

SACS Assessment Plan for the Bachelor Degree of Electrical Engineering Program

Degree: Bachelor Degree of Electrical Engineering (BSEE) 2023-2024 Assessment Plan		
	Student Learning Outcomes	<ol style="list-style-type: none"> 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. 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. 3. an ability to communicate effectively with a range of audiences. 4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. 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. 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
PLAN	Assessment Method(s)	Described in section 1.
	Proficiency	For direct assessment, minimum acceptable is 80%.
DO	Benchmark	For direct assessment, 70% of students achieve the proficiency mentioned above
	Results of Assessment	Given in section 2.
STUDY	Analysis of Results	Given in section 3.
ACT	Improvement Plan for 2024-2025	Given in section 3.

1. Description of the Continuous Improvement Process

The Chair and faculty have the responsibility for making and modifying the assessment plan for continuous improvement, collecting the required data from courses and surveys, and making and implementing recommendations for continuous improvement. Any recommendations for improvement resulting from the assessment process are evaluated by the faculty and Chair. The overall program improvements are presented in the Advisory Council meeting every semester for any recommendations. Figure 1 illustrates the feedback mechanism utilized for the continuous improvement process. Table 1 shows the assessment data collected by the program.

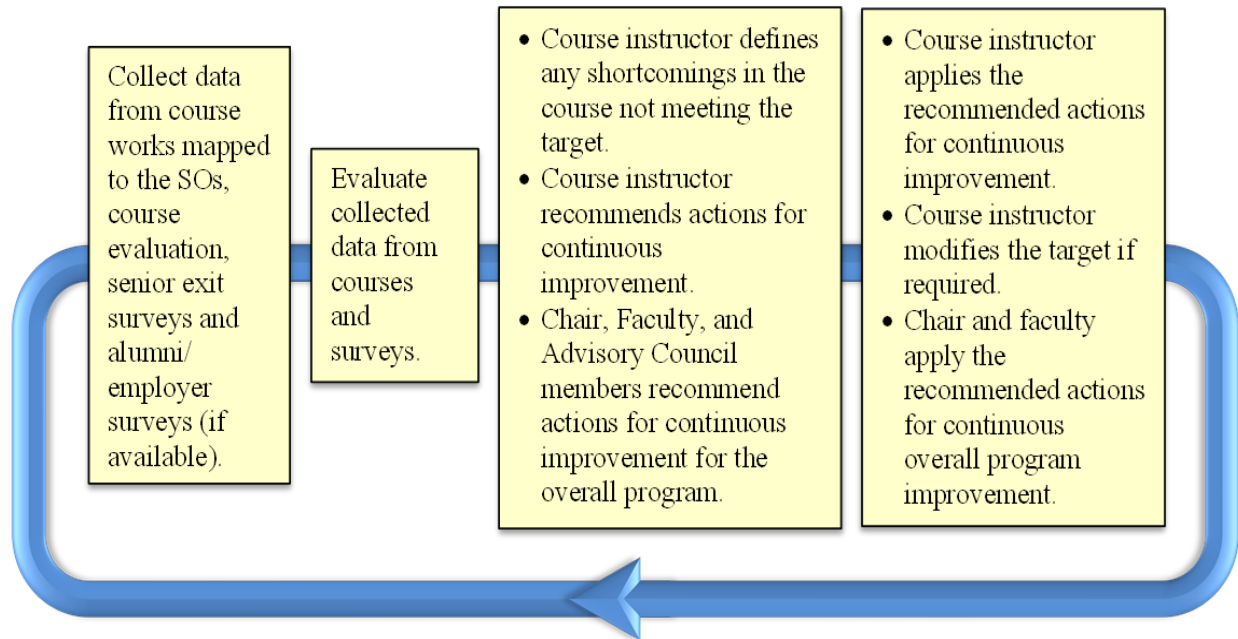


Figure 1 – The feedback mechanism utilized for the continuous improvement process.

