University of Tabuk

Faculty of Engineering

Electrical Engineering Department

Bachelor of Science in Electrical Engineering

Program Learning Outcomes Assessment Framework

Developed By: Quality Committee

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1. Introduction

The Bachelor of Science in Electrical Engineering Program (BSc EEP) at the University of Tabuk (UT) embraces a culture of continuous improvement through the systematic application of the PDCA (Plan-Do-Check-Act) cycle shown in Figure **1**. This dynamic cycle serves as the cornerstone of our commitment to excellence in electrical engineering education. In the "Plan" phase, we define our assessment goals and objectives, outlining the specific Program Learning Outcomes (PLOs) to be evaluated in a given academic year. This phase involves setting clear criteria for success and determining the assessment methods and tools that will best capture the mastery of essential electrical engineering skills.

Moving into the "Do" phase, our dedicated faculty and students actively engage in the assessment activities outlined in the plan. From examinations and laboratory projects to collaborative assignments, this phase involves the practical implementation of our assessment strategies. The "Check" phase then comes into play, where we rigorously analyze the collected data to evaluate the extent to which our students are meeting the established PLOs. This phase allows us to identify areas of achievement, as well as opportunities for enhancement in both our curriculum and instructional methodologies. In the final "Act" phase, the BSc EEP faculty takes decisive steps based on the assessment findings. This may involve refining instructional approaches, adjusting curriculum content, or the introduction of new courses to address specific challenges. The iterative nature of the PDCA cycle ensures that improvements are not just a one-time endeavor but a continuous, evolving process.

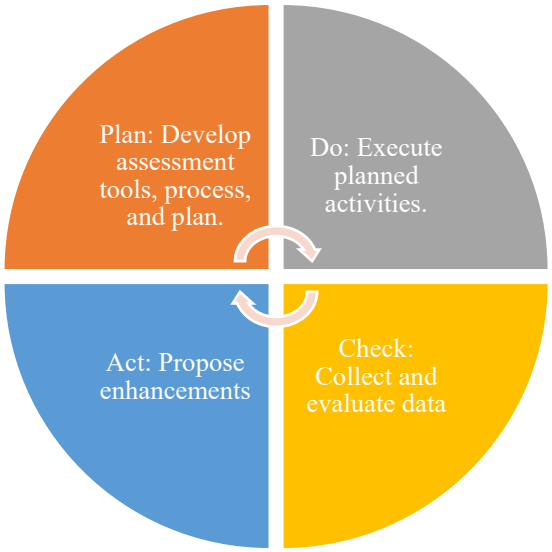

Figure 1 Continuous improvement process of BSc EEP PLOs

2. BSc EEP Program Learning Outcomes (PLOs)

The B.Sc. program in Electrical Engineering is designed to foster a comprehensive development of students across three key domains: Knowledge and Understanding (K), Skills (S), and Values, Autonomy, and Responsibility (V). The BSc EEP has eight Program Learning Outcomes (PLOs) that encapsulate the essence of these domains, reflecting the core competencies expected from

graduates. Table 1 displays the program learning outcomes for the Bachelor of Science in Electrical Engineering program (BSc EEP). Upon fulfilling the requirements for the academic degree, students acquire scientific knowledge, specialized skills, and values pertinent to the electrical engineering specialization, empowering them to effectively engage in professional practice.

The measurement of program learning outcomes stands out as a vital method for evaluating the program's quality. This evaluation process of PLOs is designed to gauge the program's ability in accomplishing its mission and goals. The collective PLOs create a robust framework guiding the assessment plan, ensuring a comprehensive evaluation of students' knowledge, skills, and values throughout their academic journey. The BSc EE program maintains a commitment to upholding quality education, employing mechanisms and tools to measure and verify program learning outcomes. Specific performance levels and detailed assessment plans are established, facilitating a thorough evaluation of student achievements. This commitment underscores our dedication to continuous improvement, aligning educational offerings with industry demands and academic standards.

Table 1 BSc EE Program Learning Outcomes

DOMAIN	PLO code	Knowledge and understanding
K	**K1**	Demonstrate knowledge and comprehension with both breadth and depth in the underlying theories, principles, and concepts of electrical engineering and science.
		Skills
S	**S1**	An ability to identify, formulate, and solve complex engineering problems by applying principles of electrical engineering, science, and mathematics.
	S2	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.
	S3	An ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgement to draw conclusions.
	S4	An ability to communicate effectively with a range of audiences.
		Values, Autonomy and Responsibility
V	**V1**	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
	V2	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.
	V3	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

3. Aligning NCAAA PLOs with ABET Student Outcomes (SOs)

The BSc Electrical Engineering (EE) program, in its pursuit of accreditation compliance, faces the dual challenge of aligning with the Accreditation Board for Engineering and Technology (ABET) and the National Commission for Academic Accreditation and Assessment (NCAAA), each utilizing distinct terminology for outcomes assessment. ABET employs the term "Student Outcomes" (SO), with specific codes ranging from SO(1) to SO(8), while NCAAA employs the term "Program Learning Outcomes" (PLO), coded as PLO(K1), PLO(S1), through PLO(V3). To bridge this terminology gap and enhance clarity, a mapping system has been established, linking NCAAA PLOs to their corresponding ABET SO codes. For instance, NCAAA's PLO(K1) corresponds to ABET's SO(8). In our program, we originally embraced the ABET framework, resulting in the integration of ABET-related terminologies throughout our documents and procedures. This is evident in various places, including the use of forms for data collection named Student Outcome Assessment Report (SOAR) and Student Outcome Evaluation Report (SOER). To avoid redundancy in our forms, we have chosen to retain their names and occasionally the terminologies within them, relying on the established mapping between Program Learning Outcomes (PLOs) and Student Outcomes (SOs) to alleviate any potential confusion.

Table 2 Mapping NCAAA PLOs to ABET SOs

NCAAA PLO code	K1	S1	S2	S3	S4	V1	V2	V3
ABET SO code	SO(8)	SO(1)	SO(2)	SO(6)	SO(3)	SO(4)	SO(5)	SO(7)

4. Aligning BSc EEP Courses with PLOs

To achieve the program learning outcomes, the Course Learning Outcomes (CLOs) for all courses are carefully defined, ensuring a seamless alignment with one or more Program Learning Outcomes (PLOs). Initially established by individual course instructors, CLOs and their mapping to PLOs are a collaborative effort, especially in courses taught by multiple instructors. The agreement on CLOs and mapping is reinforced through reviews by focus groups representing diverse areas within electrical engineering. Subsequently, the EE department council provides the final approval. CLOs and mapping them to the PLOs are transparently documented in the course specifications. This structured process establishes a clear relationship between electrical engineering courses and the specified PLOs. The alignment matrix, offering a comprehensive overview of all EE required and elective courses, along with the corresponding PLOs addressed in each course, is outlined in the program specifications.

