

Insert Academic Degree Name Here

Annual Program Report Template

Year:	2022-2023
Program:	BS Electrical Engineering
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Summary of Continuous Improvement Efforts since Last Report

Provide a brief description of how assessment results have been used for program improvement. Point to a specific example of how an assessment provided the program with data it could use for improvement and what that improvement was, if possible, also show evidence of the improvement. You may look at data from the two previous academic years to support this case.

Respond here: The 2019-2020 report had 3 SLOs. Starting from the 2020-2021 report, 5 SLOs have been used. In addition, new rubrics have been added to each SLO. These changes have enabled more comprehensive evaluations. The changes have also resulted in more stable and reliable data in the 2020-2021 and 2021-2022 reports with less variations. New instructional materials and techniques are planned to be implemented to further improve the percentage data that represents success for SLOs.

Program Highlights Since Last Report

Identify and briefly discuss any programmatic curriculum changes made since the last report (e.g. new courses, course changes, SLO changes, course deletions).

Respond here: A proposal has been submitted to offer a BS Computer Engineering degree program. Applications have been submitted to add the following as new undergraduate courses: Applied Electromagnetics. Applications have been submitted to add the following as new graduate courses: Python Programming, Computational Electromagnetics. Applications have been submitted to remove the following undergraduate course: Quantum Mechanics for EE. The above mentioned electromagnetics courses include assignments using Altair FEKO electromagnetic simulation software, which help students develop their simulation skills. SLOs of existing courses have been modified based on Bloom's Taxonomy and improved. The mapping of ABET student outcomes to undergraduate courses have been updated. New undergraduate course labs have been implemented. More lab assignments using the Analog Discovery Kit have been added. New learning strategies have been implemented into the labs to promote teamwork and better learning environment as part of the NSF RUE grant. More assignments using Matlab and Simulink have been added to improve the programming skills of undergraduate students.

Table 1. Assessment Results and Analyses for Current Cycle.

STAGE 1: PLAN				STAGE 2: DO		STAGE 3: STUDY
Departmental Student Learning Goal	Program Student Learning Outcome	Assessment	Assessment Method/Location	Benchmark Expectations 4) Exceeds expectations, 3) Meets expectations, 2) Below expectations, 1) Does not meet expectations.	Data Results	Actions/Goals Based on Data Results* What do the data tell you? How will you use this data? How were data from the last cycle used to make changes during this cycle, and What were the results of those changes?
Help students develop a strong theoretical foundation	An ability to identify, formulate, and solve engineering problems	- Objectives and description identify problem - Design formulates problem by applying STEM - Technical approach applies STEM principles	Evaluation of senior design projects / Department of Electrical Engineering	At least 3 (meets expectations) above (75%).	89%	The data supports strong foundation of projects. It will be used for further improvement. Project specifications, standards and constraints were added to support problem formulation, improving the percentage for success.
Support the necessary training for professional engineering practice	An ability to apply engineering design to produce solutions	- Engineering design is applied to provide solutions that meet desired needs	Evaluation of senior design projects / Department of Electrical Engineering	At least 3 (meets expectations) above (75%).	88%	The data supports that engineering design meets the needs. It will be used for further improvement. This student outcome was changed in 2020, resulting in a better and more accurate evaluation.
Help students experiment with interpersonal communication and teamwork	An ability to function effectively on a team	- Tasks are effectively proposed and executed to meet objectives	Evaluation of senior design projects / Department of Electrical Engineering	At least 3 (meets expectations) above (75%).	84%	The data evaluates communication and teamwork skills. This student outcome was added as a new outcome in 2020. This change enabled evaluation of communication and teamwork.
Help students develop practical engineering skills	An ability to develop and conduct appropriate experimentation	- Hardware/software demonstration is performed properly - Discussions and conclusions reflect efficient application of engineering judgment	Evaluation of senior design projects / Department of Electrical Engineering	At least 3 (meets expectations) above (75%).	86%	The data supports that successful project demonstration and engineering judgment. It will be used for further improvement. This student outcome was changed in 2020, resulting in a better and more accurate evaluation.
Help students develop abilities to build, apply and advance knowledge	An ability to acquire and apply new knowledge	- Ability to learn and apply new knowledge has been developed	Evaluation of senior design projects / Department of Electrical Engineering	At least 3 (meets expectations) above (75%).	88%	The data evaluates knowledge. This student outcome was added as a new outcome in 2020. This change enabled evaluation of the ability to acquire and apply new knowledge.

