Fall 2022, and a majority of our current students have decided to switch to the new curriculum.
Our ties with the Alaska Space Grant program are strong. The director of the program is a faculty member in our department and a significant number of our students are involved. In addition, students participate in other NASA-sponsored activities, for example, working on Senior Design projects mentored by NASA scientists.
The department also collaborates with The Alaska Center for Energy and Power (ACEP), through faculty members affiliated with the center. A number of students is involved in research activities through ACEP.
The department is taking an active approach to advising. Starting in the sophomore year, all students are assigned a faculty member as an advisor, who contacts them before the registration opens to set up an advising meeting. In addition, we are back to doing in-person group advising.

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 data using three direct (Senior Capstone Design, Faculty Performance Indicator Assessment Reports - FPAR, and FE exam) and one indirect assessment method (senior exit survey). The results are annually analyzed by the entire ECE faculty in a Student Outcomes Meeting, and used to recommend specific improvements in courses relevant to a particular outcome. This approach provides a continuous assessment and improvement of the entire program.

We have recently changed our assessment process, and will now be assessing student outcomes every year (previously – twice in three years).
1. Outcomes were assessed by the faculty teaching the Senior Capstone Design course on a 1-5 scale. In each of the categories the students have scored individually, and on average, above our threshold of 3.0.
2. Faculty evaluated the same outcomes in courses selected for assessment. The metric for each category is the percentage of students scoring Excellent or Adequate (as opposed to Marginal or Unsatisfactory) in each course. In this period, weighted averages for each category were well above our threshold of 75%
3. The national FE exam is taken by all graduating seniors. The current running 6-year average of CpE students passing the FE exam is 78% (7 out of 9). The national average is 70%. We use this data for our last outcome.
4. The first seven outcomes are indirectly assessed yearly by the seniors in a senior exit survey. In 2022 we have not received any responses from CpE students.

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:

We did not make any changes based on our assessment of student learning outcomes. However, we just went through a major curriculum revision, as described in our response to previous recommendations. Among other changes, we made our Capstone Design Project a two-semester course sequence. Because "Capstone Courses and Projects" is one of the "High Impact Practices," we believe this will have a positive impact on our enrollment numbers and student success.
Our communication outcomes are (and have been for a while) embedded in our current plan. For example, our outcome 3 is defined as "An ability to communicate effectively with a range of audiences."

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.

Not 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:

Increase in majors,Increase in degrees awarded,Decline in SCH,Decline 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.

NOTE: The gender and race data provided to us was not per degree, but per department. The following discussion is about the equity gaps in the department, not this specific degree. We have noticed a one year drop in some of the categories, and will be monitoring those categories carefully to see if the trends continue. However, the faculty did not see enough evidence to qualify any of those as equity gaps at this point. An apparent severity of some of these drops could be attributed to a small number of students in those categories. Here are the two potential concerns that will require further monitoring: - Pass rate per race: [redacted] pass rate went from 100% in 2021 to 62.5% in 2022. Other races remained flat. The percentage and the number of [redacted] students is low, which can explain the drastic drop. - Pass rate per gender: Pass rate for [redacted] students went from 100% in 2021 to 89.8% in 2022. For [redacted] students, it remained almost flat (93.3% to 92%).

Optional Data Explanation

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

We are very encouraged by the significant increase in the number of majors in the CpE program. The number of degrees awarded has also increased, although the numbers are still very small. While the number of total SCH went down, just like it did for the college as a whole, we are expecting that the trend will be reversed once the new CpE majors start taking courses in the department. The average SCH load went up, which is also encouraging. Graduation informed persistence went down, but only by 3 percentage points. With everything that was happening in the past several years we find this a relatively good result, but will continue our efforts to keep the students in the program (see for example our active approach to advising). Most of the data provided to us is given by department, not by degree/program. Only Majors, Degrees awarded, Average SCH load, and persistence are given for CpE separately. For example, gender, and race pass rates are given for the department as a whole. This is probably acceptable, because the students of our two programs are mixed in most of our classes.

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," filed 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,Undergraduate Research,Writing-Intensive Courses,Capstone Courses and Projects

Other or None of these (explain)

Submission

Submitter & Collaborator Names

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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

Increase graduates,Consider curricular revisions

Explanation of Recommendations

Revise curriculum to decrease time to graduation, increase the number of students in upper division EE courses, and distribute teaching workload more amongst the department faculty.
Develop deeper partnerships with the Alaska Space Grant program and other

Student Learning Outcomes Assessment Feedback (tags)

Strong alignment with SLOA plan

Student Learning Outcomes Assessment Feedback (narrative)

Each SLOA is assessed by (1) FPAR, (2) Senior Capstone, and (3) Exit Survey. This provides a good mix of direct and indirect learning outcomes and assessment. The program shows strong alignment between the plan, the results, and the analysis done by the program. The program did a nice job in describing their process for assessing SLOA data and how they utilize it to make recommendations on improvement. However, it's interesting that they specifically state that the program did not use the SLOA data when they went through their recent major curriculum revisions. The updated SLOA is attached.

