— B. S. in Electrical Engineering —

2023–24 Assessment Report

Cristina Crespo

Electrical Engineering & Renewable Energy Department

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 faculty addressed during AY2023-24. A report detailing the corrective action was submitted to ABET in 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 and faculty. Input from these constituents is gathered and reviewed in a periodic manner to ensure the program educational objectives and student outcomes remain aligned with the direction of industry, as well as the university's mission and resources.

The IAB and the program faculty meet once or twice per year (typically Fall and/or Spring terms). At these meetings, faculty have an opportunity to provide an update on the state of the department and its programs, as well as to collect 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 2019 to Fall 2023. 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 was 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)

	2019-20	**2020-21**	**2021-22**	**2022-23**	**2023-24**
Klamath Falls	86	76	58	60	62
Portland Metro	101	85	63	58	50
Total	187	161	121	118	112

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

	2019-20	**2020-21**	**2021-22**	**2022-23**	**2023-24**
Klamath Falls	17	16	14	10	12
Portland Metro	16	17	12	11	11
Total	33	33	26	21	23

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/or 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 was 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 2023-24 academic year in the courses indicated:

- **(1) Problem Solving** : EE 321 Electronics I (PM and KF), ENGR 465 Capstone Project (PM and KF)
- **(6) Experimentation** : EE 323 Electronics II (PM and KF), ENGR 465 Capstone Project (PM and KF)
- **(7) Independent Learning** : EE 321 Electronics I (PM and KF), ENGR 465 Capstone Project (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).

NOTE: 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 (1) Problem Solving

An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.

This outcome was assessed in EE 321 Electronics I as well as ENGR 465 Capstone Project. The assignment descriptions and assessment data are provided below.

EE321 – Fall 2023, Mateo Aboy (PM), Luis Esteban (KF)

In the Portland Metro campus, this outcome was assessed by means of a project. The purpose of the assignment was for students to design a regulated power supply. The lab assignment consisted of designing, simulating, implementing, and experimentally testing an AC–to–DC power supply and linear regulator with current boosting to provide an adjustable regulated output voltage with short–circuit/overload protection. Students were provided with a series of design specifications and

design constraints. They were expected to select an initial topology within the given constraints, identify the limitations of this topology and work on improving the design through an iterative process of analyzing and solving technical problems until the given specifications were met. Once the design was finalized (analyzed theoretically) and the simulations indicated the results were met, students were required to physically implement their designs and experimentally test them. This additional step was intended to get students to identify, analyze, and solve an additional set of technical problems related to implementation and measurement of electronic designs. Finally, the students were required to write a record and video demo showing their working design and write an IEEE camera-ready report documenting their design. The assignment involved the application of mathematics, science and engineering, as well as the acquisition and application of new knowledge as needed in order to formulate and solve a complex engineering problem, namely the design of the power supply.

In the Klamath Falls campus, the outcome was also assessed via a course project. Students were asked to design a regulated power supply. The assignment had several components including designing and simulating, an AC–to–DC power supply, choosing the components of the power supply and designing a PCB (Printed Circuit Board) using KiCAD, a PCB design software. The assignment required students to apply their current knowledge in mathematics, electronics and engineering to formulate and solve a new complex engineering problem. Additionally, students learned how to design a PCB and use the KiCAD software for this purpose, which was a new skill introduced as part of the assignment. Students were required to submit their final design, and to explain their design methodology and the results they obtained.

Table 8: Results of direct assessment for SO (1) Problem Solving in EE 321

Performance Criteria	**1 Developing**	**2 Accomplished**	**3 Exemplary**	**Students ≥2**	**Outcome Attained?**
Klamath Falls, EE321, N=7					
1.1 Identify	1	3	3	85.7%	Y
1.2 Formulate	1	2	4	85.7%	Y
1.3 Solve	1	3	3	85.7%	Y
Portland Metro, EE321, N=10					
1.1 Identify	1	8	1	90%	Y
1.2 Formulate	1	8	1	90%	Y
1.3 Solve	1	8	1	90%	Y

ENGR 465 – Spring 2024, Feng Shi (Klamath Falls), Naga Korivi (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 students to identify a technical problem, formulate it in engineering terms by developing a project specification, and use the principles and tools of mathematics, science and engineering to develop a technical solution.