Table 2. Continuous Improvement Results Since Last Report

Stage 4: ACT		
Actions/Goals Based on Data Results <i>*Copy last cycle's actions/goals and report on progress toward continuous improvement on those here.</i>	Status <i>C=Complete P=Progressing N=No Action Taken</i>	Discussion of Status <i>If C, describe efforts that led to accomplishment of actions/goals. If P, provide update on progress made toward accomplishing actions/goals and what tasks remain If N, discuss why action toward accomplishing actions/goals has been delayed and what work will be initiated toward accomplishment.</i>
Offer Computer Engineering as a new program in addition to the Electrical Engineering program. Generate curriculum for the new program	P	A proposal to offer Computer Engineering has been submitted. Two faculty members will be hired. The curriculum will be finalized.
Hire one faculty member in power engineering and two faculty members in Computer Engineering	P	Job advertisements have been posted. Search committees will be formed.
Add multiple courses, delete some courses that are no longer needed, modify existing syllabi and change course prerequisites	P	Syllabi have been updated, accordingly. Course addition/deletion forms have been submitted for the relevant courses.

Actions for Improvement:

➤ Before Fall 2022

We have performed the following activities to further improve our program and curriculum:

- There was a demand that students should acquire teamwork skills before students get to their senior year. We have added online teams for Electronics I and II, Signals and Systems, Circuits I, and Microcomputers I courses. This was part of the online lab learning strategies.
- In Fall 2019, LUEE Department has decided to replace the PHYS 3350 Modern Physics with ELEN 3328 Quantum Mechanics for Electrical Engineers. A recent analysis of our degree plan during and following our recent accreditation review revealed that the material taught in PHYS 3350 is no longer relevant to our electrical engineering students. In line with the other programs in our area, the goal is to focus the study of quantum mechanics by electrical engineers on semiconductor electronics and photonics. This focus also includes nanotechnology as practiced by electrical engineers.
- Effective 2020-2021 academic year, ELEN 4200 Electrical Engineering Seminar course of two credits has been eliminated and embedded into the Senior Project Design I and II courses (ELEN 4206 and 4207, respectively). The course credit for Senior Project Design course has been increased 3 credit hours from 2 and the courses were also renumbered as ELEN 4306 and 4307, respectively.

- Successfully continued on the unique Hardware-in-Homework (HiH) integration into upper level theory courses: This novel approach, HiH, provides a laboratory experience to upper division theory courses where students gain hands-on experience via a portable device that the students purchase for use in all of their lab work as well as HiH. Students are given homework assignments that require them to use the test and prototyping equipment that they already know how to use from their lower division formal laboratory work.
- Fall 2021: LU Electrical Engineering department, in collaboration with LU Teacher Education department, received funding from the NSF ISUE to improve the quality of online labs for electrical engineering students. This was motivated by feedback from senior exit surveys and input from the industrial advisory board, which highlighted a need for more hands-on, design, and team experience in lab experiments. The project, titled "Promoting engaged and active learning through collaborative online lab experiences," involve implementing active learning strategies such as teamwork, creating a learning community, incorporating open-ended design experiences, and using pre-lab simulations and video demonstrations in targeted courses, including Electronics I and II, Signals and Systems, Circuits I, and Microcomputers I, which are particularly important for preparing students for their senior project design.
- During Spring 2022, the active learning strategies have been implemented for Circuits I, Electronics II and Signals and Systems courses. We are continuing on the integration during Fall 2022 for Electronics I and Microcomputer I courses.
- We have established articulation agreements with community colleges in Texas TX that resulted in the corresponding 2+2 degree maps allowing community colleges and other 2-year institutions to complete two additional years at a 4-year college and earn their baccalaureate degree.
- We have also established a college-wide accelerated BSEE-ME/MESEE (4+1) track that allows qualified students to earn their Master degree faster.
- We continued on the offering of the two Undergraduate Certificates in Power & Energy Engineering and Instrumentation & Control, and one Graduate Certificate in Power and Energy Engineering.