5. Categorization of PLOs to technical and professional outcomes

The Program Learning Outcomes (PLOs) are categorized into two distinct sets to align with specific assessment methods and data collection sources. The first set, comprising PLO(K1), PLO(S1), PLO(S2), and PLO(S3), focuses on technical outcomes. This set is designed to evaluate the depth of knowledge and technical proficiency achieved by students in the field of electrical engineering. These technical outcomes are systematically evaluated through the Course Learning Outcomes (CLOs) of selected courses. In contrast, the second set, consisting of PLO(S4), PLO(V1), PLO(V2), and PLO(V3), is dedicated to professional outcomes. This set assesses students' proficiency in communication, teamwork, ethical considerations, and the ability to

continually acquire and apply new knowledge. The assessment of professional outcomes occurs through the observation of students' performance in Senior Design Projects (SDPs), with particular attention to the non-technical aspect of PLO(S2), involving design considerations. This dual categorization ensures a nuanced and comprehensive assessment that captures both technical expertise, assessed through coursework, and professional skills, observed during practical projects. Table 3 provides details on the learning domain, categories, NCAAA, and ABET codes associated with the Program Learning Outcomes (PLOs).

Table 3 Domains, Categories, NCAAA, and ABET Cods of PLOs

Learning Domain	NCAAA PLO code	PLO	ABET Code	Category
Knowledge and understanding	**K1**	Demonstrate knowledge and comprehension with both breadth and depth in the underlying theories, principles, and concepts of electrical engineering and science.	SO(8)	Technical Outcomes
Skills	**S1**	An ability to identify, formulate, and solve complex engineering problems by applying principles of electrical engineering, science, and mathematics.	SO(1)	
	S2	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.	SO(2)	
	S3	An ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgement to draw conclusions.	SO(6)	
	S4	An ability to communicate effectively with a range of audiences.	SO(3)	Professional Outcomes
Values, Autonomy and Responsibility	**V1**	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	SO(4)	
	V2	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.	SO(5)	
	V3	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	SO(7)	

6. BSc EEP PLOs Assessment Philosophy

The assessment philosophy of the BSc EE program adheres to the following guiding principles:

- In this context, PLO assessment is geared toward evaluating the attainment of Program Learning Outcomes (PLOs) rather than concentrating on the performance of individual students, faculty members, or specific courses.
- Each PLO is assessed using two distinct evaluation methods, ensuring a comprehensive and multifaceted understanding of its attainment.
- Most, if not all, EE faculty members actively participate in the assessment and evaluation processes for Program Learning Outcomes (PLOs), fostering a collective and inclusive approach.
- A transparent and well-defined assessment process is established to incentivize and facilitate the active involvement of faculty members.
- The continuous improvement process is maintained to ensure the ongoing refinement and enhancement of assessment practices over time.

Each Program Learning Outcome (PLO) undergoes assessment through a combination of direct and indirect methods. The direct method involves EE faculty members conducting assessments through examinations or observations, evaluating students' knowledge and skills against quantifiable learning objectives or performance criteria. On the other hand, indirect assessment is facilitated by students themselves through PLO surveys, commonly known as exit surveys, or by employers who express their opinions through surveys. Exit survey offers insights into students' perceptions of their own learning and skills.

7. Participants engaged in direct Assessment

The participants engaged in the direct assessment method include:

Instructors of respective courses:

They evaluate Course Learning Outcomes (CLOs) associated with specific Program Learning Outcomes (PLOs) in a controlled setting through exams and quizzes. The technical outcomes assessed by course instructors encompass PLO(S1), PLO(S2), PLO(S3), and PLO(K1).

Advisors for Senior Design Projects (SDP):

Advisors assess students' skills by observing measurable performance indicators and rubrics, detailed further in this report. The professional outcomes evaluated by SDP advisors include PLO(V1), PLO(V2), and PLO(V3).

SDP Examination Committee:

Comprising individuals responsible for examining all EE SDPs, this committee assesses PLO(S4) by evaluating students' communication skills through observable performance indicators and rubrics. Written communication skills are gauged through submitted reports, while oral communication skills are evaluated during presentations. The committee also assesses the non-technical aspect of PLO(S2) using rubrics and measurable performance indicators.

Assessment and Evaluation Committee (AEC):

This committee is responsible for consolidating data gathered from participants involved in the assessment and data collection processes to create a comprehensive report on the results of each PLO. The committee also computes the actual attainment level of each PLO at the program level. Additionally, it analyzes the data and offers recommendations for continuous improvement to the EE department council.

8. BSc EE PLOs Assessment Plan

In this section, we present the PLOs assessment plan of the BSc EE program.

8.1 Effect of COVID-19 pandemic on the BSc EEP PLOs assessment plan

Due to the COVID-19 pandemic lockdown, the method of instruction shifted from traditional in-person attendance to online lectures, starting in the second part of the Spring 2020 semester and extending through the conclusion of the Spring 2021 semester. This transition to online learning posed significant challenges for the program, students, and faculty. Consequently, the department opted to collect necessary data and conduct a comprehensive assessment of all BSc EE Program Learning Outcomes (PLOs) during the academic year 2021-2022. Although assessing all Program Learning Outcomes (PLOs) within one year is demanding and time-consuming, it is deemed essential for the program to gauge the status of PLO attainment, particularly in the aftermath of the COVID-19 pandemic.

Starting from the academic year 2022-2023, the program has decided to adjust the frequency of PLO assessments in a phased manner. In Phase 1, only four outcomes will be assessed per academic year, utilizing most BSc EEP core courses and selected elective courses to streamline the results averaging process. In Phase 2, instead of selecting most BSc EEP courses, a few courses strongly correlated with the targeted PLO will be chosen. Phase 1 is scheduled to be implemented beginning in the academic year 2022-2023, while Phase 2 is set to be initiated starting from the academic year 2023-2024. The four outcomes to be assessed in 2022-2023 are PLO(K1), PLO(S1), PLO(S4), and PLO(V3). The four PLOs to be assessed in 2023-2024 are PLO(S2), PLO(S3), PLO(V1), and PLO(V2). Afterwards, these two groups will alternate year by year.

8.2 Academic year 2021-2022

Table 4 and Table 5 present the PLO assessment plan of program learning outcomes that during the academic year 2021-2022. PLOs are assessed using almost all the BSc EE program required courses and some elective courses.

Table 4 Assessment plan of the technical outcomes during 2021-2022

Outcome	Course-Level Direct Assessment				Program-Level Direct Assessment	Indirect Assessment
	Responsibility	Method	Source of Data	Time of collecting data		
PLO(K1)	Course Instructor	Examination	Outcome-related controlled environment questions (CEQ)	Fall-21 Spring-22	The Assessment and Evaluation Committee aggregates data for each Program Learning Outcome (PLO) from its respective courses.	The Assessment and Evaluation Committee administers an exit survey among graduating students in spring 2022
PLO(S1)		Examination				
PLO(S2)		Examination and Observation				
PLO(S3)		Examination and Observation	Lab exams and/or reports			

Table 5 Assessment plan of the professional outcomes during 2021-2022

Outcome	Course-Level Direct Assessment			Program-Level Direct Assessment	Indirect Assessment	Time of collecting data
	Responsibility	Method	Source of Data			
PLO(S2) Professional Part	SDP Committees	Utilize rubrics for assessment by observing students' performance.	SDP Report	The SDP and AEC Committees aggregates data for each Program Learning Outcome (PLO) from all SDP groups.	The Assessment and Evaluation Committee administers an exit survey among graduating students.	Spring 2022
PLO(S4)	SDP Committees		SDP Report & Presentation			
PLO(V1)	SDP Advisor		SDP semester work			
PLO(V2)	SDP Advisor					
PLO(V3)	SDP Advisor					

8.3 Academic year 2022-2023

Table 6 and Table 7 present the PLO assessment plan of program learning outcomes during the academic year 2022-2023. PLOs are assessed using almost all the BSc EE program required courses and some elective courses.

