— B. S. in Electrical Engineering —

2022–23 Assessment Report

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Contents

1 Introduction

1.1 Background

The BS Electrical Engineering (BSEE) program is offered by the Electrical Engineering & Renewable Energy (EERE) department. The BSEE program is designed to prepare professionals who can perform a wide range of functions within the electrical engineering industry, while also providing solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, MBAs, or JDs. Specifically, the BSEE program lectures and laboratories equip students with a solid theoretical foundation in math, science and engineering, as well as problem solving abilities and immediately useable practical skills.

The engineering topics included in the BSEE program provide students with a strong foundation in the fundamental areas of electrical engineering, including circuits, analog electronics and solid state devices, digital circuits and systems, microcontrollers and embedded systems, linear systems and DSP, communication systems , control systems, and computer programming. To increase flexibility the program includes some technical elective courses. Engineering design is introduced early and emphasized in most engineering courses. The broad education component of the program is provided through the general education curriculum, which includes courses in communication, humanities, social sciences, and management. This helps reinforce some of the program outcomes, such as effective communication with a range of audiences, critical thinking, ability to analyze ethical issues, and a broader understanding of social, economic, and environmental issues in a global context.

The BSEE program culminates with a three-term capstone design project. This year-long project is intended to encompass a major engineering design experience incorporating appropriate engineering standards and multiple constraints, as well as using the knowledge and skills acquired in earlier coursework.

1.2 Program History

The Bachelor of Science in Electrical Engineering (BSEE) program at the Oregon Institute of Technology (Oregon Tech) was launched in Fall 2007. The program was designed as a classical electrical engineering degree, complementing the portfolio of engineering degrees on campus, namely Civil Engineering, Mechanical Engineering, and Renewable Energy Engineering. All engineering programs at Oregon Tech are currently ABET EAC accredited. The BSEE program received its first ABET general review visit and accreditation in 2012. The last ABET general review visit took place in 2022. Based on this review, ABET produced a report in which they identified no deficiencies in the program. Two weaknesses and one concern were identified, which the EERE department is in the process of addressing and resolving. A report detailing the corrective action is due to ABET by July 2024. The next ABET comprehensive review visit is scheduled for AY2028-29.

1.3 Program Locations

The BSEE program is located at both Oregon Tech campuses (Klamath Falls and Portland Metro), serving a large portion of rural Oregon and California, as well as the Portland metropolitan area.

The Klamath Falls campus is a residential campus located in Klamath Falls, a city of around 40,000 residents in Southern Oregon. Nestled on the eastern slope of the Cascade Mountains, the 190-acre campus offers spectacular views, an average of 300 days of sunshine per year, and ample opportunities to enjoy the great outdoors. This location also has access to exceptional natural energy resources, such as solar and geothermal. The Oregon Renewable Energy Center (OREC) and the affiliated Geo-Heat center are located here, providing exceptional opportunities for students to gain hands-on experience in the fields of power, energy, and renewable energy.

The Portland Metro campus is an urban non-residential campus located in Wilsonville, on the south of the greater Portland metro area, 15 miles south of downtown Portland. The campus is situated in a wooded business park setting among several technology companies, and offers excellent access to internships and other technological collaborations with the Silicon Forest (as the semiconductor industry in the Portland metropolitan area is known).

1.4 Program Constituencies and Industry Relationships

To maintain a program that is current with the needs of industry and of sufficient technical rigor requires input from many different constituents. Some of the constituents are industrial and some academic. The various constituents that are used in the program assessment process include BSEE graduates and students, Industry Advisory Board (IAB) members, employers and faculty. Input from these constituents is gathered and reviewed in a periodic manner to ensure the PEOs remain aligned with the direction of industry, as well as the university´s mission and resources.

The IAB provides advice and counsel to the EE program with respect to curriculum content, instructional resources, career guidance and placement activities, accreditation reviews, and professional-development assistance. In addition, each advisory-committee member serves as a vehicle for public relations information and potentially provides a point of contact for the development of specific opportunities with industry for students and faculty.

The IAB and the program faculty meet once or twice per year (typically Fall and Spring terms). At these meetings, faculty have an opportunity to provide and update on the state of the department and its programs, as well as receiving input and feedback from the IAB on any new departmental initiatives in light of the current industry trends and needs. The IAB periodically reviews the program PEOs and SOs to ensure they remain relevant and responsive to the needs of industry. Program changes are also reviewed by the IAB before implementation.

1.5 Program Enrollment and Graduation Data

Table 1 presents the BSEE program enrollment from Fall 2018 to Fall 2022. Table 2 presents the number of BSEE degrees awarded over the same time span. Based on a rolling average of survey data collected for the BSEE graduating classes of 2017-2019, 89% of BSEE graduates are employed and 5% involved in continued education six months after graduation. The median salary of BSEE graduates is reported as $64,000. Current employers of BSEE graduates include Lawrence Livermore National Laboratory, Black & Veatch, ASML, Intel Corporation, Microsemi Corporation, and Mentor Graphics.

Table 1: BSEE enrollment in the last five academic years (headcount of both full and part-time students in week 4 of the Fall term)

	2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Klamath Falls	90	86	76	58	60
Portland Metro	104	101	85	63	58
Total	194	187	161	121	118

Table 2: BSEE degrees awarded for the last five academic years.

	2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Klamath Falls	18	17	16	14	10
Portland Metro	31	16	17	12	11
Total	49	33	33	26	21

2 Program Mission, PEOs and SOs

2.1 Program Mission

The mission of the Electrical Engineering Bachelor of Science degree program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electrical engineering. The program will provide high-quality career-ready candidates for industry as well as teaching and research careers. Faculty and students will engage in applied research in emerging technologies and provide professional services to their communities.

2.2 Program Educational Objectives

In support of this mission, the Program Educational Objectives (PEOs) for the BSEE program are:

1. The graduates of the BSEE program will possess a strong technical background as well as analytical, critical-thinking, and problem-solving skills that enable them to excel as professionals contributing to a variety of engineering roles within the various fields of electrical engineering and the high-tech industry.
2. The graduates of the BSEE program are expected to be employed in electrical engineering positions including (but not limited to) design engineers, test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, control engineers, and power engineers.
3. The graduates of the BSEE program will be committed to professional development and lifelong learning by engaging in professional or graduate education in order to stay current in their field and achieve continued professional growth.
4. The graduates of the BSEE program will be working as effective team members possessing excellent oral and written communication skills, and assuming technical and managerial leadership roles throughout their career.

2.3 Relationship between PEOs and Institutional Mission

The Oregon Tech mission statement is as follows: "Oregon Institute of Technology ("Oregon Tech"), Oregon's public polytechnic university, offers innovative, professionally-focused undergraduate and graduate degree programs in the areas of engineering, health, business, technology, and applied arts and sciences. To foster student and graduate success, the university provides a hands-on, project-based learning environment and emphasizes innovation, scholarship, and applied research. With

a commitment to diversity and leadership development, Oregon Tech offers statewide educational opportunities and technical expertise to meet current and emerging needs of Oregonians as well as other national and international constituents."

The mission statement was approved by the Oregon Tech Board of Trustees on May 30, 2019 and reviewed by the Higher Education Coordinating Commission (HECC) on August 8, 2019.

The BSEE PEOs are in alignment with the university's mission. Specifically, PEO1 relates to graduates having a strong technical background in electrical engineering, as well as analytical, critical-thinking and problem solving skills that will allow them to succeed as professionals, whereas This links to the university's mission of offering "innovative, professionally-focused degree programs" in engineering, with an emphasis on "hands-on education".

PEO2 specifies the types of careers and engineering positions that graduates of the program should be ready to fulfill, which are consistent with the needs of the electrical engineering industry in the state of Oregon and nationwide. PEO3 has a focus on professional development and lifelong learning so that graduates will stay current in the evolving field of electrical engineering. These PEOs are in alignment with the universtiy's mission to meet "current and emerging needs".

PEO4 focuses on graduates being effective collaborators and communicators, assuming technical and managerial leadership roles throughout their careers. This is consistent with the university's mission to be committed to leadership development.