Table 9: Results of direct assessment for SO (1) Problem Solving in ENGR 465

Performance Criteria	**1 Developing**	**2 Accomplished**	**3 Exemplary**	**Students ≥2**	**Outcome Attained?**
Klamath Falls, ENGR 465, N=14					
1.1 Identify	0	5	9	100%	Y
1.2 Formulate	0	5	9	100%	Y
1.3 Solve	0	2	12	100%	Y
Portland Metro, ENGR 465, N=7					
1.1 Identify	0	2	5	100%	Y
1.2 Formulate	0	2	5	100%	Y
1.3 Solve	0	2	5	100%	Y

4.1.2 Direct Assessment of Outcome (6) Experimentation

An ability to develop and conduct appropriate experimentation, interpret data analyze and interpret data, and use engineering judgement to draw conclusions.

This outcome was assessed in EE 323 Electronics II as well as ENGR 465 Capstone Project. The assignment descriptions and assessment data are provided below.

EE323 – Winter 2024, Cristina Crespo (PM), Luis Esteban (KF)

At the Portland Metro campus, this outcome was assessed in the final project for the course, which involved the design of a discrete operational amplifier at the transistor level. Students were asked to produce two op-amp designs, using BJT and MOSFET technology, respectively. Students had to design and conduct appropriate experiments to characterize their designs based on performance parameters such as input/output resistance, CMRR, PSRR, output compliance, temperature sta-

bility, THD, etc. Students were expected to use LTSpice to model/simulate their circuit, and in some cases also build their circuits and characterize their performance experimentally. Finally, students were asked to generate a project report including a description of their design methodology, a presentation and discussion of their results, and a comparison between the performance of the BJT and MOSFET op-amps, as well as a comparison to a benchmark such as the LM741. This assignment required students to develop and conduct appropriate experiments to characterize their circuits based on specific performance parameters, as well as analyzing and interpreting the data from their characterization experiments, and use engineering judgement to draw conclusions based on the analysis of their results.

In the Klamath Falls campus, the outcome was assessed through a series of laboratory experiments aimed at demonstrating the students' proficiency in CMOS analog circuit analysis, measurement, and data interpretation. Throughout these labs, students showed their understanding and application of fundamental principles in designing analog circuits, including transistor-level design, circuit analysis, and performance optimization by selecting appropriate circuit configurations and components, as well as performing accurate laboratory measurements. The labs required students to design circuits, simulate their behavior, physically build the circuits, and perform the necessary measurements to verify correct operation. Students analyzed and interpreted data to draw conclusions regarding circuit performance.

Table 10: Results of direct assessment for SO (6) Experimentation in EE 323

Performance Criteria	**1 Developing**	**2 Accomplished**	**3 Exemplary**	**Students ≥2**	**Outcome Attained?**
Klamath Falls, EE323, N=9					
6.1 Method	1	4	4	88.9%	Y
6.2 Analysis	2	3	4	77.8%	N
6.3 Conclusions	3	3	3	66.7%	N
Portland Metro, EE323, N=10					
6.1 Method	1	8	1	90%	Y
6.2 Analysis	1	8	1	90%	Y
6.3 Conclusions	1	8	1	90%	Y

ENGR 465 – Spring 2024, Feng Shi (Klamath Falls), Naga Korivi (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 students to develop and conduct appropriate experiments to test their design and evaluate its performance. This involves the collection, analysis and interpretation of technical data, as well as the use of such data to draw conclusions about the design's performance.

Table 11: Results of direct assessment for SO (6) Experimentation in ENGR 465

Performance Criteria	**1 Developing**	**2 Accomplished**	**3 Exemplary**	**Students ≥2**	**Outcome Attained?**
Klamath Falls, ENGR 465, N=14					
6.1 Method	0	4	10	100%	Y
6.2 Analysis	0	4	10	100%	Y
6.3 Conclusions	0	3	11	100%	Y
Portland Metro, ENGR 465, N=7					
6.1 Method	0	4	3	100%	Y
6.2 Analysis	0	4	3	100%	Y
6.3 Conclusions	0	4	3	100%	Y

4.1.3 Direct Assesssment of Outcome (7) Independent Learning

An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

This outcome was assessed in EE 321 Electronics I as well as ENGR 465 Capstone Project. The assignment descriptions and assessment data are provided below.