Table 6 Assessment plan of the technical outcomes during 2022-2023

Outcome	Course-Level Direct Assessment				Program-Level Direct Assessment	Indirect Assessment
	Responsibility	Method	Source of Data	Time of collecting data		
PLO(K1)	Course Instructor	Examination	Outcome-related controlled environment questions (CEQ)	All three trimesters	The Assessment and Evaluation Committee aggregates data for each Program Learning Outcome (PLO) from its respective courses.	The Assessment and Evaluation Committee administers an exit survey among graduating students in spring 2023
PLO(S1)		Examination				

Table 7 Assessment plan of the professional outcomes during 2022-2023

Outcome	Course-Level Direct Assessment			Program-Level Direct Assessment	Indirect Assessment	Time of collecting data
	Responsibility	Method	Source of Data			
PLO(S4)	SDP Committees	Utilize rubrics for assessment by observing students' performance.	SDP Report & Presentation	The SDP and AEC Committees aggregates data for each Program Learning Outcome (PLO) from all SDP groups.	The Assessment and Evaluation Committee administers an exit survey among graduating students.	Second and third trimester
PLO(V3)	SDP Advisor		SDP semester work			

8.4 Academic year 2023-2024

Table 8 and Table 9 present the PLO assessment plan of program learning outcomes during the academic year 2023-2024. PLOs are assessed using almost all the BSc EE program required courses and some elective courses.

Table 8 Assessment plan of the technical outcomes during 2022-2023

Outcome	Course-Level Direct Assessment				Program-Level Direct Assessment	Indirect Assessment
	Responsibility	Method	Source of Data	Time of collecting data		
PLO(S2)	Course Instructor	Examination and Observation	Outcome-related controlled environment questions (CEQ)	Fall2023 and Spring2024	The Assessment and Evaluation Committee aggregates data for each Program Learning Outcome (PLO) from its respective courses.	The Assessment and Evaluation Committee administers an exit survey among graduating students in spring 2024
PLO(S3)		Examination and Observation	Lab exams and/or reports			

Table 9 Assessment plan of the professional outcomes during 2022-2023

Outcome	Course-Level Direct Assessment			Program-Level Direct Assessment	Indirect Assessment	Time of collecting data
	Responsibility	Method	Source of Data			
PLO(V1)	SDP Committees	Utilize rubrics for assessment by observing students' performance.	SDP Report & Presentation	The SDP and AEC Committees aggregates data for each Program Learning Outcome (PLO) from all SDP groups.	The Assessment and Evaluation Committee administers an exit survey among graduating students.	Spring2024
PLO(V2)	SDP Advisor		SDP semester work			

9. Actual and Target Level of Attainment

In this section, we outline the process for calculating the actual level of achievement of Program Learning Outcomes (PLOs) and establishing the targeted level of PLO attainment.

9.1 Calculations of actual level of attainment

To measure the attainment of Program Learning Outcomes (PLOs), student performance is categorized into five levels, contingent on whether the assessment involves examination or observation. Table 10 outlines the performance levels utilized by course instructors for course-level assessments of PLOs related to their courses, particularly for examination-based evaluations that focus on technical outcomes.

Table 10 Performance levels for examination-based assessment

Level	Student grade in the question used for assessment
First	Less than 25%
Second	Greater than or equal to 25% and less than 50%
Third	Greater than or equal to 50% and less than 60%
Fourth	Greater than or equal to 60% and less than 80%
Fifth	Greater than or equal to 80%

In the instance of observation-based assessment, rubrics are employed to determine the student's proficiency level, as illustrated in Table 11.

Table 11 Performance levels for observation-based assessment

Level	Student performance
First	Unsatisfactory
Second	Beginning
Third	Developing
Fourth	Satisfactory
Fifth	Exemplary

The Assessment and Evaluation Committee aggregates data from various sources, including individual courses or Senior Design Projects (SDPs), and computes the number of students in each level, as illustrated in Table 12. The actual level of attainment of each PLO is determined by

calculating the percentage of students in the fourth and fifth levels relative to the total sample size as follows:

$$Actual\ Attainment\ Level = \frac{N_4 + N_5}{N_1 + N_2 + N_3 + N_4 + N_5} \times 100$$

Table 12 Aggregation of assessment data

Level	Total number of students in each level
First	N_1
Second	N_2
Third	N_3
Fourth	N_4
Fifth	N_5

9.2 Setting the Target Level of attainment

Outcomes are deemed achieved if the actual attainment level meets or exceeds the designated target level. To set the target attainment level for Program Learning Outcomes (PLOs), the program references the document titled "Guidelines to Set Targets for KPIs, Opinion Surveys, and Learning Outcomes," which is prepared and approved by the Faculty of Engineering. Given the uncertainties surrounding the impact of COVID-19 on the educational process and learning outcomes, the program opts to commence from the baseline required by the university for students to pass a course, along with the minimum target level proposed by the Faculty of Engineering. While this starting point may seem arbitrary, it serves as a reference point post-lockdown, considering anticipated adverse effects. For the academic year 2021-2022 assessment cycle, the target attainment level is set at 60% for all PLOs. It is important to note that the program acknowledges this target may be subject to adjustment based on actual achievement levels and evolving circumstances.

10. Detailed Procedure for Collecting the Assessment Data

In this section, we explain how the assessment data is collected. To facilitate data collection, program learning outcomes are divided into two sets named technical outcomes and professional outcomes. The BSc EE program considers two assessment methods: direct and indirect assessment. CLOs-based method is used for the direct assessment of the technical outcomes PLO(K1), PLO(S1), PLO(S2), and PLO(S3). The BSc EE program uses performance indicators (PIs) and rubrics for the direct assessment of professional outcomes PLO(S4), PLO(V1), PLO(V2), and PLO(V3). PIs and rubrics are reviewed and discussed extensively by the EE accreditation

committee and are approved by the EE department. The indirect assessment of all student outcomes is performed using an exit survey which is conducted with graduating students. The sample of students used for the assessment of SOs are chosen as follows:

- CLOs-based direct assessment of technical outcomes: A sample of a minimum of 25 students is randomly selected from those who registered for the class (across all sections) and completed all assessment activities, primarily including midterm 1, midterm 2, and final exams. In cases where the class has fewer students, the sample comprises all individuals who completed all assessment activities.
- Observation-based direct assessment of professional outcomes: The sample includes all students who have registered for and completed the Senior Design Project II course.
- Indirect assessment of all outcomes: The sample comprises all students who are graduating in the semester during which data is being collected.