2.4 Program Student Outcomes

The student outcomes (SOs) of the BSEE program correspond to the ABET EAC (1)-(7) student outcomes. At the time of graduation, BSEE students must demonstrate:

1. (**Problem Solving**) an ability to identify, formulate, and solve engineering problems problems by applying principles of engineering, science, and mathematics
2. (**Design/Broader Factors**) 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
3. (**Communication**) an ability to communicate effectively with a range of audiences
4. (**Ethics**) 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
5. (**Teamwork**) 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

6. (**Experimentation**) an ability to develop and conduct appropriate experimentation, interpret data analyze and interpret data, and use engineering judgement to draw conclusions

7. (**Independent Learning**) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

2.5 Relationship between PEOs and SOs

The mission and program educational objectives (PEOs) describe the capabilities of the graduates after they have entered their chosen career. The student outcomes (SOs) are used to develop the necessary foundation of knowledge and skills that a graduate will need to accomplish these objectives as they mature in their disciplines. It is the student outcomes that allow graduates to excel at the educational objectives.

Table 3 shows a map of the BSEE student outcomes to the program education objectives. As the table indicates, the student learning outcomes correlate strongly with the education objectives, with each SO mapping to at least one PEO.

Table 3: Mapping between BSEE SOs (1)–(7) and PEOs

Student Outcome	PEO1	PEO2	PEO3	PEO4
(1) Problem Solving	•	•		
(2) Design/Broader Factors	•		•	
(3) Communication				•
(4) Ethics	•	•		•
(5) Teamwork		•		•
(6) Experimentation	•	•		
(7) Independent Learning			•	

2.6 Process for Establishment and Revision of PEOs and SOs

The PEOs were developed by the program faculty in consultation with the IAB. The BSEE student outcomes were set in accordance to the current ABET criteria (Criterion 3) for accrediting engineering programs. The BSEE SOs include ABET EAC outcomes (1)-(7), which are the general outcomes for all baccalaureate engineering programs.

The PEOs and SOs are periodically reviewed to ensure they stay relevant. The revision process

involves different constituents. At the annual EERE Convocation meeting in the Fall, the EERE faculty have an opportunity to review the PEOs and SOs for each program in light of the results from the assessment activities conducted the previous year (i.e., direct assessments collected in program courses, as well as indirect assessment from senior exit survey), results of graduate surveys provided by Career Services, the input gathered from IAB members and employers during the previous academic year, as well as any changes to the institutional or college mission, or the ABET criteria (if any have occurred). Based on the discussion, the EERE faculty may approve to make no changes to the program SOs or make recommendations for proposed changes. The results are determined by a simple majority vote.

During the academic year, one or two meetings are held with the IAB (typically Fall and Spring). These meetings provide an opportunity for faculty to present program updates, assessment results, etc., as well as gather input from the IAB to inform strategic direction of the program. If changes to the SOs have been proposed by the faculty at the Fall Convocation meeting, these are discussed with the IAB members. The IAB members may approve the changes or propose alternative changes. The results are determined by a simple majority vote.

As part of the assessment cycle, the BSEE program faculty have a Closing-the-Loop meeting. This meeting is typically scheduled in the Fall term, prior to 31 October. At this meeting, the program faculty discuss the results of the assessment activities carried out during the previous academic year and have an opportunity to review the SOs. If any changes to the SOs have been approved by the faculty and the IAB, these are announced at the Closing-the-Loop meeting and included in the annual Assessment Report, which is submitted to the Director of Assessment for the university, and if approved, the new SOs are published on the BSEE program website and submitted for inclusion in the catalog for the following academic year. Table 4 summarizes the process for review of the BSEE program student outcomes.

Table 4: BSEE PEO and SO Review Process

Event	**Task**
Convocation	EERE faculty review PEOs and SOs in light of assessment data and other feedback collected in previous academic year. Faculty may propose and approve changes to PEOs or SOs
IAB meeting	If changes to PEOs or SOs have been proposed and approved by EERE faculty, they are presented to IAB for consideration and approval or revision.
Closing the Loop (CTL) meeting	If PEO or SO changes have been approved by EERE faculty and IAB, they are announced and included in Assessment Report. New PEOs or SOs are submitted for update on the website and catalog for the following academic year.

2.7 Institutional Assessment and ISLOs

In addition to program-level student outcomes, Oregon Tech has defined and regularly assesses university-wide student outcomes. These are commonly referred to as Institutional Student Learning Outcomes (ISLOs) and are linked to the general education requirements which are common to all majors. A description of the ISLOs can be found at https://www.oit.edu/academic-excellence/GEAC/essential-studies/eslo.

Oregon Tech's ISLOs support the university's mission. They reflect the common expectations about the knowledge, skills, and abilities that Oregon Tech students will acquire and are reflected in the General Education requirements that lay the foundation upon which the major curricula build. Engaging in these ISLOs will support Oregon Tech graduates in developing the habits of mind and behaviors of professionals and lifelong learners.

Institutional Student Learning Outcomes: Oregon Tech students will

- (ISLO1) **communicate** effectively orally and in writing;
- (ISLO2) engage in a process of **inquiry and analysis**;
- (ISLO3) make and defend reasonable **ethical judgements**;
- (ISLO4) collaborate effectively in **teams** or groups;
- (ISLO5) demonstrate **quantitative literacy**;
- (ISLO6) explore **diverse perspectives**.

An initial comparison of the ISLOs to the BSEE SOs reveals good alignment between the two sets of outcomes. Both the program level and institutional level outcomes support and complement each other in a synergistic manner. This also facilitates the coordination of assessment and continuous improvement efforts at the program and institutional level. Table 5 shows a tentative map of the BSEE student outcomes to the ISLOs. As the table indicates, the student learning outcomes correlate strongly with the ISLOs, with each SO mapping to at least one ISLO.

Table 5: Mapping between BSEE SOs (1)–(7) and ISLOs

Student Outcome	**ISLO1:** Communication	**ISLO2:** Inquiry and Analysis	**ISLO3:** Ethical Judgements	**ISLO4:** Teamwork	**ISLO5:** Quantitative Literacy	**ISLO6:** Diverse perspectives
(1) Problem Solving		•				
(2) Design/Broader Factors						•
(3) Communication	•					
(4) Ethics			•			
(5) Teamwork				•		
(6) Experimentation					•	
(7) Lifelong Learning		•				

2.8 Mapping of BSEE Curriculum to SOs and ISLOs

Table 6 shows the mapping of the BSEE curriculum to the student outcomes (SOs) (1)-(7), as well as the institutional ISLOs. For each course, the table indicates whether the outcome is covered at the foundational (F), practice (P), or capstone (C) level. In the case of electives, the student outcomes covered are dependent on the specific elective course selected by the student. They have been marked with X.

Table 6: Mapping between BSEE courses and student outcomes

BSEE Student Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ISLOs	**ISLO2**	**ISLO6**	**ISLO1**	**ISLO3**	**ISLO4**	**ISLO5**	**ISLO2**
Communication							
SPE 111: Public Speaking	F		F				
SPE 321: Small Group & Team Comm.			P		F		
WRI 121: English Composition	F		F				
WRI 227: Technical Report Writing	P		P				