➤ ***During Fall 2022***

- The department decided to implement the following changes starting Spring 2023:
 - No courses are offered in hybrid mode.
 - All core courses are offered in 2 sections fully face-to-face and synchronous online, taught together.
 - If the student wants to enroll in the online section, they need to submit a request to the Department chair with documented evidence showing why they can't attend the face-to-face section.
 - Instructor can give permission for some students in the online section to take the course asynchronously if they have acceptable reason such as having a full-time job.
 - Labs are kept hybrid using the virtual lab devices until the laboratories are equipped with new instruments.
- Order for new instruments has been submitted to Texas State Higher Education Funds (HEF) to upgrade the labs and classrooms.
- The Department website has been updated to clarify the new changes, and provide the students information about all degrees, programs and certificate available in the department. In addition, a course pre-requisite flowchart is developed and posted on the Department website.

➤ *During Spring 2023*

- HEF has approved our order for the new lab and classrooms equipment, which will be available in Fall 2023.
- The department decided to implement the following changes starting Fall 2023:
 - All labs will be offered in two sections: fully face-to-face with real instruments and fully online using the virtual labs. However, the students in both sections have access to real instruments on-campus and the virtual lab devices.
 - All graduate courses will be offered in face-to-face mode instead of hybrid.
- Course and Curriculum Modifications:
 - The descriptions, contents and pre-requests of the majority Core and elective courses have been modified. Some course names have been changed as follow:

Course No.	Old Name	New Name
ELEN 1100	Intro to Electrical Engineering	Introduction to ECE
ELEN 1301	Intro Computers & Programming	Computers & Programming I
ELEN 2411	Circuits I	Circuits Analysis I
ELEN 3312	Circuits II	Circuits Analysis II
ELEN 3431	Digital Logic Design	Digital System Design I
ELEN 4486	Microcomputer I	Embedded Microprocessor Systems
ELEN 4387	Microcomputers II	Computer Organization & Architecture
ELEN 3313	Signals and Systems	Signals, Systems, and Transforms

- Communications systems course is added to the curriculum as a senior core course instead of Quantum Mechanics for Electrical Engineering.
- Electrical Analysis course is moved up to be a sophomore level instead of junior level.
- As a Probability and Statistics option, INEN 3320 Prob & Statistics Engineering course is added as another option with MATH 3370 Intro to Theory of Statistical Interference.
- Based on these changes, the degree plan and pre-request chart have been modified, as shown in the Figures below.
- No stacking for graduate and undergraduate courses is allowed.
- If 4, 5 and 6000 courses are in the same subject, they must have different titles, description, objectives, contents, outline, etc. The 6000-level course is either including the most advanced topics or has more research.
- New electives and graduate courses are proposed to eliminate the excessive dependence on the special topic courses.

**BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING
4-YEAR DEGREE PLAN**

Year 1: FALL SEMESTER		SPRING SEMESTER	
Course Name	Credits	Course Name	Credits
MATH 2413 Calculus & Analytical Geometry I	4	MATH 2414 Calculus & Analytical Geometry II	4
CHEM 1311 General Chemistry I	3	Foreign Lang./Communication Elective ⁽²⁾	3
CHEM 1111 General Chemistry I Lab	1	PHYS 2425 University Physics I	4
ELEN 1100 Introduction to ECE	1	History Elective ⁽³⁾	3
ENGL 1301 English Composition I	3	ELEN 1301 Computers & Programming I ⁽⁴⁾	3
Social Science Elective ⁽¹⁾	3		
TOTAL	15	TOTAL	17
Year 2: FALL SEMESTER		SPRING SEMESTER	
MATH 2415 Calculus III	4	MATH 3301 Ordinary Differential Equations	3
MATH 2318 Linear Algebra	3	ELEN 3381 Electrical Analysis	3
PHYS 2426 University Physics II	4	ELEN 2411 Circuits Analysis I	4
INEN 3320 Prob & Statistics Engineering, or MATH 3370 Intro to Theory of Statistical Inference	3	ELEN 3431 Digital System Design I	4
PHIL 1370 Philosophy of Knowledge ⁽⁵⁾	3		
TOTAL	17	TOTAL	14
Year 3: FALL SEMESTER		SPRING SEMESTER	
ELEN 3312 Circuits Analysis II	3	ELEN 3322 Electronics II	3
ELEN 3421 Electronics I	4	ELEN 3313 Signals, Systems, & Transforms	3
ELEN 3371 Electromagnetics	3	ELEN 3441 Fundamentals of Power Engineering	4
ELEN 4486 Embedded Microprocessor Systems	4	ELEN 4387 Computer Organization & Arch.	3
POLS 2301 Intro. to American Government I	3	POLS 2302 Intro. to American Government II	3
TOTAL	17	TOTAL	16
Year 4: FALL SEMESTER		SPRING SEMESTER	
ELEN 4306 Senior Project Design I	3	ELEN 4307 Senior Project Design II	3
ELEN 4351 Control Engineering	3	ELEN Elective ⁽⁶⁾	3
ELEN 4361 Communication Systems	3	ELEN Elective ⁽⁶⁾	3
ELEN Elective ⁽⁶⁾	3	History Elective ⁽³⁾	3
Fine Arts Elective ⁽⁷⁾			
TOTAL	15	TOTAL	12