10.1 Direct Assessment of Technical Outcomes PLO(K1), PLO(S1), PLO(S2), and PLO(S3).

Controlled Environment Questions (CEQs) are primarily employed for the direct assessment of this set of Program Learning Outcomes (PLOs). The bulk of assessment data is gathered from quizzes, midterms, and final exams, all closely monitored to ensure the individual effort of each student. A smaller portion of assessment data is derived from assignments. Figure 2 illustrates the block diagram outlining the steps and tools utilized for collecting the assessment data. Forms Used for data collection are available in the Appendix.

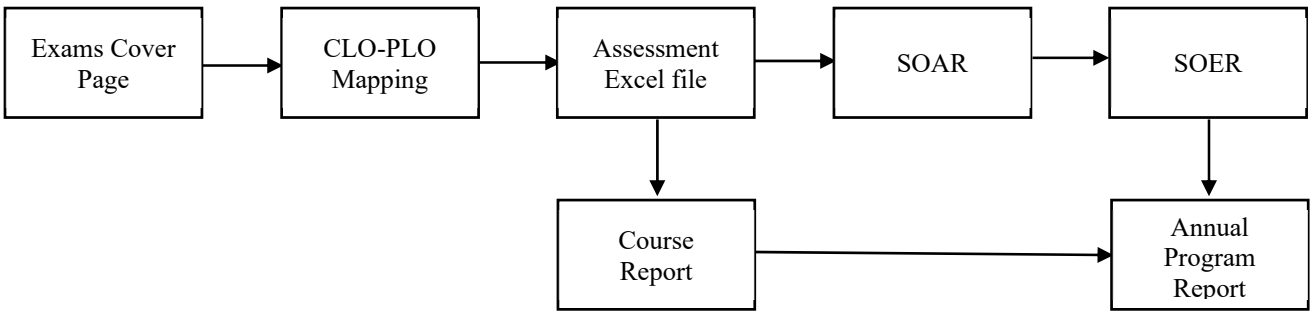

Figure 2 Steps and tools for collection of assessment data

Exam cover page

All instructors should use the same exam cover page designed and approved by the EE department. In the exam cover page, course instructor should record the following data:

- Course learning outcomes (CLOs) that will be assessed in the exam
- Mapping between the question and the CLOs
- Maximum grade of each question
- Student grade in each question

Figure 3 shows an example of recording this data on the exam cover page.

Question	Q.1	Q.2	Q.3	Q.4					TOTAL
Course Learning Outcomes	CLO(1)	CLO(2)	CLO(3)	CLO(3)					
Student Grade									
Max Grade	5	8	3	6					20

Figure 3 Data collection using exam cover page.

CLO-PLO Mapping

Course learning outcomes (CLOs) for each course are prepared and mapped to the program learning outcomes (PLOs). The CLOs and the mapping are approved by the EE department and included in the course specifications. Table 13 presents an example of mapping the CLOs of ELEN370 to PLOs.

Table 13 Example of CLO-PLO mapping

Course Learning Outcomes (CLOs)	PLO(S1)	PLO(S2)	PLO(S4)	PLO(V1)	PLO(V2)	PLO(S3)	PLO(V3)	PLO(K1)
Demonstrate knowledge of magnetic circuits.								✓
Analyze magnetic circuits.	✓							
Demonstrate knowledge of transformer equivalent circuit, tests, power flow, and voltage regulation.								✓
Solve problems related to transformers.	✓							
Demonstrate knowledge of equivalent circuits and characteristics of induction motors and synchronous generators.								✓
Solve problems related to induction motors and synchronous generators.	✓							
Demonstrate basic knowledge of DC machines.								✓

Assessment Excel file

To streamline calculations, the BSc EEP has developed an assessment tool using Microsoft Excel. This tool is employed by the instructor to compute the assessment results for the PLOs associated with the course under evaluation. The Excel file takes the data from the exam cover page (Question-CLO mapping) and CLO-PLO mapping as input, generating the percentage of PLO attainment in the course. Table 14 offers an illustrative example of the course-level direct assessment for an outcome from a particular course.

Table 14 Example of course-level direct assessment of PLO

	Midterm 1	Midterm 2	Final Exam	Overall
Number of students in Level 1 (<25%)	0	0	0	0
Number of students in Level 2 (25% to <50%)	1	6	3	2
Number of students in Level 3 (50% to <60%)	3	7	3	9
Number of students in Level 4 (60% to <80%)	9	7	11	9
Number of students in Level 5 (>=80%)	12	5	8	5
Sample size	25	25	25	25
Percentage of students in levels 4 and 5	84	48	76	56
Results	Achieved	Not Achieved	Achieved	Not Achieved

Student Outcome Assessment Report (SOAR)

The instructors of the courses considered in the assessment process use the data obtained from the excel sheet to prepare the SOAR form. This form can be considered as the course-level assessment of PLOs. The SOAR form includes the following data:

- Course Information
- Summary of Assessment Results
- Instructor's Comments and Recommendations for improvement of the assessments Process

- Instructor's Comments on the assessments results
- Recommendations for improvement of student outcome attainment

The SOAR form is incorporated into the course binder, and the information it contains is integrated into the course report. This form simplifies the process for the assessment committee to gather assessment data from individual courses.

Student Outcome Evaluation Report (SOER)

The Assessment and Evaluation Committees (AECs) utilize the information derived from the SOAR forms to generate the SOER form. Eight SOER forms are created, with each form dedicated to a specific PLO. The SOER form serves the purpose of data aggregation and can be viewed as the program-level assessment of PLOs. The data included in the SOER form encompasses the following:

- Course Information
- Summary of Assessment Results
- Instructor's Comments and Recommendations for improvement of the assessments Process
- Instructor's Comments on the assessments results
- Recommendations for improvement of student outcome attainment

10.2 Direct Assessment of Professional Outcome PLO(S4)

The direct assessment of program learning outcome PLO(S4) is performed using rubrics in SDPs. The assessment is performed by the SDP examination committee using the final report for written communication and the final presentation for oral communication. Table 15 and Table 16 present the rubrics used for the assessment of outcome PLO(S4). The percentage of students located in level (4) and level (5) is calculated by the assessment and evaluation committee (AEC) and recorded in the SOER form. The AEC committee analyzes, evaluates the results, and provides recommendations for improvement.

Table 15 Rubrics used for the assessment of written communication.

	Unsatisfactory (1)	**Beginning (2)**	**Developing (3)**	**Satisfactory (4)**	**Exemplary (5)**
Produce a quality of writing	**Unable** to gather relevant data and research and to use proper grammar and formatting	**Barely** gather relevant data and research and **rarely** use proper grammar and formatting	can collect the relevant data and research and use proper grammar and formatting to **some** extent	**Mostly** can collect the relevant data and research and **typically** use proper	Gather **all** the relevant data and research and **always** use proper grammar and formatting

				grammar and formatting	
Organize the content in a logical fashion	**Does not** organize the content in logical fashion	**Rarely** organize the content in logical fashion	Organize, to **some** extent, the content in a logical fashion	**Mostly** organize the content in logical fashion	Organize **all** the content in logical fashion
Use Graphs, Figures, Tables, and Equations	**Does not** use graphs, figures, tables, and equations	**Barley** use graphs, figures, tables, and equations	Use, to **some** extent, graphs, figures, tables, and equations	**Mostly** use graphs, figures, tables, and equations	**Always** use graphs, figures, tables, and equations

Table 16 Rubrics used for the assessment of oral communication.

