Program: Bachelor of Science (BS), Electronics Engineering Technology (141)

College of Arts and Sciences

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Northwestern Mission. Northwestern State University is a responsive, student-oriented institution committed to acquiring, creating, and disseminating knowledge through innovative teaching, research, and service. With its certificate, undergraduate, and graduate programs, Northwestern State University prepares its increasingly diverse student population to contribute to an inclusive global community with a steadfast dedication to improving our region, state, and nation.

College of Arts and Sciences Mission. The College of Arts & Sciences, the largest college at Northwestern State University, is a diverse community of scholars, teachers, and students, working collaboratively to acquire, create, and disseminate knowledge through transformational, high-impact experiential learning practices, research, and service. The College strives to produce graduates who are productive members of society equipped with the capability to promote economic and social development and improve the overall quality of life in the region. The College provides an unequaled undergraduate education in the social and behavioral sciences, English, communication, journalism, media arts, biological and physical sciences, and the creative and performing arts, and at the graduate level in the creative and performing arts, English, TESOL, and Homeland Security. Uniquely, the College houses the Louisiana Scholars' College (the State's designated Honors College), the Louisiana Folklife Center, and the Creole Center, demonstrating its commitment to community service, research, and preservation of Louisiana's precious resources.

Engineering Technology Department Mission: The Engineering Technology Department is dedicated to delivering high-quality education in the areas of engineering technology, electronics engineering technology, and industrial engineering technology, as well as pre-engineering preparation. The department prepares students for successful careers and enriched lives in the public, private, and nonprofit sectors, and promotes economic development and enrichment of the communities we serve.

Electronics Engineering Technology Mission Statement: The mission of the BS in Electronics Engineering Technology is to produce four-year graduates with the breadth and depth of knowledge in electronics engineering technology to become lifelong productive members of the regional workforce and the local society.

Purpose: The Bachelor of Science in electronics engineering technology program will prepare students to: 1) analyze, test, build, operate, and maintain electronic systems, and 2) manage, maintain, and install low voltage/power systems, automation, and controls. It prepares students for entry positions in government or the private sector in which the ability to implement changes, upgrade operations, set up equipment, analyze problems, and modify if necessary is increasingly critical. It will also prepare interested students for the pursuit of advanced degrees in Engineering and Technology at other institutions.

Methodology: The assessment process for the BS in Electronics Engineering Technology program is as follows:

(1) Data from assessment tools (both direct–indirect, quantitative, and qualitative) are collected and returned to the department head and ET ABET committee.

(2) The department head and ET ABET committee analyze the data to determine whether students have met measurable outcomes.

(3) Results from the assessment are discussed with the program faculty.

(4) The department head, in consultation with the Engineering Technology Advisory Board, will propose changes to measurable outcomes, assessment tools for the next assessment period, and, where needed, curricula and program changes.

Student Learning Outcomes (SLOs):

Student learning outcome data was collected, analyzed, and reported for the Electronics Engineering Technology degree program. Measures used to collect data include reports, case studies, projects, exams, presentations, and written exercises. Assessment data for the academic year 2022-2023 showed that some targets were met or exceeded and, in other cases,not met. Most of the student performance indices for all SLOs were found to be satisfactory. For those assessments where the targets are not met, action plans were devised and will be implemented in the next cycle.

From these results, there were several key actions recommended, and decisions made to enhance the student experience and student-learning outcomes with the focus onassuring students meet and exceed target expectations.

SLO 1. Ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline (ETAC of ABET Outcome1).

Measure 1.1. Every spring semester, students in EET 2350 are graded using rubric measuring their ability to design Integrator Circuits. The acceptable target is that 80% of students score 12 out of 16 (75%) on the rubric-based assessment of the project.

Finding: Target was met.

Analysis: In AC 2023-2024, the target was met with 19 out of 21 (86%) students scoring at least 12 out of 16 (75%) on the rubric-based assessment of their integrator circuit. Based on the analysis of the AC 2023-2024 results, the faculty made the following changes in 2024-2025. The instructor worked with every student to ensure they completed their assignments on time in terms of designing more comprehensive projects and problems in integrator and differentiation circuits, comparators circuits, and oscillators.

As a result of these changes, in 2024-2025, the target was met. In AC 2024-2025, 7 out of 8 (88%) students scored at least 12 out of 16 (75%) on the rubric-based assessment of their integrator circuit. The results showed a relatively higher level of student success, relative to those of AC 2023-2024. The single failing measurement can be attributed to the student's inability to complete all assignments.