Table 6: Mapping between BSEE courses and student outcomes

BSEE Student Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ISLOs	**ISLO2**	**ISLO6**	**ISLO1**	**ISLO3**	**ISLO4**	**ISLO5**	**ISLO2**
WRI 3xx/4xx: Adv. Writing Elective	P		C				
Math/Science							
CHE 201/4: General Chemistry & Lab	F				F	F	
MATH 251: Differential Calculus	F					F	
MATH 252: Integral Calculus	P					P	
MATH 253: Sequences and Series	P					P	
MATH 254: Vector Calculus I	C					C	
MATH 321: Applied Differential Eq. I	C					C	
MATH 341: Linear Algebra I	C					C	
MATH 465: Mathematical Statistics	C					C	
PHY 221: General Physics w/ Calculus	F				F	F	
PHY 222: General Physics w/ Calculus	P				F	P	
PHY 223: General Physics w/ Calculus	C				F	C	
Math/Science Elective	P					P	
General Engr. & Programming							
CST 116: C++ Programming I	F					F	
ENGR 101: Intro. to Engineering I	F	F	F	F	F		F
ENGR 102: Intro. to Engineering II	F	F	F	F	F		F
ENGR 267: Engineering Programming	P					P	
Electrical Engineering							
EE 131: Digital Electronics I	F	F			F	F	F
EE 133: Digital Electronics II	F					F	F
EE 221: Circuits I	F		F		F	F	F
EE 223: Circuits II	F		F		F	F	F
EE 225: Circuits III	P		P		P	P	P
EE 321: Electronics I	P	F	P		P	P	P
EE 323: Electronics II	P	F	P		P	P	P
EE 325: Electronics III	C	P	C		C	C	C
EE 331: Digital Sys. Design w/ HDL	P					P	P

Table 6: Mapping between BSEE courses and student outcomes

BSEE Student Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ISLOs	**ISLO2**	**ISLO6**	**ISLO1**	**ISLO3**	**ISLO4**	**ISLO5**	**ISLO2**
EE 333: Microcontroller Engineering	P					P	P
EE 335: Adv. Microcontroller Engr.	C	P	P	P	C	C	C
EE 341: Elec. and Mag. w/ Trans. Lines	P					P	P
EE 343: Solid-State Electronic Devices	P					P	P
EE 401: Communication Systems	C	C				C	C
EE 430: Linear Systems & DSP	C	C			C	C	C
EE 461: Control Systems Design	C					C	C
Engineering Electives (varies)	X	X	X	X	X	X	X
ENGR 465: Capstone Project	C	C	C	C	C	C	C
Business and General Education							
MGT 345: Engineering Economy		F		P		F	
Humanities Electives (varies)	X	X	X	X	X	X	X
Social Science Electives (varies)	X	X	X	X	X	X	X

3 Cycle of Assessment of Student Outcomes

3.1 Introduction, Methodology, and the Assessment Cycle

The BSEE faculty conducts periodic assessment of student outcomes. Assessment of program student outcomes is conducted over a three (3) year cycle, which is shown in Table 7. For each outcome, assessment data is collected via direct and indirect assessment measures.

In addition to the program outcomes scheduled for a particular year, assessment is also performed for Oregon Tech's Institutional Student-Learning Outcomes (ISLOs) that are scheduled for that particular year by the Executive Assessment Committee. More information on institutional assessment was presented in section 2.7 (Institutional Assessment and ISLOs).

The correspondence between programmatic student outcomes (1)-(7) and institutional ISLOs is presented in Table 7. In order to streamline the assessment process, effective 2022-23 the BSEE program assessment will be modified to match the current university ISLO assessment cycle. The last three columns of Table 7 show the new assessment cycle, with the BSEE SO outcome assessment (shown as (•)) overlaps with the ISLO outcome assessment (shown as (x)).

Table 7: BSEE Outcome Assessment Cycle. Year of current report is shaded. Bullets (•) indicate BSEE SO (1)-(7) assessment cycle. Crosses (x) indicate ISLO assessment cycle.

Student Outcome	2019-20	2020-21	2021-22	**2022-23**	2023-24	2024-25
(1) Problem Solving		•			•	
ISLO2 Inquiry & Analysis		x			x	
(2) Design/Broader Factors		•		•		
ISLO6 Diverse Perspectives	x			x		
(3) Communication	•		•			•
ISLO1 Communication			x			x
(4) Ethics			•			•
ISLO3 Ethical Reasoning			x			x
(5) Teamwork			•			•
ISLO4 Teamwork			x			x
(6) Experimentation			•		•	
ISLO5 Quantitative Literacy		x			x	
(7) Independent Learning	•				•	
ISLO2 Inquiry & Analysis		x			x	

3.2 Methodology for Assessment of Student Outcomes

At the beginning of Fall term, an **assessment plan** is generated by the Assessment Coordinator in consultation with the faculty. This plan includes the outcomes to be assessed during that assessment cycle (refer to Table 7), as well as the courses and terms where these outcomes will be assessed. For each outcome, two direct assessment activities are typically planned from two different campus locations.

Direct assessment of student outcomes is performed as part of the course curriculum by means of assignments, exams and course projects. A systematic, rubric-based process is then used to assess the level of attainment of a given program outcome, based on a set of performance criteria. The work produced by each student is evaluated according to the different performance criteria, and assigned a level of 1-developing, 2-accomplished, or 3-exemplary.

Indirect assessment of the student outcomes is performed on an annual basis through a senior exit survey.

The results of the direct and indirect assessment are reviewed by the faculty at the annual closing-the-loop meeting, which takes place at the beginning of Fall term in the following academic year. The standard acceptable performance level is to have at least 80% of the students obtain a level of accomplished or exemplary in each of the performance criteria for any given program outcome. It has been accepted in past closing-the-loop meetings that faculty can set a different threshold if required by the type of assignment or outcome, but must do so prior to the assessment.

If the assessment data indicates performance below the established level for any student outcome, that triggers the process of continuous improvement. Based on the evidence, the faculty decides on an adequate action plan. The possible courses of action are:

- Collect more data (if there is insufficient data to reach a conclusion as to whether the outcome is being attained or not); this may be the appropriate course of action when assessment was conducted on a class with low enrollment, and it is recommendable to re-assess the outcome on the following year, even if it is out-of-cycle, in order to obtain more data.
- Make changes to the assessment methodology (if the faculty believe that missing the performance target on a specific outcome may be a result of the way the assessment is being conducted, and a more proper assessment methodology may lead to more accurate numbers); for example, this could be the suggested course of action if an outcome was assessed in a lower-level course, and the faculty decide that the outcome should be assessed in a higher-level course before determining whether curriculum changes are truly needed.
- Implement changes to the curriculum (if the faculty conclude that a curriculum change is needed to improve attainment of a particular outcome). A curriculum change will be the course of action taken when the performance on a given outcome is below the target level, and the evidence indicates that there is sufficient data and an adequate assessment methodology already in place, and therefore there is no reason to question the results obtained.

Degree completion, retention and equity data are also collected by the university and annually reviewed by the program faculty as part of an initiative to identify and close equity gaps. This is done through the use of the university's dashboards, which allow to track the 6-year graduation rates as well as the 1-year retention rates, and sort this data along different demographic categories such as gender, race and socio-economic status. At the closing-the-loop meeting, program faculty review the equity data for their program to identify trends or equity gaps. Potential ways to address these are discussed and appropriate action plans are developed as needed.

The results of the direct and indirect assessment, as well as the conclusions of the faculty discussion at the **closing-the-loop meeting** are included in the annual BSEE **assessment report**, which is reviewed by the department chair and submitted to the Office of Academic Excellence for review by the Executive Assessment Committee. If action plans include suggested changes to the curriculum, these are presented and discussed with all the department faculty, as well as with the Industry Advisory Board. If approved, these changes are submitted to the Curriculum Planning Commission and updated in the catalog for the following academic year.

4 Assessment Data

4.1 Assessment of Program Outcomes

The following student outcomes were assessed in the 2022-23 academic year in the courses indicated:

- **(2) Design/Broader Factors** : ENGR 465 Capstone Project (PM and KF), EE325 Electronics III (PM and KF)

The sections below describe the targeted assessment activities and detail the performance of students for each of the assessed outcomes. Unless otherwise noted, the tables report the percentage of students performing at a 1 - developing level, 2 - accomplished level, and 3 - exemplary level for each performance criteria, as well as the percentage of students performing at an accomplished level or above (i.e., assessed level ≥ 2).

The target attainment level for all outcomes is 80% of students at or above a level 2 (Accomplished). All direct assessment was performed using the rubrics in section 6 (Rubrics).

4.1.1 Direct Assesssment of Outcome (2) Design/Broader Factors

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

A total of 16 BSEE students were assessed in ENGR 465 (KF: N = 10; PM: N = 6). The results are presented in Table 8. An additional 3 students were assessed in EE325 (KF: N = 1; PM: N = 2). The results are presented in Table 9.