	Unsatisfactory (1)	**Beginning (2)**	**Developing (3)**	**Satisfactory (4)**	**Exemplary (5)**
Produce a quality of writing	**Unable** to gather relevant data and research and to use proper grammar and formatting	**Barely** gather relevant data and research and **rarely** use proper grammar and formatting	can collect the relevant data and research and use proper grammar and formatting to **some** extent	**Mostly** can collect the relevant data and research and **typically** use proper grammar and formatting	Gather **all** the relevant data and research and **always** use proper grammar and formatting
Organize the content in a logical fashion	**Does not** organize the content in logical fashion	**Rarely** organize the content in logical fashion	Organize, to **some** extent, the content in a logical fashion	**Mostly** organize the content in logical fashion	Organize **all** the content in logical fashion

Use Graphs, Figures, Tables, and Equations	**Does not** use graphs, figures, tables, and equations	**Barley** use graphs, figures, tables, and equations	Use, to **some** extent, graphs, figures, tables, and equations	**Mostly** use graphs, figures, tables, and equations	**Always** use graphs, figures, tables, and equations
Use delivery techniques	Unable to use delivery techniques such as posture, gesture, and eye contact to engage the audience during presentations.	**Barely** use delivery techniques such as posture, gesture, and eye contact to engage the audience during presentations.	Use **some** of the delivery techniques such as posture, gesture, and eye contact to engage the audience during presentations.	Use **most** of the delivery techniques such as posture, gesture, and eye contact to engage the audience during presentations.	Use **all** delivery techniques such as posture, gesture, and eye contact to engage the audience during presentations.
Respond well to questions	**Does not** respond well to questions	**Barely** respond well to questions	**Sometimes** respond well to questions	**Mostly** respond well to questions	**Always** respond well to questions

10.3 Direct Assessment of Professional Student Outcome PLO(V1), PLO(V2), PLO(V3)

Rubrics within Senior Design Projects (SDPs) are employed for the direct assessment of this set of outcomes. SDP advisors conduct the assessment while collaborating with their students throughout the semester and during the final oral presentation. This involves observing students' responses during discussions related to the outcomes, both with the advisor and the SDP examination committee. Table 17, Table 18, and Table 19 outline the rubrics utilized for assessing these outcomes. The Assessment and Evaluation Committee (AEC) calculates the percentage of students falling within levels (4) and (5) and records this information in the SOER form. The AEC committee further analyzes and evaluates the results, providing recommendations for improvement.

Table 17 Rubrics used for the assessment of outcome PLO(V1)

PIs	Unsatisfactory (1)	Beginning (2)	Developing (3)	Satisfactory (4)	Exemplary (5)

Know the code of ethics for the discipline.	Student **does not** know what a code of ethics and professional responsibility. is.	Student **barely** knows what a code of ethics and professional responsibility for the discipline is.	Student has **some** knowledge of the code of ethics and professional responsibility for the discipline.	Student is **mostly** aware of the code of ethics and professional responsibility for the discipline.	Student **completely** aware of the code of ethics and professional responsibility for the discipline.
Recognize the ethical and professional responsibilities of a problem in the discipline.	Student is **unable** to recognize the ethical and professional responsibilities of a problem in the discipline.	Student can **barely** recognize the ethical and professional responsibilities of a problem in the discipline.	Student can recognize the ethical and professional responsibilities of a problem in the discipline to **some** extent.	Student can **mostly** recognize the ethical and professional responsibilities of a problem in the discipline.	Student can **always** recognize the ethical and professional responsibilities of a problem in the discipline
Explain professional, ethical, environmental, economic, and social considerations in an engineering context.	Student is **unable** to explain professional, ethical, environmental, economic, and social considerations in an engineering context.	Student can **barely** explain professional, ethical, environmental, economic, and social considerations in an engineering context.	Student can explain, to **some** extent, professional, ethical, environmental, economic, and social considerations in an engineering context.	Student can **mostly** explain professional, ethical, environmental, economic, and social considerations in an engineering context.	Student can **always** explain professional, ethical, environmental, economic, and social considerations in an engineering context.

Table 18 Rubrics used for the assessment of outcome PLO(V2)

PI	**Unsatisfactory (1)**	**Beginning (2)**	**Developing (3)**	**Satisfactory (4)**	**Exemplary (5)**
Demonstrate an ability to establish goals, plan tasks, and meet objectives in a team environment	**Doesn't** demonstrate an ability to establish goals, plan tasks, and meet objectives in a team environment	**Rarely** demonstrate an ability to establish goals, plan tasks, and meet objectives in a team environment	**Sometimes** demonstrate an ability to establish goals, plan tasks, and meet objectives in a team environment	**Mostly** demonstrate an ability to establish goals, plan tasks, and meet objectives in a team environment	**Always** demonstrate an ability to establish goals, plan tasks, and meet objectives in a team environment

Fulfill different roles on teams	**Doesn't** perform any duties of the assigned role	**Rarely** performs duties and assigned role	Performs **some** of the duties and assigned role	Performs **most** of the duties and assigned role	Performs **all** duties and assigned role
Establish an inclusive environment that values the contributions of all team members	**Doesn't** establish an inclusive environment that values the contributions of all team members	**Rarely** establish an inclusive environment that values the contributions of all team members	**Sometimes** establish an inclusive environment that values the contributions of all team members	**Mostly** establish an inclusive environment that values the contributions of all team members	**Always** establish an inclusive environment that values the contributions of all team members
Perform actions that demonstrate leadership in interactions with team members	Doesn't perform actions that demonstrate leadership in interactions with team members	Rarely perform actions that demonstrate leadership in interactions with team members	Sometimes perform actions that demonstrate leadership in interactions with team members	Usually perform actions that demonstrate leadership in interactions with team members	Routinely perform actions that demonstrate leadership in interactions with team members

Table 19 Rubrics used for the assessment of outcome PLO(V3)

	Unsatisfactory (1)	**Beginning (2)**	**Developing (3)**	**Satisfactory (4)**	**Exemplary (5)**
Identify the type of information needed for problem or task	**Unable** to identify information needed	**Barely** identifies information needed	Identifies **some** of the information needed	Identifies **most** of the information needed	Identifies **all** the information needed
Apply appropriate strategies to acquire knowledge	**Unable** to apply appropriate strategies	**Barely** applies appropriate strategies	Applies **some** of the appropriate strategies	Applies **most** of the appropriate strategies	Applies **all** the appropriate strategies

Demonstrate an ability to use information to solve a problem	**Unable** to use acquired information to solve a problem	**Barely** demonstrates ability to use acquired information to solve a problem	Demonstrates ability to use **some** of the acquired information to solve a problem	Demonstrates ability to use **most** of the acquired information to solve a problem	Demonstrates ability to use **all** the acquired information to solve a problem

10.4 Direct Assessment of the non-technical part of PLO(S2)

PLO (S2) states "*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*". The second part of the outcome "*with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors*" is assessed using rubrics from the SDP II. The rubrics used for the assessment of this apart are indicated in Table 20.