Notes:

All STEM courses require a grade of 'C' or better to satisfy degree plan/prerequisite requirements.

1. Social Science electives are: ECON 1301, PSYC 2301, SOCI 1301, ECON 2301, ECON 2302 or INEN 2373

2. Foreign Language or Communications Electives are: COMM 1315, COMM 1321, DSDE 1371, FREN 1311 or SPAN 1311

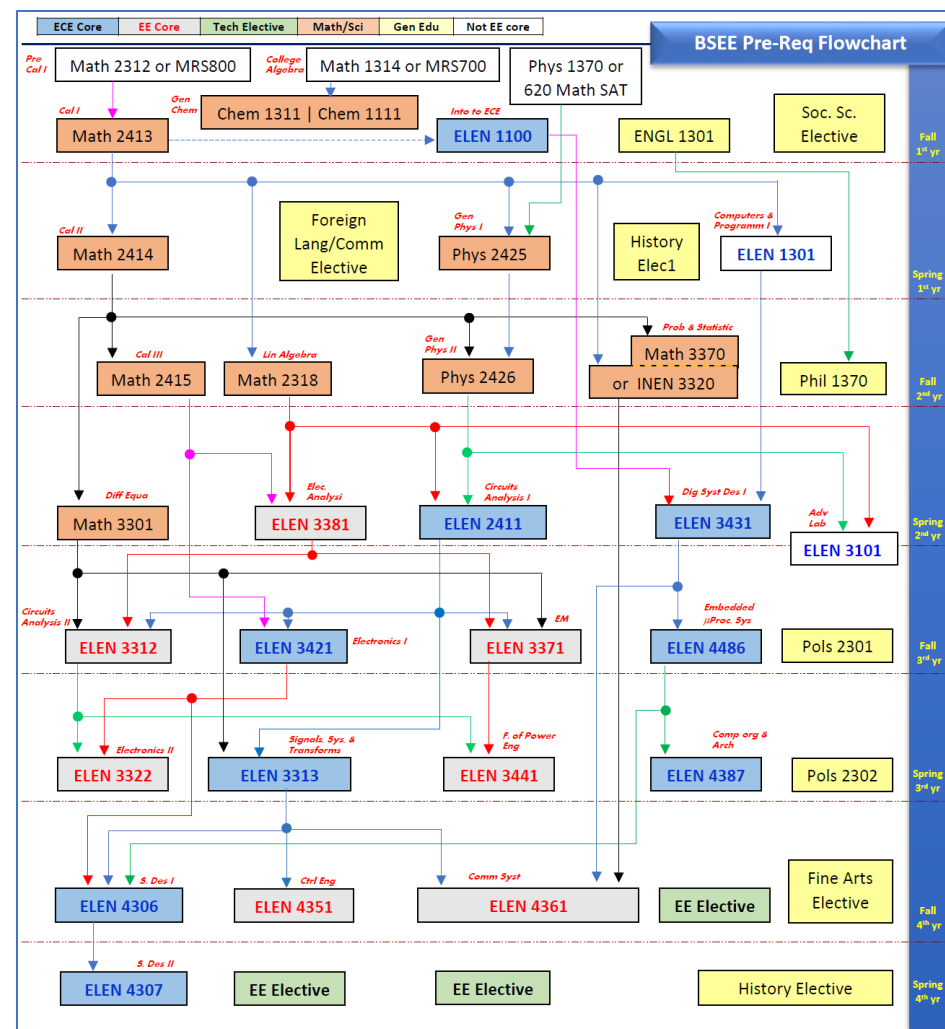
3. Two semesters of US or Texas history from: HIST 1301, 1302 or 2301