Table 1. Assessment Data Collected by the Program

Source of Data	Assessment Type	Constituencies	Frequency of Feedback
Course assessment data for student outcomes	Direct	Faculty	Every semester
Senior design project	Direct	Faculty, students, and Advisory Council members	Every semester
Course evaluation	Indirect	Students in the course	Every semester
Senior exit surveys	Indirect	Graduating students	Every semester
Alumni and/or employer surveys (if available)	Indirect	Alumni and Employers	Occasionally

The LUEE faculty directly assess the “SOs” in selected courses. Table 2 shows the courses used to assess the SOs. In Fall 2023, the performance indicators (PIs) shown in Table 3 have been developed for each SO. Each PI is evaluated using one or more of instruments as shown Table 4 for the courses in the Fall and Spring. The target to be achieved is: At least 70% of the students get “80%” or better on the instrument used to evaluate the PIs in each SO. This 70% is equivalent to 2.8 on the 4.0 scale. To calculate the result of a certain PI, we count number of students who get 80% or more in the instrument used to evaluate this PI and divide it by the total number of students and multiply by “4.0”. The instructor can choose a different value from 80% depending on the difficulty level of the course. Every semester, each PI is evaluated, and actions for continuous improvement are taken if the result does not meet the target. These actions are usually applied to the specified course, however more actions may extend to the pre-requisite courses if the failure to meet the target is related to these courses too. The instructor may also suggest additional modifications to the course if he/she believes that they can improve the performance of the students in class and the quality of the course. Besides, we collect the students’ concerns and recommendations in the exit survey and course evaluation every semester, then we suggest and implement actions for continuous improvement accordingly.

Table 2 – Student Outcome vs. Courses Starting Fall 2022

Outcome Course\	Sem-ester	SO 1	SO 2	SO 3	SO 4	SO 5	SO 6	SO 7	Course Title
ELEN 2411	SP	X		X			X		Circuits Analysis I
ELEN 3312	FL	X							Circuits Analysis II
ELEN 3313	SP	X		X			X		Signals, Systems, & Transforms
ELEN 3322	SP	X					X		Electronics II
ELEN 3371	FL	X							Electromagnetics
ELEN 3381	SP	X		X			X		Electrical Analysis
ELEN 3421	FL	X		X			X		Electronics I
ELEN 3431	SP	X		X			X		Digital System Design I
ELEN 3441	SP	X		X			X		Fund. of Power Engineering
ELEN 4306	FL		X	X	X	X	X	X	Senior Project Design I
ELEN 4307	SP		X	X	X	X	X	X	Senior Project Design II
ELEN 4351	FL	X					X		Control Engineering
ELEN 4361	FL	X							Communication Systems
ELEN 4387	SP	X							Computer Org. & Arch.
ELEN 4486	FL	X		X		X	X		Embedded Microprocessor Sys.

Table 3 – The PIs for the SOs (Starting Fall 2023)

SO1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.					
	<i>Apply principles of engineering, science, and mathematics to:</i>				
PI1	Identify complex engineering problems		PI3	Solve complex engineering problems	
PI2	Formulate complex engineering problems				
SO2. 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.					
	<i>Engineering design produces solutions that meet specified needs with consideration of:</i>				
PI1	Global factors	PI3	Environmental factors	PI5	Public Health & Safety
PI2	Cultural & Social factors	PI4	Welfare & Economic factors		
SO3. An ability to communicate effectively with a range of audiences.					
PI1	Oral communication efficiency.				
PI2	Written communication efficiency.				
SO4. 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.					
	<i>Recognize ethical and professional responsibilities in the assigned engineering project and make informed judgments considering the impact of engineering solutions in:</i>				
PI1	Global context	PI3	Environmental context		
PI2	Societal context	PI4	Economical context		
SO5. 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.					
PI1	Team defines final goal and creates a plan to achieve it.				
PI2	Team defines members' tasks that integrate to achieve the final goal.				
PI3	Team creates collaborative and inclusive environment that achieved the goal.				
SO6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.					
PI1	Develop and conduct experiment and/or hands on activities.				
PI2	Analyze and interpret data and make conclusions.				
SO7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.					
PI1	Independently acquire new knowledge to achieve design goals.				
PI2	Apply new knowledge to achieve design goals.				

Table 4 – The instruments used to evaluate each PI in every SO for the Fall and Spring courses