Table 20 Rubrics used for the assessment of outcome PLO(S2)

	Unsatisfactory (1)	**Beginning (2)**	**Developing (3)**	**Satisfactory (4)**	**Exemplary (5)**
Public health, Safety and Welfare	Design is hazardous and unsafe to use	Under some usage conditions, the design may become unsafe	The design is safe under normal usage, but may become unsafe if not used properly	Clear signs indicating possible hazards are included	Extra safety measures are included to protect people misusing the device/product
Global factors	Design contradicts current global trends	Limited global factors were mentioned but the design does not satisfy them	Some global factors were mentioned, and the design meets most of them	Global factors had a clear impact on the design	Design may find wide acceptance globally
Social and cultural factors	Outcome is not acceptable socially and/or culturally.	Limited social and cultural factors were mentioned, but	Social and cultural factors were mentioned, and	Social and cultural factors had a clear	Design is likely to become popular in the community.

		the design may not satisfy them.	the design meets the requirements.	impact on the design	
Environmental factors	Design does not consider Environmental factors and may harm the environment	Limited environmental factors were mentioned, but the design may not satisfy them.	Some environmental factors were considered/mentioned, and the design meets their requirements.	Environmental factors had a clear impact on the design/component selection	The design will improve/sustain some Environmental factors
Economic factors	Design is economically infeasible	Limited Economic factors were considered in the design, but more economic alternatives were not considered	Design is economically sound, though additional optimization is possible	Design satisfies the economic factors and is suitable for marketing.	Design is optimized for maximum economic benefits and has clear economic value

10.5 Indirect Assessment of PLOs

Indirect assessment involves a dual approach, comprising an exit survey gauging students' self-perceived capabilities in achieving Program Learning Outcomes (PLOs) and employer surveys eliciting feedback on graduates' proficiency. The comprehensive exit survey assesses all outcomes for graduating students, with relevant questions in each course aligning with specific PLOs outlined in Table 21. This survey, integral to indirect assessment, is administered to students nearing graduation to determine their perceptions of outcome achievement, emphasizing commitment for a robust response rate from senior students. On the other hand, the employer survey is structured into six categories: knowledge, technical skills, communication skills, proficiency, professionalism, leadership, and aptitude. Feedback from respondents is gathered to assess employers' perspectives on the proficiency of program graduates. Employers' evaluation of the program graduates' proficiency include the following questions:

Part 1: Knowledge

1. Graduates have a good knowledge of facts, concepts and applications in their fields.
2. Graduates are able to relate theory to application in their field of work.
3. The graduate has the skills of understanding and comprehension.
4. The graduate has knowledge of the basics of safety and security in the field of work.

Part 2: Technical Skills

5. Graduates identify and describe problems and suggest solutions to them.
6. Graduates collect and analyze data and propose alternatives to solve problems.
7. The graduates possess the appropriate technical skills in the field of his/her specialization.
8. The graduate has the skills of creativity and innovative thinking in the field of work.
9. The graduate has ability to adapt to modern technology and his work environment.

Part 3: Communication Skills

10. The graduate is able to communicate, speak and dialogue in his/her field.
11. The graduate is able to present and participate in panel discussions and teamwork.
12. The graduates have the skills of negotiation and persuasion.
13. The graduate is able to prepare reports in his/her field of work.

Part 4: Proficiency

14. Graduates are proficient in English (if so, demanded by employment)
15. The graduate is proficient in using the computer and its applications effectively.
16. The graduates are able to achieve the targets in their fields of the work.
17. The graduates perform the tasks assigned to them efficiently.
18. The graduate enjoys independent thinking and proposes alternatives in his work.

Part 5: Professionalism

19. Graduates understand the ethical and professional responsibilities in their specialties.
20. Graduates understand their roles and impact of specialization in the national context.
21. The graduate's loyalty to the institution in which he/she works is high.
22. The graduates respect the deadlines and job disciplines.

Part 6: Leadership and aptitude

23. The graduate has leadership quality.
24. The graduates are able to effectively work as a member of work teams.
25. The graduate's relationship with his/her co-workers is good.
26. The graduate motivates to work, develop and learn in his field of work.
27. The graduates offer creative ideas that improve and develop the work.
28. The graduate has ability to effectively deal with feedback on his performance.
29. Graduates' proficiency is at par with the job market demand and employers' expectations.

Part 7: Recommendations

30. What aspects you like in the graduates of the University and couldn't find?
31. Do you have any recommendations for developing the skill set of graduates? Please specify?

This multifaceted approach ensures a comprehensive evaluation of both student and employer perceptions, contributing valuable insights to the overall assessment process.

Table 21 Exit survey for indirect assessment

PLO(S1): On a scale from 1 (Very low) to 5 (Very high), How do you rate your abilities in the followings areas		1	2	3	4	5
1.	Analyzing AC and DC electronic circuits					
2.	Analyzing open loop and closed loop control systems					
3.	Analyzing AM, FM and PCM communication systems					
4.	Analyzing the operation of electric machines and three phase power systems					
5.	Identifying the variables in a given engineering problem					
6.	Formulating an engineering problem					
7.	Solving a given engineering problem					
PLO(S2): On a scale from 1 (Very low) to 5 (Very high), How do you rate your abilities in the followings areas		1	2	3	4	5
8.	Writing computer programs to perform a task					
9.	Programming embedded systems					
10.	Identifying the requirements and desired outcomes of a design					
11.	Determining the constraints limiting design options					
12.	Designing a system, component, and process to meet given objectives and constraints					
13.	Design evaluation and verification					
14.	Building and running a simulation model					
PLO(S4): On a scale from 1 (Strongly disagree) to 5 (Strongly agree), To what extent do you agree with the following statements		1	2	3	4	5
15.	I can write readable, well organized, and informative documents focused on one topic					
16.	My reports are written with a clear language and free of grammatical mistakes					
17.	I use properly labeled figures to display results and information					
18.	I use animations, colors, and visual effects in my presentations					
19.	I can prepare well organized presentations					
20.	I include graphs and figures in my presentations					
21.	I speak fluently and keep eye contact during presentations					
PLO(V1): On a scale from 1 (Strongly disagree) to 5 (Strongly agree), To what extent do you agree with the following statements		1	2	3	4	5