ENGR 465 – Spring 2023, Feng Shi (Klamath Falls), Slobodan Petrovic (Portland Metro)

This outcome was assessed in ENGR 465 - Capstone Project. The capstone project is a year-long (three-term) project that students complete in their senior year, which involves a major design experience. Throughout the year, students are required to complete the definition, design, implementation, and verification of a major engineering design project. During the initial stage, students work under the supervision of their capstone project advisor to select a project of adequate scope, and submit a project proposal. The proposal includes an background review of the state of art, explanation of the project relevance and problem addressed, a project definition or specification, a proposed design, a timeline with major milestones, a list of resources needed to complete the project, and a projected cost analysis. Once the proposal is approved by the academic advisor, students go through the different phases of design, implementation, and verification of their project.

During this time, students have regular meetings with their project advisor in order to report progress, notify of plan changes if needed, present results, and perform prototype demonstrations. Throughout the term, students present status updates of their project to the class and answer questions. Once the design, implementation, and verification process is completed, and there is a final working prototype, students are required to generate and present a poster for the annual Student Project Symposium and submit a formal written report.

The capstone project requires the application of engineering design principles and skills to produce solutions. Beyond the technical specifications, students must consider other factors in their design solution, such as public safety, as well as environmental and economic factors, among others.

Table 8: Results of direct assessment for student outcome (2) Design/Broader Factors

Performance Criteria	**1 Developing**	**2 Accomplished**	**3 Exemplary**	**Students ≥2**	**Outcome Attained?**
Klamath Falls, ENGR 465, N=10					
2.1 Design	0	2	8	100%	Y
2.2 Broader Factors	0	2	8	100%	Y
Portland Metro, ENGR 465, N=6					
2.1 Design	1	5	0	83.3%	Y
2.2 Broader Factors	0	2	4	100%	Y

EE325 – Spring 2023, Cristina Crespo (Klamath Falls, Portland Metro)

The EE325 course was taught in an online modality, and included students from both campuses. The number of BSEE students enrolled was low (N = 3), as this is an elective course in the BSEE program.

The assignment used for assessment was the final project for the course. Students were required to complete a project focused on an application of electronic circuits. The project involved the design and simulation of the circuit, followed by its implementation on a PCB and final verification and troubleshooting. The assignment required students to create a plan for their project, including project objectives and milestones. Once their plan was approved, students had to follow the design process to meet the objectives laid out in their project specification. Students were asked to consider a number of factors beyond the technical aspects of their design, such as safety, cost, and/or environmental factors.

Students were required to create a poster presentation of their design. They were asked to make a presentation of their poster and a live demo of their project. In their presentation, they were asked to specifically address their key design challenges and considerations, both technical and non-technical (the latter to include considerations of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors).

Table 9: Results of direct assessment for student outcome (2) Design/Broader Factors

Performance Criteria	1 Developing	2 Accomplished	3 Exemplary	Students ≥2	Outcome Attained?
Klamath Falls, EE325, N=1					
2.1 Design	0	0	1	100%	Y
2.2 Broader Factors	0	1	0	100%	Y
Portland Metro, EE325, N=2					
2.1 Design	0	1	1	100%	Y
2.2 Broader Factors	0	1	1	100%	Y

4.1.2 Indirect Assessment of Program Outcomes

In addition to direct assessment measures, student outcomes (1)-(7) were indirectly assessed through a senior exit survey of graduating students.

Graduating students are asked to rate their competency in each of the program outcomes on a 4-point scale (0-lowest to 3-highest). The departmental objective is to have at least 80% of participants give a rating of 2 or 3 in both questions.

Only 2 BSEE graduating seniors completed the Senior Exit Survey (9.5% of the graduating class). The low participation rate was due to issues with the survey distribution at the institutional level. The results of this indirect assessment are presented in Figure 1. These results and how the institutional issues have been addressed are discussed in the Closing-the-Loop section of the report (see section 5).

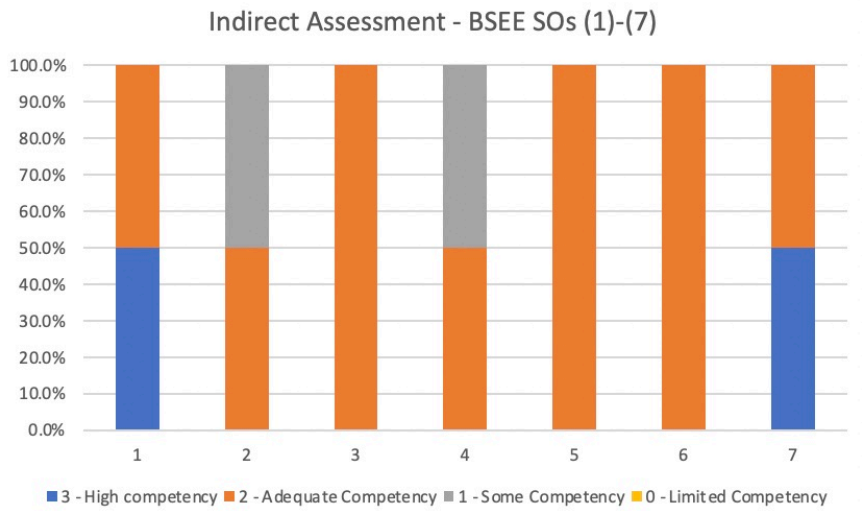

Figure 1: Results of indirect assessment for program SOs (1)-(7) (N=2)

4.2 Assessment of ISLOs

The following ISLOs were assessed in the 2022-23 academic year in the courses indicated:

- **ISLO6 Diverse Perspectives** : ENGR 465 Capstone Project (PM and KF), EE325 Electronics III (PM and KF)

The sections below describe the targeted assessment activities and detail the performance of students for each of the assessed ISLOs. *The target attainment level for all outcomes is 70% of students at or above a level 3 (Proficiency). All direct assessment was performed using the ISLO rubrics as described in section 6 (Rubrics).*

4.2.1 Direct Assesssment of ISLO6 Diverse Perspectives

ISLO 6 Diverse Perspectives is defined as:

Recognition of diverse perspectives requires the self-awareness, intellectual flexibility, and broad knowledge that enables perception of the world through the eyes of others. This includes but is not limited to the awareness and understanding of the customs, practices, methodologies, and viewpoints of varied cultures, individuals, and identities.

Direct assessment was performed on a sample of 19 BSEE students (KF: N = 11, PM: N = 8). A description of the artefacts used for direct assessment can be found in section 4.1. All direct assessment was performed using the ISLO rubrics in section 6 (Rubrics). The results are presented in Table 10.

The results display the percentage of students showing 1 - limited proficiency, 2 - some proficiency, 3 - proficiency and 4 - high proficiency in each performance criteria, as well as the percentage of students reaching a level of proficiency ≥ 3. The target attainment level for all ISLOs is 70% of students at or above a level 3 (Proficiency).

4.2.2 Indirect Assesssment of ISLOs

In addition to direct assessment measures, ISLOs 1-6 are indirectly assessed through a senior exit survey of graduating students.

Students are asked to rate their proficiency in each of the ISLOs on a 4-point scale. The attainment target is to have at least 70% of participants give a rating of 3 or above.

Graduating students are asked to rate their competency in each of the program outcomes on

Table 10: Results of direct assessment for ISLO6 - Diverse Perspectives

Performance Criteria	**1 Limited Proficiency**	**2 Some Proficiency**	**3 Proficiency**	**4 High Proficiency**	**Students ≥3**	**Outcome Attained?**
Direct Assessment, N = 19, Attainment Target: 70% of scores ≥ 3						
Recognize	0	5	4	10	73.7%	Y
Know	1	3	5	10	78.9%	Y
Understand	0	5	6	8	73.7%	Y
Apply	1	4	6	8	73.7%	Y
Indirect Assessment, N = 3, Attainment Target: 70% of scores ≥ 3						
ISLO6	0	0	1	2	100.0%	Y

a 4-point scale (0-lowest to 3-highest). The departmental objective is to have at least 80% of participants give a rating of 2 or 3 in both questions.