EE321 – Fall 2023, Mateo Aboy (PM), Luis Esteban (KF)

In the Portland Metro campus, this outcome was assessed by means of a project. The purpose of the assignment was for students to design a regulated power supply. The lab assignment consisted of designing, simulating, implementing, and experimentally testing an AC–to–DC power supply and linear regulator with current boosting to provide an adjustable regulated output voltage with short–circuit/overload protection. Students were provided with a series of design specifications and design constraints. They were expected to select an initial topology within the given constraints, identify the limitations of this topology and work on improving the design through an iterative process of analyzing and solving technical problems until the given specifications were met. Once

the design was finalized (analyzed theoretically) and the simulations indicated the results were met, students were required to physically implement their designs and experimentally test them. This additional step was intended to get students to identify, analyze, and solve an additional set of technical problems related to implementation and measurement of electronic designs. Finally, the students were required to write a record and video demo showing their working design and write an IEEE camera-ready report documenting their design. The assignment involved the application of mathematics, science and engineering, as well as the acquisition and application of new knowledge as needed in order to formulate and solve a complex engineering problem, namely the design of the power supply.

In the Klamath Falls campus, the outcome was also assessed via a course project. Students were asked to design a regulated power supply. The assignment had several components including designing and simulating, an AC–to–DC power supply, choosing the components of the power supply and designing a PCB (Printed Circuit Board) using KiCAD, a PCB design software. The assignment required students to apply their current knowledge in mathematics, electronics and engineering to formulate and solve a new complex engineering problem. Additionally, students learned how to design a PCB and use the KiCAD software for this purpose, which was a new skill introduced as part of the assignment. Students were required to submit their final design, and to explain their design methodology and the results they obtained.

Table 12: Results of direct assessment for SO (7) Independent Learning in EE 321

Performance Criteria	**1 Developing**	**2 Accomplished**	**3 Exemplary**	**Students ≥2**	**Outcome Attained?**
Klamath Falls, EE321, N=7					
7.1 Acquire	2	2	3	71.4%	N
7.2 Apply	2	1	4	71.4%	N
Portland Metro, EE321, N=10					
7.1 Acquire	1	8	1	90.0%	Y
7.2 Apply	1	8	1	90.0%	Y

ENGR 465 – Spring 2024, Feng Shi (Klamath Falls), Naga Korivi (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 students to acquire knowledge beyond what's covered in the curriculum (e.g., more in-depth knowledge of the particular subfield most related to their project, and/or new methods or tools), as well as the application of such knowledge to develop a technical solution.

Table 13: Results of direct assessment for SO (7) Independent Learning in ENGR 465

Performance Criteria	**1 Developing**	**2 Accomplished**	**3 Exemplary**	**Students ≥2**	**Outcome Attained?**
Klamath Falls, ENGR 465, N=14					
7.1 Acquire	0	4	10	100%	Y
7.2 Apply	0	4	10	100%	Y
Portland Metro, ENGR 465, N=7					
7.1 Acquire	0	5	2	100%	Y
7.2 Apply	0	5	2	100%	Y

4.1.4 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 (adequate or high competency).

Ten graduating seniors completed the Senior Exit Survey (43% of the graduating class). The results of this indirect assessment are presented in Figure 1. These results are discussed in the Closing-the-Loop section of the report (see section 5).

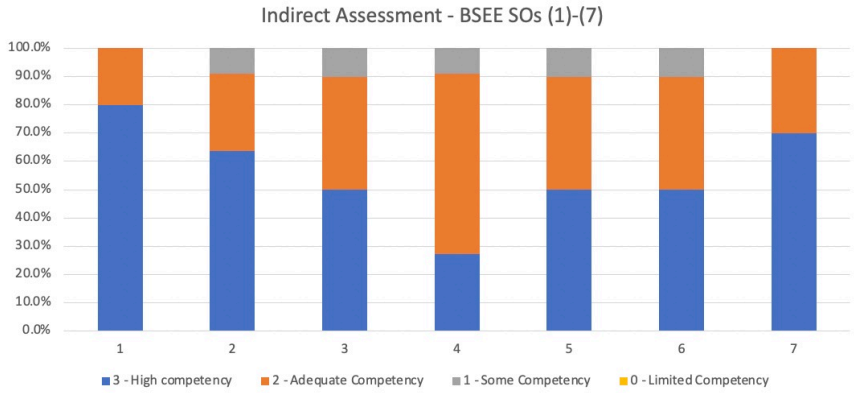

Figure 1: Results of indirect assessment for program SOs (1)-(7) (N=10)

4.2 Assessment of ISLOs

The following ISLOs were assessed in the 2023-24 academic year in the courses indicated:

- **ISLO2 Inquiry and Analysis** : EE 321 Electronics I (PM and KF) and ENGR 465 Capstone Project (PM and KF)
- **ISLO5 Quantitative Literacy** : EE 323 Electronics II (PM and KF) and ENGR 465 Capstone Project (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 Assesssment of ISLO2 Inquiry and Analysis

ISLO 2 Inquiry and Analysis consists of posing meaningful questions about situations and systems, gathering and evaluating relevant evidence, and articulating how that evidence justifies decisions and contributes to students' understanding of how the world works.