22.	I know the engineering code of ethics					
23.	I know my professional responsibilities as an electrical engineer					
24.	I can explain the economic, societal, and environmental impacts of engineering solutions					
PLO(V2): On a scale from 1 (Strongly disagree) to 5 (Strongly agree), To what extent do you agree with the following statements		1	2	3	4	5
25.	I can identify contemporary issues and relate them to electrical engineering					
26.	I can distribute work fairly and lead a team					
27.	I always fulfill my duties as a team member and help achieve the team goals					
28.	I always value and respect my teammates					
PLO(S3): On a scale from 1 (Strongly disagree) to 5 (Strongly agree), To what extent do you agree with the following statements		1	2	3	4	5
29.	I can design an experiment to test and measure parameters					
30.	I can connect circuits and devices and conduct experiments					
31.	I can record, analyze, and interpret data from experiments					
PLO(V3): On a scale from 1 (Strongly disagree) to 5 (Strongly agree), To what extent do you agree with the following statements		1	2	3	4	5
32.	I need to learn new skills and update my knowledge to advance my career					
33.	I can make plans to acquire the knowledge necessary for my career					
PLO(K1): On a scale from 1 (Strongly disagree) to 5 (Strongly agree), To what extent do you agree with the following statements		1	2	3	4	5
34.	I can identify electric and electronic circuits components and explain their operation					
35.	I can recall the laws of electromagnetic fields and identify the relationship between the fields					
36.	I can explain the operation of AM, FM and PCM communication systems					
37.	I can explain the operation of electric machines					

11. Continuous Improvement and Development of PLOs Achievement

The concluding phase of the program's learning outcomes measurement plan aims to formulate suitable improvement and development strategies for the program based on the assessment results. The program leverages the insights gained from the measurement process to make informed decisions and implement necessary enhancements.

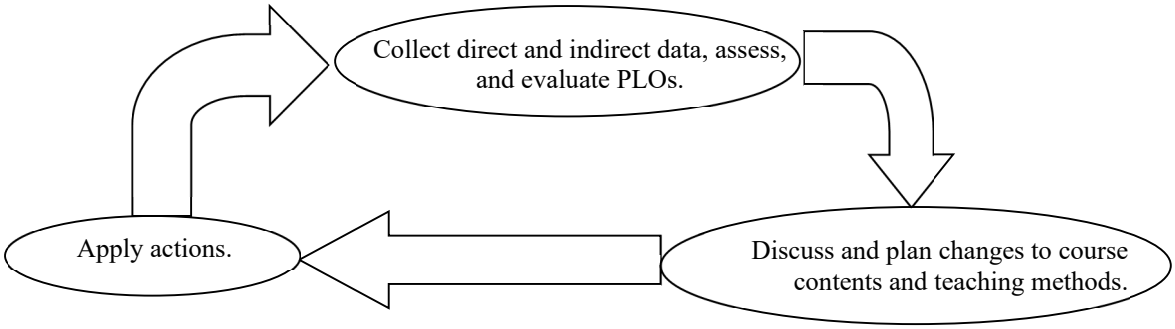

Figure 4 Course-Level PLO Continuous Improvement Cycle

Enhancing the actual attainment level of the program learning outcomes in the BSc EEP is divided into two scenarios: course-level PLO improvement and program-level PLO improvement. The course-level improvement cycle is designed to enhance the attainment of Program Learning Outcomes (PLOs) by suggesting minor adjustments to enrich course content and teaching methods, thereby maximizing student comprehension within the curriculum. The suggested actions in this scenario are put into practice in a particular course or a group of courses. Since these changes fall within minor boundaries and are in accordance with university guidelines, approval is required only from the department or college and need not necessarily undergo university-level approval. The course-level improvement cycle commences with the collection of direct and indirect data to evaluate the level of PLO achievement, as outlined in the PLOs Assessment Framework. After the completion of the PLO assessment report (SOER forms) by AEC committees, an evaluation workshop is organized to discuss the evaluation results and formulate an action plan for improvement. This action plan is then implemented and reviewed upon its completion. This process is repeated periodically but not necessarily for the same PLOs every time. Figure 4 shows the course-level PLO continuous improvement cycle.

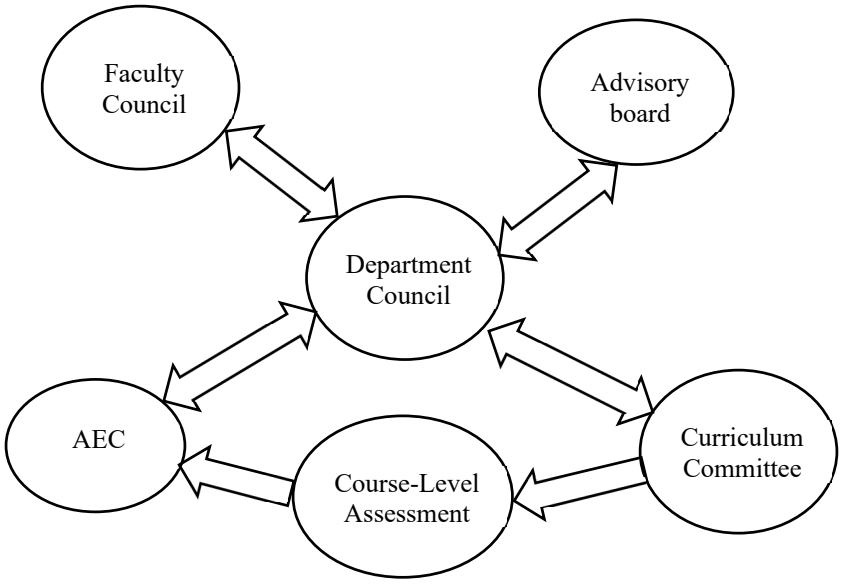

Figure 5 Program-Level PLO Continuous Improvement Cycle

The program-level Program Learning Outcomes (PLO) improvement cycle aims to significantly enhance PLO attainment by implementing recommended measures throughout the entire program, primarily through substantial adjustments to the curriculum. Input for this cycle is derived from recommendations offered by faculty members, the faculty council, assessment and evaluation committees or workshops, the curriculum committee, employers, and the advisory board, consisting of individuals from the program, industry, and alumni. Typically, the data collected provides insights into program effectiveness, deficiencies, knowledge gaps among graduates, evolving job market requirements, and includes recommendations for extending PLO achievement.

This data, along with recommendations, is collaboratively reviewed by the department council, shaping a comprehensive program-level action plan. Such action plans often involve substantial changes such as adding, removing, modifying, or merging courses, reviewing educational objectives, introducing new topics or methods of delivery, adjusting credit hours, or other significant modifications. Moreover, action plans may encompass workshops on specific topics, specialized student programs to address specific needs, tutoring for personalized support, and guest speakers to bring real-world perspectives into the learning environment, thereby enriching the overall educational experience. Based on the magnitude of these recommendations, university approval may be required. Implementation of these actions is not frequent, and the entire program cycle, spanning five years, is usually needed. Exceptions may arise in cases of non-curriculum-related actions or immediate tangible improvements promised by mandatory curriculum-related actions, such as alterations in prerequisites or sequencing.

Following approval, the curriculum-related modifications are transmitted to the curriculum committee for implementation in accordance with university regulations. The effectiveness of these actions is assessed directly through program learning outcomes and indirectly through feedback from alumni and industry However, tangible improvement may not be realized quickly; it often takes about half of the program cycle, approximately 2 to 3 years, as significant changes

in the program require time to be fully integrated, and their impact must be thoroughly assessed. The transformative effect of curriculum modifications necessitates a sufficient period for students to progress through the updated curriculum. Figure 5 shows the program-level continuous improvement cycle.