4. ELEN 1301 Computers & Programming I is required unless substituted by an equivalent high school programming course
5. or PHIL 2306 Ethics

6. Non-EE courses may substitute EE Electives if approved by the department chair

7. Fine Arts electives are: ARTS 1301, DANC 2304, MUSI 1306, COMM 1375 or PHIL 1330

**New Degree Plan and Pre-Req Chart for BS in
Electrical Engineering**



**BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING
4-YEAR DEGREE PLAN**

Year 1: FALL SEMESTER		SPRING SEMESTER	
Course Name	Credits	Course Name	Credits
MATH 2413 Calculus and Analytical Geometry I	4	MATH 2414 Calculus and Analytical Geometry II	4
ELEN 1100 Intro. to Electrical Engineering	1	PHYS 2425 University Physics I	4
CHEM 1311 General Chemistry I	3	Foreign Lang./Communication Elective ⁽²⁾	3
CHEM 1111 General Chemistry I Lab	1	History Elective ⁽³⁾	3
ENGL 1301 English Composition I	3		
Social Science Elective ⁽¹⁾	3		
TOTAL	15	TOTAL	14
Year 2: FALL SEMESTER		SPRING SEMESTER	
MATH 2415 Calculus III	4	MATH 3301 Ordinary Differential Equations	3
MATH 2318 Linear Algebra I	3	ELEN 3328 Quantum Mechanics for EE	3
PHYS 2426 University Physics II	4	**ELEN 2411 Circuits I	4
MATH 3370 Intro to Theory of Statistical Inference	3	ELEN 3431 Digital Logic Design	4
PHIL 1370 Philosophy of Knowledge ⁽⁴⁾	3		
TOTAL	17	TOTAL	14
Year 3: FALL SEMESTER		SPRING SEMESTER	
ELEN 3312 Circuits II	3	ELEN 3313 Signals and Systems	3
ELEN 3371 Electromagnetics I	3	ELEN 3322 Electronics II	3
ELEN 3421 Electronics I	4	ELEN 3381 Electrical Analysis	3
ELEN 4486 Microcomputers I	4	ELEN 3441 Fund. Power Engr.	4
		ELEN 4387 Microcomputers II	3
TOTAL	14	TOTAL	16
Year 4: FALL SEMESTER		SPRING SEMESTER	
ELEN 4306 Senior Project Design I	3	ELEN 4307 Senior Project Design II	3
ELEN 4351 Control Engineering	3	ELEN Elective ⁽⁵⁾	3
ELEN Elective ⁽⁵⁾	3	History Elective ⁽³⁾	3
ELEN Elective ⁽⁵⁾	3	POLS 2302 Intro. to American Government II	3
POLS 2301 Intro. to American Government I	3	Fine Arts Elective ⁽⁶⁾	3
TOTAL	15	TOTAL	15

Notes:

All STEM courses require a grade of 'C' or better to satisfy degree plan/prerequisite requirements.

1. Social Science electives are: ECON 1301, PSYC 2301, SOCI 1301, ECON 2301, ECON 2302 or INEN 2373

2. Foreign Language or Communications Electives are: COMM 1315, COMM 1321, DSDE 1371, FREN 1311 or SPAN 1311

3. Two semesters of US or Texas history from: HIST 1301, 1302 or 2301

4. or PHIL 2306 Ethics

5. Non-EE courses may be substituted if approved by the department chair

6. Fine Arts electives are: ARTS 1301, DANC 2304, MUSI 1306, COMM 1375 or PHIL 1330

** ELEN 1301 Intro to Computers and Programming is needed before taking ELEN 2411 Circuits I (An equivalent high school programming course may be accepted)

**Old Degree Plan and Pre-Req Chart for BS in
Electrical Engineering**