Only 3 BSEE graduating seniors completed the Senior Exit Survey (14.3% of the graduating class). The low participation rate was due to issues with the survey distribution at the institutional level. The results of this indirect assessment are presented in Figure 2. These results and how the institutional issues have been addressed are discussed in the Closing-the-Loop section of the report (see section 5).

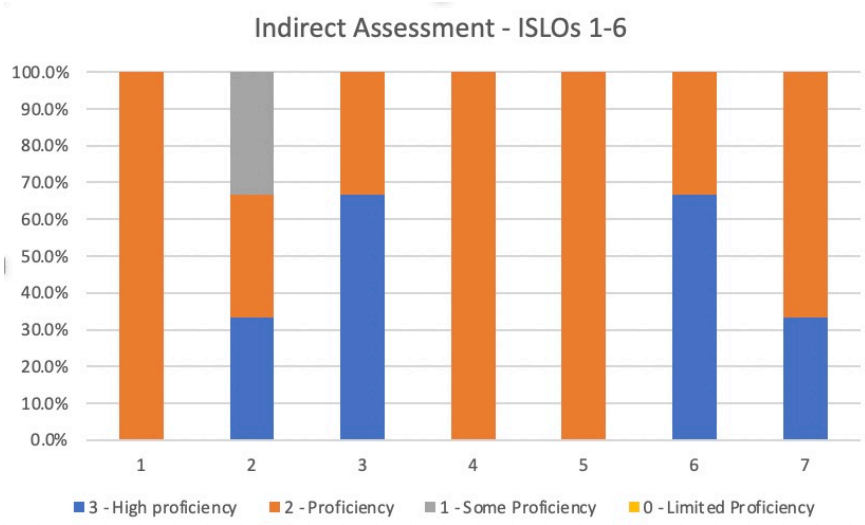

Figure 2: Results of indirect assessment for ISLOs 1-6 (N=3)

4.3 Degree Completion, Retention and Equity Data

The university has recently started tracking equity data as part of an initiative to identify and close equity gaps. To this end, the university has developed several dashboards that allow to track the 6-year graduation rates as well as the 1-year retention dates, and to sort this data along different demographic categories such as gender, race and socio-economic status.

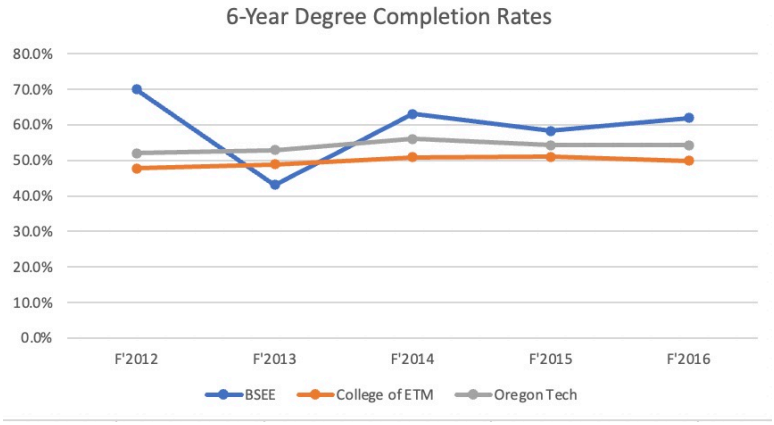

Figure 3: 6-year completion rates for students who started at Oregon Tech in Fall 2012 through Fall 2016.

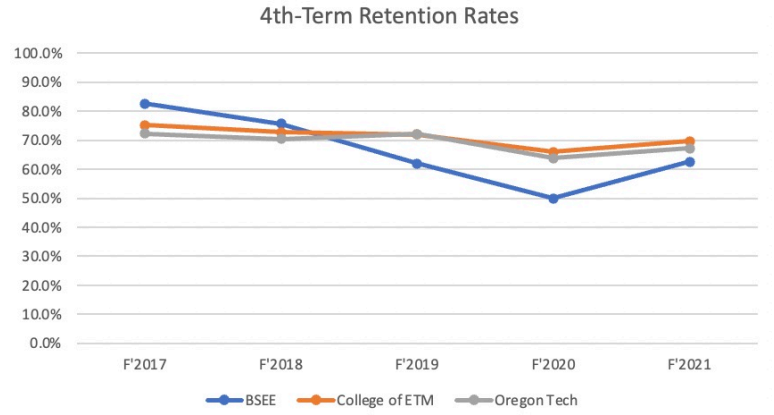

Figure 4: 4th term retention rates for students who started at Oregon Tech in Fall 2016 through Fall 2020.

Figure 3 shows the 6-year degree completion rates for students starting their degree in Fall 2012 through Fall 2016. Figure 4 shows the 4th term retention rates for students starting at Oregon Tech in Fall 2016 through Fall 2020. The 4th term retention rate represents the proportion of students who were still enrolled at Oregon Tech four terms after their start term (excluding Summer term). Both sets of data are presented for three student populations: (1) BSEE students, (2) College of ETM students, and (3) all Oregon Tech students. By overlapping these three populations, we

can identify whether there are trends that pertain specifically to BSEE students, or whether they follow the overall college or university trend.

Figure 5 shows the 6-year degree completion rates for students starting in Fall 2012 through Fall 2016 (a 5-year window, N=222). The data is presented for different subpopulations of students categorized according to various equity groups (gender, race, etc.). The 6-year degree completion rate for the overall BSEE population (59%) is also shown for reference.

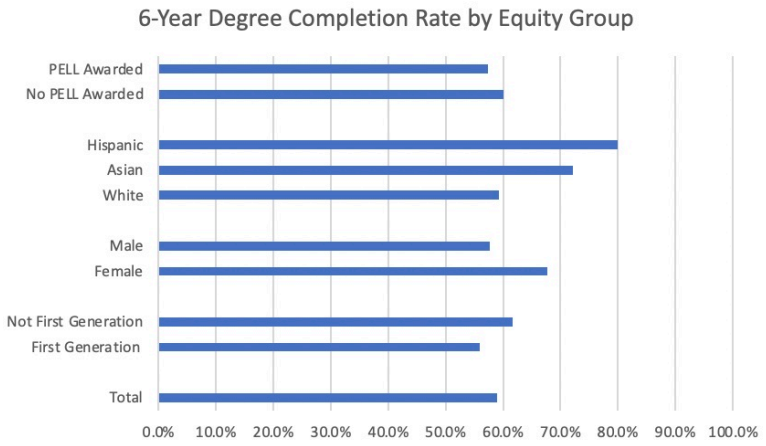

Figure 5: 6-year completion rates for students who started at Oregon Tech in Fall 2012 through Fall 2016.

5 Continuous Improvement and Closing-the-Loop

The BSEE Closing-the-Loop meeting was held on 14 October 2021 to review the assessment results. A summary of the discussions and action plans based on assessment results are presented in the following sections.

5.1 Historical Summary of Program Assessment Results

Table 11 shows a summary and history of results for the direct assessment of program outcomes assessed in AY2022-23. The table shows the percentage of students scoring 2 (accomplished) or above in each performance criteria. These results combine the total number of students assessed within the year from all campus locations. The objective set by the EERE department is to have at least 80% of the students perform at the level of accomplished or exemplary in all performance criteria.

Table 11: Summary and historical results of BSEE assessment. The objective set by the EERE department is 80% attainment.

Student Outcome	**AY19–20**	**AY20–21**	**AY21–22**	**AY22–23**	**Outcome Met?**
(2) Design/Broader Factors					
Direct Assessment	—	$N = 13$	$N = 4$	$N = 19$	
2.1 Engineering Design	—	100%	100%	94.7%	Yes
2.2 Broader Factors	—	—	100%	100%	Yes
Indirect Assessment	—	$N = 14$	$N = 9$	$N = 2$	
Design/Broader Factors	—	100%	100%	–	N/A

Table 11 shows a summary and history of results for the direct assessment of outcomes assessed in AY2021-22. The table shows the percentage of students scoring 2 (accomplished) or 3 (exemplary) in each performance criteria. These results combine the total number of students assessed within the year from all campus locations. The objective set by the EERE department is to have at least 80% of the students perform at the level of accomplished or exemplary in all performance criteria.