Profile Feedback

Financial Feedback

Student Success & Equity Feedback

Persistent number of majors during the reporting period, but low graduation rates, only one or two per year. The program provides no reasoning for this. There are gender and race inequities that could be assessed, specifically there has not been a [redacted] graduating since 2018 from the program, and a decline of [redacted] students in their courses. Data can be disaggregated at the program level, which would add more specificity to your report. The Accreditation and Assessment office will follow up to walk you through the process.

High-Impact Practices Feedback

The program integrates multiple HIPs throughout their program and provides a good discussion on how it supports student success. The program also states that it "has increased students' enthusiasm for the program". It will be good to follow up during the next reporting cycle to see if that enthusiasm equals a higher number of majors and/or graduates.

UNIVERSITY OF ALASKA FAIRBANKS
Student Learning Outcomes Assessment Plan
Bachelor of Science in Computer Engineering
College of Engineering and Mines

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 with the following program educational objectives: **1. Breadth.** Graduates will utilize their broad education emphasizing computer engineering to serve as the foundation for productive careers in the public or private sectors, graduate education, and lifelong learning. **2. Depth.** Graduates will apply their understanding of the fundamental knowledge prerequisite for the practice of and/or advanced study in computer engineering, including its scientific principles, rigorous analysis, and creative design. **3. Professional Skills.** Graduates will apply skills for clear communication, responsible teamwork, professional attitudes, and ethics to succeed in the complex modern work environment.	1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	Faculty Performance Assessment Reports (FPARs) in EE 333 and EE 443	Assessed annually by course instructor starting in 22-23 (Last assessed 21-22)
		Senior Capstone Design Project evaluated using standard rubric	Yearly by course instructor
		Senior Exit Survey	Every year, student survey
	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.	FPAR in Senior Capstone Design Course (EE 482). Until 2022 it was assessed in EE 444	Assessed annually by course instructor. (Last assessed in 21-22)
		Senior Capstone Design Project	Yearly by course instructor
		Senior Exit Survey	Every year, student survey
	3) An ability to communicate effectively with a range of audiences.	FPAR in EE 482 (previously in EE 444)	Yearly by course instructor. (Assessed 21-22)
		Senior Capstone Design Project	Yearly by course instructor
		Senior Exit Survey	Every year, student survey
	4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	FPAR in EE 482 (previously in EE 444)	Yearly by course instructor. (Assessed 22-22)
		Senior Capstone Design Project	Yearly by course instructor
		Senior Exit Survey	Every year, student survey
	5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	FPAR in EE 102 FPAR in EE 482 (previously EE 444)	Yearly by course instructor. (Assessed 21-22)
		Senior Capstone Design Project	Yearly by course instructor
		Senior Exit Survey	Every year, student survey
	6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	FPAR in EE 331 FPAR in EE 333 FPAR in EE 443	Yearly by course instructor. (Assessed 21-22)
		Senior Capstone Design Project	Yearly by course instructor
		Senior Exit Survey	Every year, student survey

Continued on the next page

	7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	FPAR in EE 482 (previously EE 444)	Yearly by course instructor. (Assessed 21-22)
		Senior Capstone Design Project	Yearly by course instructor
		Senior Exit Survey	Every year, student survey
	Acquire broad knowledge base expected in the field of Computer Engineering.	Nationally standardized FE (Fundamentals of Engineering) Exam, with subscores in many topic areas	Collect results from each Fall and Spring FE Exam, evaluated by ECE faculty

Evaluation and Use of Assessment Results: The assessment results are annually analyzed and evaluated by the entire ECE faculty in a Student Outcomes Meeting held typically in the 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. This approach provides a continuous assessment and improvement of the entire BSCpE program.