Direct assessment was performed in EE 321 Electronics I (KF: N = 7, PM: N = 10) and ENGR 465 Capstone Project (KF: N=14, PM: N=7). A description of the artefacts used for direct assessment can be found in section 4.1.

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. Ten graduating students completed the survey (N = 10).

The results of the direct and indirect assessments of ISLO 2 are presented in Table 14.

Table 14: Results of direct assessment for ISLO2 - Inquiry and Analysis

Performance Criteria	**1 Limited Proficiency**	**2 Some Proficiency**	**3 Proficiency**	**4 High Proficiency**	**Students ≥3**	**Outcome Attained?**
Direct Assessment, EE 321, N = 17, Attainment Target: 70% of scores ≥ 3						
Identify	0	2	11	4	88.2%	Y
Investigate	0	4	10	3	76.5%	Y
Support	0	4	10	3	76.5%	Y
Evaluate	0	3	12	2	82.4%	Y
Conclude	0	3	12	2	82.4%	Y
Direct Assessment, ENGR 465, N = 21, Attainment Target: 70% of scores ≥ 3						
Identify	0	3	7	11	85.7%	Y
Investigate	0	3	5	13	85.7%	Y
Support	0	5	5	11	76.2%	Y
Evaluate	0	4	6	11	76.2%	Y
Conclude	0	4	5	12	81.0%	Y
Indirect Assessment, N = 10, Attainment Target: 70% of scores ≥ 3						
ISLO2	0	0	3	7	100.0%	Y

4.2.2 Assesssment of ISLO5 Quantitative Literacy

ISLO 5 Quantitative Literacy comprises the ability to appropriately extract, interpret, evaluate, construct, communicate, and apply quantitative information and methods to solve problems, evaluate claims, and support decisions in students' everyday professional, civic, and personal lives.

Direct assessment was performed in EE 323 Electronics II (KF: N = 10, PM: N = 10) and ENGR 465 Capstone Project (KF: N =14, PM: N = 7). A description of the artefacts used for direct assessment can be found in section 4.1.

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. Ten graduating students completed the survey (N = 10).

The results of the direct and indirect assessments of ISLO 2 are presented in Table 15.

Table 15: Results of direct assessment for ISLO5 - Quantitative Literacy

Performance Criteria	**1 Limited Proficiency**	**2 Some Proficiency**	**3 Proficiency**	**4 High Proficiency**	**Students ≥3**	**Outcome Attained?**
Direct Assessment, EE 323, N = 20, Attainment Target: 70% of scores ≥ 3						
Calculate	0	2	8	10	90.0%	Y
Interpret	0	4	6	10	80.0%	Y
Representations	0	2	8	10	90.0%	Y
Apply in Context	0	5	7	8	75.0%	Y
Communicate	0	6	10	4	70.0%	Y
Direct Assessment, ENGR 465, N = 21, Attainment Target: 70% of scores ≥ 3						
Calculate	0	5	5	11	76.2%	Y
Interpret	0	5	5	11	76.2%	Y
Representations	0	5	5	11	76.2%	Y
Apply in Context	0	2	8	11	90.5%	Y
Communicate	0	4	4	13	81.0%	Y
Indirect Assessment, N = 10, Attainment Target: 70% of scores ≥ 3						
ISLO5	0	0	1	9	100.0%	Y

4.2.3 Indirect Assesssment of ISLOs

The complete results of the indirect assessment of all ISLOs from the senior exit survey is shown in Figure 2. The target of 70% of students rating themselves at a level of 3 or above was met for all ISLOs. (Note: ISLO1 Communication is split into two subcategories, 1a Writing and 1b, Speaking).