5.2 Evaluation of Assessment Results and Data Driven Action Plans

Below is a summary of the discussion and recommendations made by the BSEE faculty based on the evaluation of the assessment results. The summary of the action plans proposed can be found in Table 12.

1. **Assessment of Program SOs**
   Outcome (2) Design/Broader Factors was attained to the desired level, which is consistent with historical trends. No action required at this point.

2. **Assessment of ISLOs**
   ISLO 6 Diverse Perspectives was attained to the desired level. No action required.

3. **Indirect Assessment**
   In AY2022-23, the university changed its reporting system from FAST to a new reporting application Edify. Due to a clerical error when linking the Student Exit Survey to the new system, only students who graduated in Fall term were able to complete the student exit survey, and therefore the sample size for the indirect assessment this year is too small to be meaningful. Carrie Dickson is working on this and expects this issue to be resolved by Fall 2023. Indirect assessment data collected from previous years shows generally a positive level of attainment of student outcomes.

4. **Program Changes**
   The BSEE curriculum map was updated effective Fall 2023 with the aim of having the courses line up in the same terms in K Falls and PM campuses. This should make it easier to run courses remotely if there is a last minute adjunct cancellation, for example. Advisors must also be aware of the changes to the communications courses (course names and credits) implemented last year. BSEE advisors should keep an eye for changes in the terms course are offered and assist students whose academic plans may have been impacted. Any issues with the new curriculum maps should be reported to the BSEE Program Director.

5. **Accreditation**
   The final report from the ABET accreditation visit from Fall 2023 was positive for reaccreditation. No deficiencies were found. Two weaknesses and one concern were identified. The first weakness relates to criterion 2 - Program Educational Objectives (ensuring all stakeholders have input in the periodic revision of PEOs). The second weakness relates to Criterion 5 - Curriculum (documenting the use of engineering codes and standards in capstone projects). The concern relates to Criterion 8 - Institutional Support (low faculty numbers to support the current programs). The department must submit a report describing the corrective actions to address these items by July 1, 2014. A request to ABET for a reaccreditation report evaluation must be made by January 31, 2024.

6. **Enrollment, Retention, Graduation and Equity trends**
   BSEE enrollment is 60 in Klamath Falls and 58 in Portland Metro. Overall enrollment has steadily decreased in the last 5 years, from 194 in AY2018-19 to 118 in AY2022-23.

   The 4th-term retention rate has improved from 50.0% (Fall 2020) to 62.5% (Fall 2021). This is slightly lower than the retention for the College of ETM (69.7%) and Oregon Tech (67.1%).

   The 6-year graduation rate has also seen a slight improvement from last year (last year: 58.3%, this year: 61.9%), and is higher than the College of ETM (49.9%) and the university (54.2%).

The equity data was collected over a 5-year window to avoid artefacts due to low sample sizes. In general, no major equity gaps (>10%) are observed among different groups. The female 6-year graduation rate is slightly higher than the male (67.7% vs. 57.6%), and students of white race also show lower rates than asians or hispanics (59.2% vs. 72.2% and 80.0%, respectively). In both cases, the sample sizes in one or more of the subcategories is too small (N< 30), so based on this data there are no equity gaps that can be meaningfully identified.

Enrollment and retention have been an ongoing issue for a few years, and have been negatively impacted by the COVID-19 pandemic, followed by the high rate of faculty attrition in the last year. The department has been working (and will continue to do so) on stabilizing the situation. A new department chair was brought on board this year, as well as some new faculty hires. In order to improve timely graduation rates and retention, the department will prioritize predictable course scheduling (e.g., ensuring adequate faculty resources to deliver the curriculum at the expected level of quality, minimizing course cancellations). The department chair and BSEE faculty will work with Strategic Enrollment Management and the Admissions office to determine how we can inform and collaborate in recruiting efforts.

Table 12: Summary of data-driven action plans

Item	**Action**	**Person In Charge**	**Due Date**
SO (2) Design / Broader Factors - Outcome met	None.	N/A	N/A
ISLO6 Diverse Perspectives - Outcome met	None.	N/A	N/A
Indirect Assessment - Low participation	Address and correct institutional issues with Student Exit Survey distribution.	C. Dickson	Fall 2023
Program Changes - Updates to BSEE curriculum map effective Fall 2023, and changes to Gen Ed courses	Updated curriculum maps must be published on the website and advisors should refer to updated versions on EERE website. Any issues that may arise must be reported to BSEE PD and resolved. Catalog should be checked and updated if needed.	N. Korivi, L. Esteban	Fall 2023
Accreditation - 2 weaknesses and 1 concern identified in last ABET visit	A small task force led by M. Aboy will work on determining what changes need to be implemented to address the ABET weaknesses and concern, see that these changes are implemented, and generating the report for ABET describing the corrective action taken.	M. Aboy, L. Esteban, N. Korivi	Spring 2024

Table 12: Summary of data-driven action plans

Item	Action	Person In Charge	Due Date
Enrollment, Retention, Graduation and Equity Data	In order to improve timely graduation rates and retention, the department will prioritize predictable course scheduling (e.g., ensuring adequate faculty resources to deliver the curriculum at the expected level of quality, minimizing course cancellations). The department chair and BSEE faculty will work throughout the academic year with Strategic Enrollment Management and the Admissions office to determine how we can inform and collaborate in recruiting efforts.	N. Korivi	Spring 2024
SO (4) Ethics: Outstanding item from last year's report (see Table 13)	The faculty decided to include an Ethics element as part of the Capstone project. Capstone reports should include discussion of any ethical aspects or judgements relevant to the project.	S. Petrovic, F. Shi	Spring 2024

5.3 Review of Previous Year Action Plans

Table 13 shows the status of implementation of recommendations for changes based on prior assessments.

Table 13: Status of action plans from prior assessments.

Item	Action	Person In Charge	Status
SO (2) Design / Broader Factors	Ensure broader factors / diverse perspectives component is included as part of the capstone project requirements and final report.	F. Shi, S. Petrovic	Completed.
SO (4) Ethics	Provide students opportunities to develop their ethical judgement by including some coverage of ethics in courses throughout the curriculum. Add ethics module to EE 461 - Control Systems I.	R. Melendy	Moved to AY2022-23 (see Table 12)

Table 13: Status of action plans from prior assessments.

Item	Action	Person In Charge	Status
SO (5) Teamwork	Modify team assignments in EE325 to ask students to take into account availability of team members in the planning stages, and where pertinent include it in their project proposals.	C. Crespo	Completed
Indirect Assessment	Rephrase categories in Exit Survey as: 1. *Limited Competency* 2. *Some Competency* 3. *Adequate Competency* 4. *High Competency.* • Note: *Competency evaluated against other graduates of ABET-accredited engineering programs.* Add comment field: *If you rated any Outcomes at 2 or below, please indicate the reasons.*	M. Aboy, S. Prahl	Completed
Enrollment: Sharp decline in enrollment following COVID-19 pandemic	Continue to monitor enrollment data on an annual basis to determine whether trend is reversed. Faculty should aim to participate in recruiting and registration events throughout the year.	C. Crespo, BSEE faculty	In progress (see Table 12
Retention: Decline in retention rates following pandemic, faculty strike, faculty resignations	Request faculty positions to replace those who resigned in order to continue to ensure program quality.	S. Prahl	In progress. 2 faculty positions added in KF and 1 in PM for Fall 2023.
Equity Dashboards: Only absolute numbers reported. Provides no meaningful information regarding potential equity gaps.	Work with IR and Executive Assessment Committee to modify equity dashboards so proportions for equity categories can be extracted and equity data can be interpreted meaningfully.	C. Crespo	Completed

5.4 Assessment Plan for AY2023-24

An outline of the planned assessment activities for AY2023-24 is shown in Table 14. The table shows the outcomes that will be assessed (both programmatic SOs and ISLOs), as well as the courses and terms when they will be assessed, and the faculty responsible for collecting the assessment data.