Fall Courses (Starting Fall 2023)											
	SO1			SO3		SO5			SO6		
	PI1	PI2	PI3	PI1	PI2	PI1	PI2	PI3	PI1	PI2	
3312	I1	I1	I1								
3371	I1	I1	I1								
3421	I1	I1	I1		I4				I4	I4	
4351	I1	I1 and I12	I1						I12	I12	
4361	I1	I1	I1								
4486	I1	I1	I1	I9	I4	I4	I4	I4	I4	I4	
4306				I9	I5	I6	I6	I6	I6	I6	
	SO2					SO4				SO7	
	PI1	PI2	PI3	PI4	PI5	PI1	PI2	PI3	PI4	PI1	PI2
4306	I6	I6	I6	I6	I6	I6	I6	I6	I6	I7	I7
Spring Courses (Starting Spring 2024)											
	SO1			SO3		SO5			SO6		
	PI1	PI2	PI3	PI1	PI2	PI1	PI2	PI3	PI1	PI2	
2411	I1	I1	I1		I4				I4	I4	
3313	I1	I1	I1		I4				I4	I4	
3322	I1	I1	I1						I4	I4	
3381	I1	I1	I1		I3				I12	I12	
3431	I1	I1	I1		I4				I4	I4	
3441	I1	I1	I1		I4				I4	I4	
4387	I1	I1	I1								
4307				I9	I5	I6	I6	I6	I6	I6	
	SO2					SO4				SO7	
	PI1	PI2	PI3	PI4	PI5	PI1	PI2	PI3	PI4	PI1	PI2
4307	I6	I6	I6	I6	I6	I6	I6	I6	I6	I6	I6
I1: Quiz/Exam Question(s) I2: HWK/Assignment Question(s) I3: Discussion Forum I4: Lab Work & Report I5: Project Report I6: Project Report Section					I7: Technical Paper I8: Proposal I9: Presentation I10: Poster I11: Demo Video I12: MATLAB/Computer Prog.						

2. Continuous Improvement Results 2023-2024

Direct Assessment and Its Related Actions for Improvement:

- Fall 2023

The assessment data for Fall 2023 are shown in the table below.

Fall 2023 Student Outcome Direct Assessment Results											
	SO1			SO3		SO5			SO6		
	PI1	PI2	PI3	PI1	PI2	PI1	PI2	PI3	PI1	PI2	
3312	2.23	2.23	2.23								
3371	3.60	4.00	3.16								
3421	3.42	2.86	2.86		3.80				3.80	3.80	
4351	3.13	3.02, 3.56	2.99						3.67	3.24	
4361	3.37	3.37	3.37								
4486	3.40	3.68	3.68	3.68	3.84	4.00	4.00	3.20	3.84	3.52	
4306				3.33	3.87	3.87	3.47	4.00	3.54	3.54	
	SO2					SO4				SO7	
	PI1	PI2	PI3	PI4	PI5	PI1	PI2	PI3	PI4	PI1	PI2
4306	3.00	3.73	3.43	3.11	3.67	3.60	2.96	3.11	3.50	3.44	3.44

- Spring 2024

The assessment data for Spring 2024 are shown in the table below.

Spring 2024 Student Outcome Direct Assessment Results											
	SO1			SO3		SO5			SO6		
	PI1	PI2	PI3	PI1	PI2	PI1	PI2	PI3	PI1	PI2	
2411	3.35	2.06	1.55		3.68				3.72	3.72	
3313	2.52	1.83	3.54		3.67				3.78	3.89	
3322	3.03	2.90	3.27						3.41	3.41	
3381	3.48	2.80	2.28		3.44				3.56	3.44	
3431	3.88	3.08	2.04		3.08				3.48	3.08	
3441	3.23	2.77	2.96		3.85				3.85	3.85	
4387	3.52	3.39	2.67								
4307				4.00	3.37	3.58	2.95	2.95	3.37	3.16	
	SO2					SO4				SO7	
	PI1	PI2	PI3	PI4	PI5	PI1	PI2	PI3	PI4	PI1	PI2
4307	3.58	3.58	3.58	3.05	3.16	3.58	3.58	3.47	3.58	3.16	3.58

Indirect Assessment:

- **2023/24 Senior Exit Surveys Summary**

No of students: **37**

PEOs Approval: 35/37 = **94.6%**

Student outcomes [*Excellent(4), Good(3), Neutral(2), Fair(1), Poor(0)*]:

SO1	SO2	SO3	SO4	SO5	SO6	SO7
3.19	3.24	3.27	3.27	3.27	3.32	3.38

The results in the table show that all student outcomes have met the target (2.8 on a 4 scale). However, the students expressed the concerns and recommendations listed below:

- Adding Electric Vehicle course.
- Adding more hands-on experiences.
- Adding plant-based classes!

- **Course Evaluation: Relevant Students' Concerns/Recommendations:**

- Some students showed concerns about using mouse to write on the PPT slides.
- Faculty have old laptops with low camera resolution.
- Faculty standing in one place during class to record each lecture.
- Faculty don't point the camera to the board when moving from PPT to work on the board.