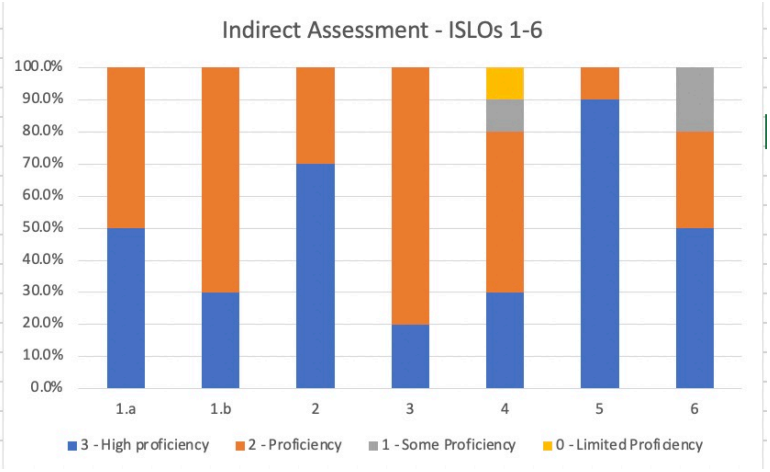

Figure 2: Results of indirect assessment for ISLOs 1-6 (N=10)

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.

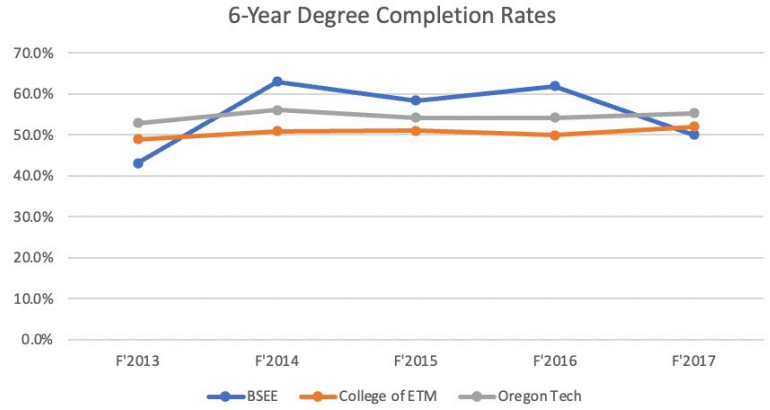

Figure 3: 6-year completion rates for students who started at Oregon Tech in Fall 2013 through Fall 2017.

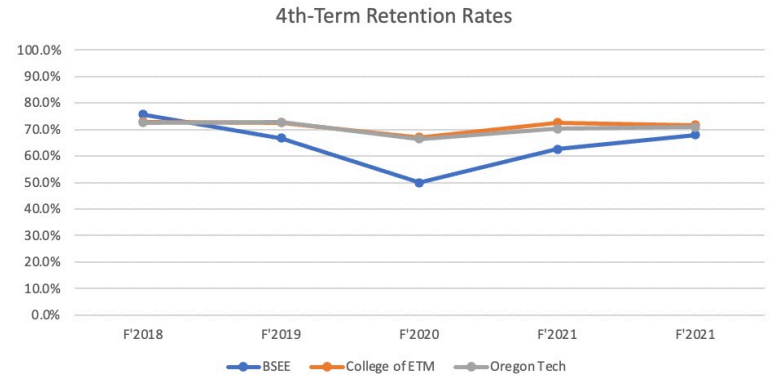

Figure 4: 4th term retention rates for students who started at Oregon Tech in Fall 2017 through Fall 2021.

Figure 3 shows the 6-year degree completion rates for students starting their degree in Fall 2013 through Fall 2017. Figure 4 shows the 4th term retention rates for students starting at Oregon Tech in Fall 2017 through Fall 2021. 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 2013 through Fall 2017 (a 5-year window, N=232). 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 (55%) is also shown for reference.

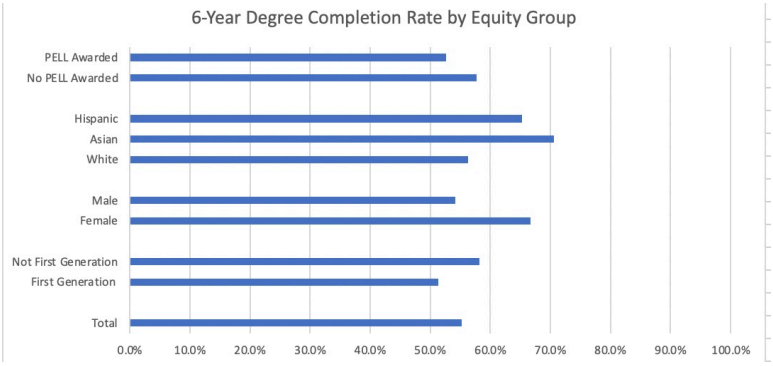

Figure 5: 6-year completion rates for students who started at Oregon Tech in Fall 2013 through Fall 2017.