Revised 11/16/22 by Dejan Raskovic

Performance Rubrics for ABET 1-7 Student Outcomes

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

Student Outcomes	1 = very weak	3 = average	5 = very strong
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	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. Does not grasp the interrelationship of wide-ranging or conflicting technical issues associated with the complex engineering problem.	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 trouble in model development. Grasps some of the wide-ranging or conflicting technical issues and their interrelationship associated with the complex engineering problem.	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 computer engineering. Formulates a creative solution within bounds of wide-ranging or conflicting technical issues.
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	No design strategy, haphazard approach; Unable to relate prior knowledge to the design problem; Several important design criteria are missing; Ideas are not new or innovative. Does not consider or evaluate the impact of a design on public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	Uses a design strategy with guidance; Can use prior knowledge to design individual pieces of equipment competently when guided to do so; Missing some essential and desirable design specifications/criteria; Generates solutions that are workable and practical, but generally are not that innovative. Sometimes considers the impact of a design on some of the following: public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. Sometimes can evaluate how that design impacts the above factors.	Develops a design strategy, including a plan of attack, decomposition of work into subtasks, development of a timetable; Understand how areas interrelate and demonstrates ability to integrate prior knowledge into a new problem; Establishes a comprehensive list of essential and desirable design specifications/criteria; Generates alternative solutions that are unique, novel and workable. Considers and evaluates the impact of a design on public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Student Outcomes	1 = very weak	3 = average	5 = very strong
3. An ability to communicate effectively with a range of audiences	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. Unable to distinguish the comprehension abilities of a wide range of audiences, and hence fail at communicating.	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 or incomprehensible, most 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. Able to distinguish the comprehension abilities of a wide range of audiences, and able to communicate somewhat effectively with some range of audiences, but not all.	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. Able to clearly communicate with a wide range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Student is not aware of any codes for ethical behavior; Blames other for own issues and problems. Often exhibits unprofessional behavior. Student does not understand the many professional and ethical responsibilities in all steps of the engineering design process. The student does not make informed engineering judgments considering the impact of engineering solutions in global, economic, environmental, and societal contexts.	Student is aware of the existence of the IEEE Code of Conduct and other bases for ethical behavior; Doesn't always recognize the need to take personal responsibility for his/her actions; Sometimes exhibits unprofessional behavior. Student understands some the many professional and ethical responsibilities in all steps of the engineering design process. The student does sometimes make informed engineering judgments considering the impact of engineering solutions in global, economic, environmental, and societal contexts.	Student understands IEEE Code of Conduct and other bases for ethical behavior; Takes person responsibility for his/her actions. Student understands the many professional and ethical responsibilities in all steps of the engineering design process. The student makes excellent informed engineering judgments considering the impact of engineering solutions in global, economic, environmental, and societal contexts.

Student Outcomes	1 = very weak	3 = average	5 = very strong
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Cannot lead others, is not prepared for meetings, does not bring any ideas forward. Does not cooperate with others or value alternative perspectives or encourage or create an inclusive environment. Does not understand or establish achievable goals. Cannot plan ahead to meet deadlines. Does not contribute appropriate work products to meet the objectives of the team project.	Shows some leadership for their portion of team projects and is sometimes prepared for meetings with clearly formulated ideas. Sometimes cooperates with others and sometimes values alternative perspectives and participation among all team members. Sometimes may criticize others, jeopardizing the inclusive environment. Can sometimes collaborate with others to establish achievable goals, but not always. Sometimes articulates plans to ensure deadlines are met. Generally, but not always, contributes appropriate work products to meet the objectives of the team project.	Shows excellent leadership for their portion of team projects and is prepared for meetings with clearly formulated ideas. Cooperates with others; Values alternative perspectives and encourages participation among all team members in an inclusive environment. Collaboratively establishes achievable goals. Develops well-articulated plans to ensure deadlines are met. Contributes appropriate work products to meet the objectives of the team project.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Does not follow experimental procedures; Cannot select the appropriate equipment and instrumentation for required investigations; Is unaware of measurement error; Makes no attempt to relate data to theory. Does not apply good engineering judgment and draws mostly inappropriate conclusions.	Experimental procedures most often followed, but occasional oversight leads to loss of experimental efficiency and/or loss of data; Needs some guidance in selecting appropriate equipment and instrumentation; Is aware of measurement error but does not account for it statistically or does so at a minimal level; Applies appropriate theory to data when prompted to do so, but misinterprets physical significance of theory or variable involved and makes errors in unit conversions. Applies some engineering judgment and draws some appropriate conclusions.	Develops and implements logical experimental procedures; Can select appropriate equipment and instruments to perform investigations; Is aware of measurement error and is able to account for it; Analyzes and interprets data carefully using appropriate theory and translates theory into practice or applies to physical systems. Applies very good engineering judgment to draw appropriate conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Requires detailed or step-by-step instructions to complete a task; Unable to recognize own shortcomings or deficiencies; Assumes that all learning takes place within the confines of the class; Shows little or no interest in outside learning resources; Does not show any interest in professional and/or technical societies. Unable to find and access appropriate learning strategies to gain the required new knowledge.	Requires guidance as to expected outcome of task or project; Sometimes is able to avoid repeating the same mistakes; Does not always take responsibility for own learning; Seldom brings information from outside sources to assignments; Occasionally participates in the activities of local professional and technical societies. Finds and accesses some appropriate learning strategies to gain some of the required new knowledge.	Demonstrates ability to learn independently; Learns from mistakes and practices continuous improvement; Demonstrates responsibility for creating one's own learning opportunities; Participates and takes a leadership role in professional and technical societies available to the student body. Finds and accesses appropriate learning strategies to gain the required new knowledge.

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