3. Continuous Improvement Actions for 2024-2025

The results in Fall 2023 show that the following course didn't meet the target, therefore the following actions for course improvements are recommended.

Course	SO	Improvements
3312	1	The target was not met. A modification with more solving in class examples and assigning more homework problems will be given to make sure the topic of a delta connection lead to a three-phase source to be more clear for all students.

- Additional actions for course improvement proposed by the course instructor:

The following actions for improvement are recommended by the course instructors based on the detailed analysis on Bb Ultra CMS or their observations of the student's performance in the class during the semester.

Course	Improvements
4351	The target was met for all PIs, however the instructor suggested to use MATLAB online training provided by MathWorks to further enhance the students' programming skills.
4361	The results show that the average scores of the class performance met the targeted goal for each student outcome. However, it is suggested that additional exercise on the use of probability for communication system to be implemented in class in the future.

The results in Spring 2024 show that the following courses didn't meet the target, therefore the following actions for course improvements are recommended.

Course	SO	Improvements
2411	1	More examples and homework problems will be given on transient analysis on RLC circuits, also solving AC circuits problem with more techniques like superposition and source transformation.
3313	1	Students appear to perform well on the assignments that include hands-on activities, while the conceptual assignments may pose difficulties. I consider developing hands-on experiments that will explore the specific concepts, such as instability, for instance. The above analysis further suggests that the students may underperform on the assignments requiring problem identification and formulation, while solving them appears easier. To alleviate this, I consider assignments, where students will be asked to formulate the problems.
3381	1	More exercise in mathematical calculations. Students who do not succeed in this class are weak in their Algebraic capability.
3431	1	The analysis indicates, more practice is needed for some problems, such as creating a logic circuit with PFETs and NFETs, pipelining throughput/latency.
3441	1	Students fell short on SO1, PI2, which indicates the ability to formulate complex engineering problems. Only 69% of students could develop the problem successfully, which eventually affected the score associated with solving the entire problem. The plan is to integrate more content on formula derivation, break down the problem formulation process into smaller steps, provide guidance at each stage, and foster an

		environment where students are encouraged to ask questions, challenge assumptions, and analyze problems from multiple perspectives.
4387	1	More time will be spent to cover the implementation of functions using sequential circuits. More examples will be solved on sequential circuits.

- Additional actions for course improvement proposed by the course instructor:

The following actions for improvement are recommended by the course instructors based on the detailed analysis on Bb Ultra CMS or their observations of the student's performance in the class during the semester.

Course	Improvements
3322	While the target was met for all outcomes, for SO1 PI2, the score was slightly above target. Therefore, an action has been taken. More examples will be given in class to formulate time constants in an equivalent small-signal amplifier.

General Actions for Improvement for the Overall Program:

- In October 2023, a proposal was submitted to the Texas Higher Education Coordinating Board to establish a new Bachelor of Science Degree in Computer Engineering program in the Department of Electrical Engineering, and consequently change the name of the Department to "Department of Electrical and Computer Engineering." These requests were approved on December 20, 2023, to be effective January 1, 2024.
- The Department investigated possible collaboration with Tatum University in research and education.
- The Department website was updated to a new template in Fall 2023.
- An ABET mock visit was conducted in January 2024. All PEV's comments and concerns were considered.
- A search committee was formed to hire a new faculty in Computer Engineering in Fall 2024.
- The Department purchased a large touch screen and installed it in Cherry 1101 to allow the instructors to give more explanation to the power point slides using the screen pen (not mouse) and engage the students in class by asking them to solve problems on the screen.
- The Department purchased touch screen laptops for the faculty to allow them to give more explanation to the power point slides using pens (not mouse).
- The Department purchased wireless microphones and presentation remote clickers to allow the instructors to move freely in the classroom while teaching.
- To substitute for the absence of employer survey, which is performed by the College, we have developed the 2-page survey to be filled out by the mentors of the students who have internships/co-ops and enrolled in ELEN 4304 – Electrical Engineering Practicum course starting Summer 2024.
- In Spring 2024, the college of engineering planned significant remodeling of all classrooms in Cherry building with an approximate budget close about \$1M. The purpose is to unify the technology used in the classrooms to allow for the best teaching method for on-campus and online students and make it easy for the faculty to move from one classroom to another. The following table shows the final suggested list for each classroom to be installed in Summer or Fall 2024.