Table 14: Assessment Plan for AY2023-24

Student Outcome	Fall 2023	Winter 2024	Spring 2024
(1) Problem Solving ISLO2 Inquiry & Analysis	EE321 L.Esteban, M. Aboy		ENGR465 F. Shi, S. Petrovic
(6) Experimentation ISLO5 Quantitative Literacy		EE323 L. Esteban, C. Crespo	ENGR465 F. Shi, S. Petrovic
(7) Independent Learning ISLO2 Inquiry & Analysis	EE321 L.Esteban, M. Aboy		ENGR465 F. Shi, S. Petrovic

6 Rubrics

The rubrics used by the program faculty for direct assessment of programmatic student outcomes are included below. To promote consistency and reliability of assessment results, all faculty assessing a particular outcome use the same rubric.

The rubrics used for ISLO assessment are provided by the university through the Executive Assessment Committee, and can be found on the Institutional Assessment website.

EAC RUBRIC: OUTCOME (1) – PROBLEM SOLVING

Outcome (1) An ability to identify, formulate, and solve complex engineering problems[1] by applying principles of engineering, science, and mathematics

CRITERIA	1-DEVELOPING	2-ACCOMPLISHED	3-EXEMPLARY	SCORE
ABILITY TO IDENTIFY A COMPLEX ENGINEERING PROBLEM	An engineering problem is not identified, or the identification is too vague or unclear.	An engineering problem of reasonable complexity is adequately identified and its significance minimally explained.	A complex engineering problem is properly identified and clearly stated. Its significance is thoroughly explained.	
ABILITY TO FORMULATE A COMPLEX ENGINEERING PROBLEM BY APPLYING PRINCIPLES OF ENGINEERING, SCIENCE AND MATHEMATICS	A complex engineering problem is not properly formulated in engineering, scientific, and/or mathematical terms. Most of the assumptions and specifications are either missing or unclear.	A complex engineering problem is adequately formulated in engineering, scientific, and/or mathematical terms, but some of the assumptions and specifications may be missing or not clearly presented.	A complex engineering problem is clearly formulated with a valid and complete set of assumptions and specifications.	
ABILITY TO SOLVE A COMPLEX ENGINEERING BY APPLYING PRINCIPLES OF ENGINEERING, SCIENCE AND MATHEMATICS	The solution to a complex engineering problem is not developed according to engineering, scientific, and mathematical principles, or it does not follow the original set of assumptions and specifications.	The solution to a complex engineering problem is developed according to engineering, scientific, and mathematical principles. The solution reasonably meets most of the original set of assumptions and specifications.	The solution to a complex engineering problem is very well developed according to engineering, scientific, and mathematical principles. The solution meets or exceeds the original set of assumptions and specifications.	

[1] As defined by ABET, complex engineering problems include one or more of the following characteristics: involving wide-ranging or conflicting technical issues, having no obvious solution, addressing problems not encompassed by current standards and codes, involving diverse groups of stakeholders, including many component parts or sub-problems, involving multiple disciplines, or having significant consequences in a range of contexts.

EAC RUBRIC: OUTCOME (2) – BROADER FACTORS

Outcome (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

CRITERIA	1-DEVELOPING	2-ACCOMPLISHED	3-EXEMPLARY	SCORE
ABILITY TO APPLY ENGINEERING DESIGN TO PRODUCE SOLUTIONS THAT MEET SPECIFIED NEEDS	Does not follow the engineering design process, or the designed solution does not meet the specified need(s).	Reasonably follows the engineering design process to produce a solution that adequately meets the specified need(s).	Methodically follows the engineering design process to produce a solution that thoroughly meets the specified need(s).	
ABILITY TO DESIGN SOLUTIONS ACCOUNTING FOR BROADER CONSIDERATIONS, SUCH AS PUBLIC HEALTH, SAFETY, AND WELFARE, AS WELL AS GLOBAL, CULTURAL, SOCIAL, ENVIRONMENTAL, AND ECONOMIC FACTORS	The solution provided does not take into account broader practical considerations, such as public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	The solution provided takes into account and partially addresses some of the broader practical considerations, such as public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	The solution provided takes into account and thoroughly addresses several of the broader practical considerations, such as public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	

EAC RUBRIC: OUTCOME (3) – COMMUNICATION

Outcome (3) An ability to communicate effectively with a range of audiences

CRITERIA	1-DEVELOPING	2-ACCOMPLISHED	3-EXEMPLARY	SCORE
ABILITY FOR EFFECTIVE ORAL COMMUNICATION	The main ideas are not clearly presented. Low volume or monotonous tone make it hard for audience to engage. Speaker does not transmit any interest or enthusiasm about the topic.	The main ideas are clearly presented. Adequate volume and dynamic tone are used to engage audience. Speaker occasionally transmits interest and enthusiasm about the topic.	Speaker is an excellent communicator. The main ideas are clearly presented. Speaker is eloquent and dynamic, effective at engaging the audience. Speaker displays and transmits a strong interest and enthusiasm about the topic.	
ABILITY FOR EFFECTIVE WRITTEN COMMUNICATION	Content is disorganized, the main ideas are not clearly stated and developed. Writing style is rough or imprecise. Frequent grammar/spelling errors. Document presentation and format rough or inconsistent.	Content is well organized and the main ideas are clearly stated and reasonably developed. Writing style is adequate for purpose and readable. Grammar/spelling mostly correct. Document presentation and format adequate and consistent.	Content is very well organized and easy to follow, main ideas are clearly presented and thoroughly developed. Writing style is adequate for purpose, readable, and tailored to intended audience. Grammar/spelling correct. Work is professionally presented and very well formatted.	
ABILITY FOR EFFECTIVE GRAPHICAL COMMUNICATION	Inadequate use of figures, charts, and/or tables to display data. Figures are not well placed, many figures, charts, and tables missing key formatting elements, such as titles, labels, units, captions, etc. Overall, figures do not contribute to a better understanding of key ideas or results.	Adequate use of figures, charts, and tables to display data. Figures are well placed, most figures, charts, and tables are properly labeled and formatted. Figures moderately contribute to a better understanding of key ideas or results.	Excellent use of figures, charts, and tables to display data. All figures, charts, and tables properly labeled and formatted, easy to read and interpret. Figures substantially and effectively contribute to a better understanding of key ideas or results.	
ABILITY TO ADDRESS A RANGE OF AUDIENCES	Does not address target audience. Content is too technical or too superficial to be understood by and of interest to a wide range of audiences.	Adequately addresses the target audience. Content has a reasonable balance of technical and non-technical information to be understood by and of interest to a wide range of audiences.	Effectively addresses the target audience. Content has the right balance of technical and non-technical information to be understood by and of interest to a wide range of audiences.	

EAC RUBRIC: OUTCOME (4) – ETHICS

Outcome (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

CRITERIA	1-DEVELOPING	2-ACCOMPLISHED	3-EXEMPLARY	SCORE
ABILITY TO RECOGNIZE ETHICAL AND PROFESSIONAL RESPONSIBILITIES IN ENGINEERING SITUATIONS	Description of ethical and professional responsibilities is limited or rudimentary.	Description of ethical and professional responsibilities is substantive.	Description of ethical and professional responsibilities is complete and thorough.	
ABILITY TO IDENTIFY GLOBAL, ECONOMIC, ENVIRONMENTAL, AND SOCIETAL CONTEXTS IN ENGINEERING SITUATIONS	Identifies a single context area relevant in an engineering situation. Explanation of the context is rudimentary.	Identifies most context areas relevant in an engineering situation. Explanation of the contexts is substantive.	Identifies all context areas relevant in an engineering situation. Explanation of contexts is complete and thorough.	
ABILITY TO JUDGE THE IMPACT OF ENGINEERING SOLUTIONS ON GLOBAL, ECONOMIC, ENVIRONMENTAL, AND SOCIETAL CONTEXTS	Analysis and judgement of the impact of engineering solutions on contexts is rudimentary.	Analysis and judgement of the impact of engineering solutions on contexts is substantive.	Analysis and judgement of the impact of engineering solutions on contexts is complete and thorough.	