5 Continuous Improvement and Closing-the-Loop

The BSEE Closing-the-Loop meeting was held on 18 September 2024 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 16 shows a summary and history of results for the direct assessment of program outcomes assessed in AY2023-24. 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 16: Summary and historical results of BSEE assessment. The objective set by the EERE department is 80% attainment.

Student Outcome	**AY20–21**	**AY21–22**	**AY22–23**	**AY23–24**	**Outcome Met?**
(1) Problem Solving					YES
Direct Assessment	$N = 31$	–	–	$N = 38$	
1.1 Identify	94%	–	–	95%	✓
1.2 Formulate	97%	–	–	95%	✓
1.3 Solve	87%	–	–	95%	✓
Indirect Assessment	$N = 14$	–	–	$N = 10$	
Problem Solving	92%	–	–	100%	✓
(6) Experimentation					YES
Direct Assessment	–	$N = 22$	–	$N = 40$	
6.1 Method	–	95%	–	95%	✓
6.2 Analysis	–	82%	–	92%	✓
6.3 Conclusions	–	82%	–	90%	✓
Indirect Assessment	–	$N = 9$	–	$N = 10$	
Experimentation	–	100%	–	90%	✓
(7) Independent Learning					YES
Direct Assessment	–	–	–	$N = 38$	
7.1 Acquire	–	–	–	92%	✓
7.2 Apply	–	–	–	92%	✓
Indirect Assessment	–	–	–	$N = 10$	
Independent Learning	–	–	–	100%	✓

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 17.

1. **Assessment of Program SOs**
   All outcomes assessed were attained to the desired level, which is consistent with historical trends. No action required at this point.
   Outcome (6) Experimentation attainment was slightly lower at the K Falls campus junior-level course (EE323), although no significant differences were detected in the assessment performed on senior students at the Capstone project. No action needed at this point, but will continue to monitor for any differences the next time this outcome comes up for assessment in the regular cycle.

2. **Assessment of ISLOs**
   ISLOs 2 and 5 were assessed and attained to the desired level. No action required.

3. **Indirect Assessment**
   Indirect assessment data collected from senior exit survey shows generally a positive level of attainment of student outcomes. Participation in exit survey has increased with respect to last year. Will continue to encourage participation by having advisors remind students when they submit their applications to graduate.

4. **Program Changes**
   Last year guidelines were developed to include engineering standards in senior projects. All faculty teaching capstone projects must ensure that engineering standards are incorporated as part of the capstone project report.
   Faculty also discussed the need to incorporate content related to ethical judgements in the curriculum. An assignment was designed as an independent module and used for the EE 401 Communications course. The assignment requires students to familiarize themselves with the IEEE code of ethics, and articulate an ethical reasoning to a case study based on current technological trends in the electrical engineering field. Faculty agreed that this or a similar module will continue to be incorporated in EE 401 Communications as well as ENGR 465 Capstone Project.

5. **Accreditation**
   The department submitted the interim report to ABET to address the two weaknesses related to Criterion 2 - PEOs and Criterion 5 - Curriculum from the last ABET visit. ABET deemed actions taken to be effective at removing the weaknesses and re-granted accreditation until the next general visit in AY2028-29.

6. **Enrollment, Retention, Graduation and Equity trends**
   BSEE enrollment is 65 in Klamath Falls and 43 in Portland Metro. Overall enrollment has steadily decreased in the last 5 years, from 187 in AY2019-20 to 112 in AY2023-24. It appears

enrollment in K Falls is reversing trend and starting to increase slowly.

The 4th-term retention rate has improved from 62.5% (Fall 2021) to 67.9% (Fall 2022). This is more in line to the retention for the College of ETM (71.7%) and Oregon Tech (70.9%).

The 6-year graduation rate has gone down from last year (last year: 61.9%, this year: 50.0%), and is now closer to the College of ETM (52.0%) and the university (55.3%).