Category	Item Name	Price
Instructor PC	Dell Precision 7865	2,923
Camera and Mic	Logitech Rally Plus UHD 4K Conference Camera System with Dual-Speakers and Mic Pods Set	2,599
Mic Array	5 Logitech Rally Mic Pod Boundary Microphone	
Main Display	Samsung Q80C 98" 4K HDR Smart QLED TV	4,973
Main Display Touch	Samsung WM85B Flip Pro 85" 4K Interactive Touchscreen LED Display	5,931
Auxiliary Display	Samsung CU7000 Crystal UHD 85" 4K HDR Smart LED TV	1,100
Display Touch	Wacom Cintiq Pro 24 Creative Pen & Touch Display	2,700
Document Camera	Elmo MX-P3 Visual Presenter & Document Camera	405
Display Bracket	Wacom Ergo Stand for Wacom Cintiq Pro 24	500
Display Bracket	Kanto Living PMX700 Pro Series Full-Motion Wall Mount for 42 to 100" Displays (Black)	460
Display Bracket	Tilting Wall Mount for 37 to 100" TVs	30
HDMI Splitter	Monoprice Blackbird 4K HDMI 2x4 Splitter and Switch	70
Desk (Embedded Monitor)	Versatable Downview Computer Desk	1200
Desk (Traditional)	Versatable Enclosed Classroom Desk	610
Consumables	Xcellon 3-in-1 USB-C HDMI Multiport Adapter	30
Consumables	Pearstone High-Speed HDMI Cable with Ethernet (Black, 6')	13
Consumables	Pearstone DisplayPort to HDMI Cable (6.6')	11
Consumables	Wacom Grip Pen	59
Consumables	Belkin 12-Outlet Home/Office Surge Protector	28
Consumables	Expo Markers Dry Erase Accessory Kit	30
Touchscreen Cart	Kanto Living Rolling TV Cart with Height Adjustment for 60 to 100" Displays	
Hub Adapter	2 8-Port USB Type-C Multimedia Hub Adapter	
HDMI Switch Splitter Extender	(US Plug)(1 Pcs 2x6)4K HDMI Switch Splitter Extender 2x6 over Ethernet Cat5e/6 100M HDMI Switch 2 in 6 out with 2 Loop-out + 4 Channel RJ45 UTP out	
Ethernet ports	2 Ethernet ports	
Logitech Rally Hub	2 Logitech Rally Mic Pod Hub for Rally Video-Conferencing Systems	
Roll of Ethernet Cable	200 Belden Cat 6 Bulk Ethernet Cable (1000', White)	
Cable Runner	2 Cable Runner	
Consumables	2 Pluggable 12-Outlet Power Strip with USB Charging (6 ft)	
mDP to HDMI	mDP to HDMI	
Whiteboard	Luxor MB7248WW Mobile Magnetic Reversible Whiteboard (72x48")	304

- The Chair advised the faculty to use MAX grade to early identify the students at risk. MAX grade, as shown in the table below, is the maximum grade the student can get during the semester assuming

he/she will get maximum grade in the remaining parts the course. The faculty are advised to contact the students when their MAX grades change from one grade to a lower one.

	Student Name	HW1	HW2	HW3	HW4	Test 1	Test 2	Final	Total	% Final	Final	% Current	Current	MAX	MAX
		5	5	5	5	20	20	40	100	Grade	Grade	Grade	Grade	%	Grade
		5	5	0	0	20	0	0	30						
1	Student 1	5	5			20			30	30.0%	F	100.0%	A	100.0%	A
2	Student 2	4	4			17			25	25.0%	F	83.3%	B	95.0%	A
3	Student 3	3	3			14			20	20.0%	F	66.7%	D	90.0%	A
4	Student 4	1	1			8			10	10.0%	F	33.3%	F	80.0%	B
5	Student 5	0	0			0			0	0.0%	F	0.0%	F	70.0%	C

- On February 16, 2024, the college of engineering leaders met with the college of science leaders to discuss issues related to the Math and Science courses in all engineering curricula. It was suggested to:
 - Include MATLAB practice in the math courses.
 - Modify the course schedule for the Math and Science courses to resolve course conflict with engineering courses.
 - Offer some course sections in the evening because many students in engineering either work full time or have co-ops.
 - Increase class capacity, because many students were not able to register in the Face-to-Face sections because of their low capacities.
 - Remove the Cal I co-requisite for the Chem 1311/Chem 1111 course.
 - Agree to hold this meeting at least one time every semester.
- The Department will meet in Fall 2024 to discuss students' concerns in the exit survey and any recommendations for continuous improvement in the courses and the program.