EAC RUBRIC: OUTCOME (5) – TEAMS

Outcome (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				
CRITERIA	1—DEVELOPING	2—ACCOMPLISHED	3—EXEMPLARY	SCORE
ABILITY TO PROVIDE TEAM LEADERSHIP	Lacks adequate ability to resolve problems and conflicts. Lacks ability to provide adequate leadership in decision making, planning, and goal setting. Does not show appreciation for other team members' contributions. Exhibits poor team communication skills (e.g., interrupts others, gets defensive, does not ask questions, gets distracted). Does not motivate others or lead by example.	Capable of resolving problems and conflicts. Demonstrates adequate leadership ability in decision making, planning, and goal setting. Occasionally shows appreciation for other team members' contributions. Exhibits reasonable team communication skills. Capable of motivating others. Willing to share problems and progress. Mainly does assigned work instead of willingly taking on additional responsibilities.	Proficient in resolving problems and conflicts and exhibits proficient leadership ability in decision making, planning, and goal setting. Appropriately recognizes and shows appreciation for other team members' contributions. Exhibits proficient team communication skills including good body language and active listening. Transparent about expectations and objectives. Motivates others and leads by example. Willing to share problems and take on additional responsibilities and help others when necessary.	
ABILITY TO CREATE A COLLABORATIVE AND INCLUSIVE ENVIRONMENT AS A TEAM MEMBER	Rarely uses respectful language or show cooperative communication skills. Does not demonstrate mutual respect and tends to dismiss others' unique perspectives, opinions, or ideas. Does not demonstrate ability and willingness to compromise with other group members.	Generally, uses respectful language and shows cooperative communication skills. Does not disrespect other group members or dismiss their unique perspectives, opinions, or ideas. Demonstrates adequate ability and willingness to compromise with other group members. Does not dismiss the sharing of ideas.	Uses respectful language and shows cooperative communication skills. Actively demonstrates mutual respect and welcomes others' unique perspectives. Demonstrates high ability and willingness to compromise with other group members. Makes other group members feel safe and valued through openly encouraging the sharing of ideas.	
ABILITY TO ESTABLISH GOALS, PLAN TASKS, AND MEET OBJECTIVES AS A TEAM MEMBER	Lacks basic awareness of team duties and responsibilities. Lacks basic awareness of the links between project goals and tasks. Fails to identify risks to meet project deadlines.	Capable of performing most team duties and responsibilities. Capable of establishing goals and performing necessary talks on time to meet project deadlines and identifies most issues impacting project success.	Proficient execution of all team duties and responsibilities. Proficient in establishing goals and performing necessary tasks on time to meet project deadlines and identifies issues impacting projects success.	

EAC RUBRIC: OUTCOME (6) – EXPERIMENTATION

Outcome (6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

CRITERIA	1-DEVELOPING	2-ACCOMPLISHED	3-EXEMPLARY	SCORE
ABILITY TO DEVELOP AND CONDUCT AN EXPERIMENT	Demonstrates inadequate knowledge and abilities for conducting experiments with standard test and measurement equipment to collect experimental data. May not observe lab safety and procedures.	Demonstrates adequate knowledge and abilities for conducting experiments. Able to use standard test and measurement equipment to collect experimental data. Reasonably capable of troubleshooting to overcome measurement problems. May require supervision and steering in the right direction. Overall, observes lab safety plan and procedures.	Demonstrates comprehensive knowledge, exceptional abilities, and resourcefulness for conducting experiments. Selects appropriate equipment and measuring devices and methodology for conducting experiments. Demonstrates a proficient ability to troubleshoot, predict and overcome measurement problems. Observes established lab safety plan and procedures. Proposes improvements as necessary.	
ABILITY TO ANALYZE AND INTERPRET DATA	Demonstrates inadequate knowledge and abilities for analyzing and interpreting experimental results. Reporting methods are unsatisfactory.	Demonstrates adequate abilities for experimental data analysis, interpretation, and visualization. Able to draw some reasonable conclusions based on experimental results. Demonstrates an awareness for measurement error. Reporting methods are satisfactorily organized, logical, and complete	Demonstrates exceptional ability for experimental data analysis, interpretation, and visualization. Able to draw insightful conclusions based on experimental results. Analyzes and interprets data using appropriate theory, accounts for measurement error into analysis and interpretation, reporting methods are well-organized, logical, and complete.	
ABILITY TO USE ENGINEERING JUDGEMENT TO DRAW CONCLUSIONS	Lacks the ability and awareness for interpreting experimental data to draw meaningful conclusions, decide, act, and/or communicate suggestive actions using of appropriate scientific/engineering principles, standards, and practices. Not adept at navigating complexity, open ended problems, or ambiguous data.	Adequately capable of interpreting experimental data to draw meaningful conclusions, decide, act, and/or communicate suggestive actions based upon the use of appropriate scientific/engineering principles, standards, and practices. May require significant guidance in the face of complexity, open ended problems, or ambiguous data.	Proficient in interpreting experimental data to draw meaningful conclusions, decide, act, and/or communicate suggestive actions based upon the use of appropriate scientific/engineering principles, standards, and practices. Able to make quality engineering decisions/conclusions, especially in the face of complexity, open-ended problems, or ambiguous data.	

EAC RUBRIC: OUTCOME (7) – LEARNING

Outcome (7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

CRITERIA	1-DEVELOPING	2-ACCOMPLISHED	3-EXEMPLARY	SCORE
ABILITY TO ACQUIRE NEW KNOWLEDGE USING APPROPRIATE LEARNING STRATEGIES	Shows poor ability and little openness to acquire new knowledge and diagnosing their learning needs. Does not identify proper opportunities or resources to expand knowledge and skills. Unable or uninterested to find new information without significant guidance and prompting. Lacks awareness at one's current knowledge and skills for identifying basic gaps in understanding. Lacks the strategies and motivation necessary for self-directed learning.	Shows sufficient ability and openness to acquire new knowledge and diagnosing their learning needs. Able to identify some opportunities or resources to expand knowledge and skills. Able and interested to find new information, perhaps with some prompting. Uses current knowledge and skills to identify basic gaps in understanding. Exhibits adequate strategies and motivation necessary for self-directed learning.	Demonstrates proficient ability and openness to acquire new knowledge and diagnosing their learning needs. Independently identifies and uses a diverse range of resources to expand knowledge and skills. Able and interested to find new information with minimal prompting. Uses current knowledge and skills to identify key gaps in understanding. Exhibits exemplary strategies and motivation necessary for self-directed learning.	
ABILITY TO APPLY NEW KNOWLEDGE AS NEEDED	Inadequately unmotivated and skilled at applying new knowledge as needed for decision making, completing tasks, drawing conclusions, and/or understanding a topic in more depth. Insufficiently understands and determines the significance or relevance of the learned information needed for the task.	Adequately motivated and skilled at applying new knowledge as needed for decision making, completing tasks, drawing conclusions, and/or understanding a topic in more depth. Partially understands and determines the significance or relevance of the learned information needed for the task.	Proficiently skilled and motivated at applying new knowledge as needed for decision making, completing tasks, drawing conclusions, and/or understanding a topic in more depth. Understands and determines the significance or relevance of the learned information needed for the task.	

7 Raw Assessment Data

The EERE department stores all data used for direct assessment in the *EERE/Assessment* folder in Teams. The raw data for the BSEE direct assessments performed in AY2022-23 can be found in the folder *EERE/Assessment/BSEE/2022-23*. The documentation in the folder includes, for every direct assessment performed, a copy of the assignment used for assessment of the outcome, the individual student work, and a spreadsheet listing the scores given to each student in the different performance criteria for the outcome, according to the outcome rubric. This data is not included in the report for space considerations, but access to this data is available upon request.