The equity data was collected over a 5-year window to avoid artefacts due to low sample sizes. Only two gaps greater than 10% were identified in 6-year graduation rates: (1) Female students outperform male students (66.7% vs. 54.1%), and students of white race underperform asians and hispanics (56.3% vs. 70.6% and 65.2%, respectively). In both cases, the sample sizes in one or more of the subcategories is too small (N< 30), so based on this data 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 following years. The department has been working on stabilizing the situation. A new department chair was brought on board last year, and two new faculty members were hired at the K Falls campus. The enrollment in K Falls has started to pick up in the last two years, and we expect this trend to continue. In order to improve timely graduation rates and retention, the department will continue to work on (1) hiring new faculty to fill out vacant faculty lines, (2) prioritizing predictable course scheduling (e.g., ensuring adequate faculty resources to deliver the curriculum at the expected level of quality, minimizing course cancellations), and (3) continue to work with Strategic Enrollment Management and the Admissions office to determine how we can inform and collaborate in recruiting efforts.

7. **Assessment Process**
   Assessment data must be timely collected and submitted at the end of every term. Assessment coordinator to send out assessment plan at the beginning of the academic year, as well as an e-mail with instructions and an e-mail reminder at the beginning and end of every term.

Table 17: Summary of data-driven action plans

Item	**Action**	**Person In Charge**	**Due Date**
Program SOs: All SOs assessed this year met to the desired target level.	None	N/A	N/A

Table 17: Summary of data-driven action plans

Item	Action	Person In Charge	Due Date
ISLOs: ISLO2 - Inquiry and Analysis and ISLO5 - Quantitative Literacy met.	None.	N/A	N/A
Indirect Assessment - All SOs and ISLOs attained. Participation at 43%	Continue to encourage participation. Advisors to remind students to complete survey when application for degree is submitted.	Faculty advisors.	Spring 2025
Program Changes - Include: (1) engineering standards in capstone project report, and (2) ethical reasoning module/assignment in EE 401 Communications and ENGR 465 Capstone Project	Last year guidelines were developed to include engineering standards in senior projects. All faculty teaching capstone courses must ensure engineering standards are included in the capstone project report. An ethics module/assignment was developed for EE 401 Communications. This or a similar ethics module/assignment will be used in EE 401 Communications and ENGR 465 Capstone Project courses .	Naga Korivi, Luis Esteban, Scott Prahl, Feng Shi (all faculty teaching EE 401 or ENGR 465)	Spring 2025
Accreditation - Interim report submitted and effective	Two weaknesses related to Criterion 2 - PEOs and Criterion 5 - Curriculum from the last ABET visit cleared. No further action until next accreditation visit in AY2028-29.	N/A	N/A
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

Table 17: Summary of data-driven action plans

Item	Action	Person In Charge	Due Date
Assessment Process: Need for improvement regarding timely submission of assessment data	Assessment data must be timely and correctly submitted at the end of every quarter. Assessment coordinator to send out assessment plan at the beginning of the academic year, as well as e-mail with instructions at the beginning and end of each quarter.	C. Crespo	Beginning and end of each term.

5.3 Review of Previous Year Action Plans

Table 18 shows the status of implementation of recommendations for changes based on prior assessments.

Table 18: Status of action plans from prior assessments.

Item	Action	Person In Charge	Status
Indirect Assessment - Low participation	Address and correct institutional issues with Student Exit Survey distribution.	C. Dickson	Completed
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	Completed
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	Completed

Table 18: Status of action plans from prior assessments.

Item	Action	Person In Charge	Status
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	In progress. Continued in AY24-25
SO (4) Ethics: Outstanding item from last year's report (see Table 18)	The faculty decided to include an Ethics element as part of the Capstone project course.	S. Petrovic, F. Shi	In progress. Continued in AY24-25

5.4 Assessment Plan for AY2024-25

An outline of the planned assessment activities for AY2024-25 is shown in Table 19. 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 19: Assessment Plan for AY2024-25

Student Outcome	Fall 2024	Winter 2025	Spring 2025
(3) Communication ISLO1 Communication		EE 323 C. Crespo, L. Esteban	ENGR465 F. Shi, S. Prahl
(4) Ethics ISLO3 Ethical Reasoning		ENGR 465 F. Shi, S. Prahl	EE 401 L. Esteban
(5) Teamwork ISLO4 Teamwork		EE 341 F. Shi	ENGR465 F. Shi, S. Prahl

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 AY2023-24 can be found in the folder *EERE/Assessment/BSEE/2023-24*. 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.