Assessment and Evaluation Committees (AEC) conduct outcome assessments and may provide course-level improvement recommendations based on assessment results. Program-level recommendations may be issued if weaknesses persist over several evaluation cycles or to meet specific program criteria. Table 22 provides a comparative overview of the course-level and program-level PLO improvement scenarios.

Table 22 Comparison between PLO improvement scenarios

Aspect	Course-Level PLO Improvement	Program-Level PLO Improvement
Objective	Enhance attainment of Program Learning Outcomes (PLOs) at the course level through minor adjustments.	Enhance PLO attainment throughout the entire program with substantial curriculum adjustments.
Scope of Changes	Minor adjustments to course content and teaching methods in specific courses or a group of courses.	Substantial changes, including adding, removing, modifying, or merging courses, adjusting credit hours, and more, impacting the entire program.
Data Collection	Direct and indirect data collection to evaluate PLO achievement, following the PLOs Assessment Framework.	Input derived from faculty, committees, workshops, employers, and advisory board, offering insights into program effectiveness and graduate knowledge gaps.
Recommendation Source	Assessment and Evaluation Committees (AEC) may issue recommendations based on outcome assessments.	Recommendations come from faculty members, faculty council, assessment and evaluation committees, curriculum committee, employers, and advisory board.
Approval Process	Department or college approval is typically sufficient, following minor boundaries and university guidelines.	University approval may be required, considering the substantial nature of changes, spanning a five-year program cycle.
Implementation Frequency	Periodic repetition (annually) of the improvement cycle,	Infrequent implementation, typically spanning the entire program cycle due to substantial modifications.

	addressing different PLOs each time.	
Time for Tangible Improvement	Tangible improvement may occur periodically, with each cycle addressing specific PLOs.	Tangible improvement often takes approximately 2 to 3 years, given the substantial changes at the program level. Exceptions may arise for non-curriculum-related actions or cases promising immediate tangible improvements.

11.1 Setting new attainment target

Setting higher targets for program learning outcomes (PLOs) in BSc EEP can offer several advantages, inspiring a culture of excellence and motivating both faculty and students to strive for greater achievements. Ambitious targets can enhance the competitiveness of the program, aligning it more closely with industry standards and attracting high-achieving students. However, it is essential to approach this strategy with careful consideration. Targets should be challenging yet realistic to avoid frustration and demotivation.

11.2 Finalizing Action Plans in the PLO assessment Report

In this PLO assessment report, the program examines the progress achieved in the action plan from the previous cycle and introduce a series of proposed initiatives aimed at enhancing the attainment of Program Learning Outcomes (PLOs) within the Electrical Engineering (EE) Bachelor of Science (BSc) program. These initiatives encompass the establishment of new targets, and the development of improvement plans at both the course and program levels. The proposed actions are the culmination of insights gathered through various workshops conducted by the assessment and evaluation committees, curriculum committee, and EE department council. Recommendations derived from course reports, assessment forms, advisory board meetings, results of opinion surveys, and direct oral feedback provided by faculty members during these workshops have collectively shaped the comprehensive action plan outlined in PLO assessment conclusive report, which has to receive final approval from the department council, marking the conclusion of this strategic endeavor.

12. Appendix: Forms utilized in the assessment process

Starting from the next page, we present the forms utilized in the assessment of program learning outcomes. These forms are:

Exams Cover Page
Course-level PLO assessment report (SOAR)
Program-level PLO evaluation report (SOER)

جامعة تبوك University of Tabuk	**University of Tabuk** **Faculty of Engineering** **General Engineering**	College Vision: A distinguished and pioneering college locally and internationally in the field of engineering education, innovative research, and building a knowledge society

Exam Cover Page

Course Code / Title: ELEN260 / Comm. Eng. I **Instructor:** Dr. Taha Khalaf, Dr. Osama Salem

Exam: ☐ **Midterm 1** ☐ **Midterm 2** ☑ **Final** **Total:** **40** **Points**

Semester / Year: Spring / 2019 **Exam date:** 20-Dec-2019 **Duration:** 2 Hours

Student Name		**Section**	2860
Student ID		**Serial Number**	

Course Learning and Program Learning (Student) Outcomes:

This exam targets the following course learning outcomes (CLOs):

CLO(1): Demonstrate the knowledge of AM, FM, and PCM systems
CLO(2): Analyze AM signals in both time and frequency domains.
CLO(3): Analyze FM signals in both time and frequency domains.
CLO(4): Analyze pulse modulated signals
CLO(5): Compare different AM, FM, and Pulse modulations techniques in terms of power, bandwidth, and complexity.
CLO(6): Compare different multiplexing techniques such as FDM and TDM.

This exam targets the following program learning outcomes/student outcomes PLOs/SOs:

SO(1)-PLO(S1): An ability to identify, formulate, and solve complex engineering problems by applying principles of electrical engineering, science, and mathematics.
SO(2)-PLO(S2): 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.
SO(8)-PLO(K1): An ability to demonstrate knowledge of concept of electrical engineering and science

Question	**Q.1**	**Q.2.a**	**Q.2.b**	**Q.3**	**Q.4**				**TOTAL**
Course Learning Outcomes	CLO (1,2)	CLO(2)	CLO(3)	CLO (4,5,6)	CLO (6,7)				
Student Grade									
Max Grade	**15**	**5**	**5**	**9**	**6**				**40**

Student Outcome Assessment Report

1. Course Information

Course Title:	
Course Code:	
Section(s):	
Course Instructor:	
Classification:	
Student Outcomes Covered in The Course	
Semester:	
Total Number of Students Completed the Course:	
Sample Size[1]	

2. Summary of Assessment Results

Student Outcome	Target Level %	Actual Level Direct %	Comments

[1]A sample of twenty (25) students should be considered unless the class has a fewer number.

3. Instructor's Comments and Recommendations for improvement of the assessments Process

This section must be filled.

4. Instructor's Comments on the assessments results

SO(1)

SO(2)

SO(3)

NA

SO(4)

NA

SO(5)

NA

SO(6)

NA

SO(7)

NA

SO(8)

5. Recommendations for improvement of student outcome attainment

1.

Signature **Date:**

Course Instructor:		
Assessment Coordinator:		

University of Tabuk
Faculty of Engineering
Department of Electrical Engineering

Student Outcome Evaluation Report (SOER)

An ability to demonstrate knowledge of concepts of electrical engineering and science.

Evaluation of Last Cycle ():

Table (1)

Direct Assessment	Indirect Assessment

Current Evaluation (2022/2023):

In Tables (2-4), the weighted average is computed using the formula $\left(\frac{\sum_{i=1}^{n} (M_i X_i)}{\sum_{i=1}^{n} M_i}\right)$ where (n) is the number of sources, (X_i) is the result of assessment of the (i^{th}) source, (M_i) is the number of students sample of the (i^{th}) course.

Table (2)

Source	Trimester	Direct	Indirect	Sample Size
Weighted Average				

Table (3)

Source	Trimester	Direct	Indirect	Sample Size
Weighted Average				

Table (4)

Source	Trimester	Direct	Indirect	Sample Size
Weighted Average				

Comments on the assessments results

Recommendations for improvement of student outcome attainment

Signatures **Date:**

AEC Member 1:		
AEC Member 2:		