Decision: In 2024-2025, the target was met. Based on the analysis of AC 2024-2025, the faculty will implement the following changes in 2025-2026 to drive the cycle of improvement. The instructor will emphasize both theoretical analysis and MultiSim simulation to explore circuit systems. The instructor will request students apply more extensive use of algebra and calculus in the analysis and design of circuit systems.

Measure 1.2. Every fall semester, students in EET 4310 are graded using a rubric designed to measure their ability to design FM receivers. The acceptable target is that 80% of students score 9 out of 12 (75%) on the rubric-based assessment of the semester project.

Finding: Target was met.

Analysis: In AC 2023-2024 the target was met with 5 out of 6 (83.3%) students scoringat least 9 out of 12 (75%) on the rubric-based assessment of the assignment on the design of FM receivers. Based on the analysis of the AC 2023- 2024, the faculty made the following changes in 2024-2025 to drive the cycle of improvement. The instructor mandated that students submit written status reports on semester projects at the beginning of the 13th week of the semester. The instructor gave feedback and extra lectures to students based on these interim reports. The instructor sent a reminder email to students at the beginning of the 15th week of the semester about the upcoming deadline for the semester project and encouraged them to submit the final semester report on time.

As a result of these changes in AC 2023-2024, the target was met. In AC 2024-2025, 10 out of 10 (100%) students scored at least 9 out of 12 (75%) on the rubric-based assessment of the assignment on the design of FM receivers.

Decision: In AC 2024-2025, the target was met. Based on the analysis of AC 2024-2025, the faculty will implement the following changes in AC 2025-2026 to drive the cycle of improvement. The instructor will provide more emphasis on explaining the design aspects of modern FM communication with real life applications. The outlines of the related components ensuring optimum performance will be explained in detail. More group activities will be done during class time and instantaneous feedback will be provided to the students to accelerate learning. These changes will improve the students' ability to complete semester projects on or before the due date thereby continuing to push the cycle

of improvement forward.

SLO 2. Ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes(ETAC of ABET Outcome 4).

Measure 2.1. Every spring semester, students in EET 2351 are graded using a rubric designed to measure their ability to design Op-Amp Circuits. The acceptable target is that 80% of students score 12 out of 16 (75%) on rubric-based assessment of projects.

Finding: Target was met.

Analysis: In AC 2023-2024, the target was met when 18 out of 22 (82%) students scored at least 12 out of 16 (75%) on the rubric-based assessment of lab assignments on the analysis and design of op-amps circuits. Based on the analysis of the AC 2023-2024 results, the faculty made the following changes in 2024-2025. The instructor demonstrated powerful troubleshooting principles, including the half-splitting method and the divide and conquer method.

Because of the change in AC 2024-2025, the target was met with 7 out of 8 (88%) students scoring at least 12 out of 16 (75%) on the rubric-based assessment of lab assignments on the analysis and design of op-amps circuits.

Decision: In AC 2024-2025, the target was met. Based on the analysis of AC 2024-2025, the faculty will implement the following changes in 2025-2026 to drive the cycle of improvement. In AC 2025-2026, the instructor will introduce more computer simulations to demonstrate the theory. The instructor will also introduce mathematical software such as Desmos and the AI tool GPT to help students analyze the issues of circuit systems. This change will improve the practical skills of the students.

Measure 2.2. Every fall semester, students in EET 4311 are graded using a rubric designed to measure the ability to design an FM Modulator. The acceptable target is that that 80% of students score 9 out of 12 (75%) on rubric-based assessment of projects.

Finding: Target was met.

Analysis: In AC 2023-2024, the target was met with 5 out of 6 (83.3%) of the students scoring at least 9 out of 12 (75%) on the rubric-based assessment of FM Modulator design.

Based on the results of the AC 2023-2024 assessment, the faculty made the following changes in AC 2024-2025. The instructor put more weight on key design steps and components required to obtain the optimal solution for an FM modulator. Students were asked to submit a rough draft at the beginning of the 13th week of the semester about this important lab project to get feedback from the instructor. This has provided an opportunity for students to take corrective actions on their data collection, tests, measurements, experiments, analysis, and interpretation.

As a result of these changes in AC 2024-2025, the target was met with 10 out of 10 (100%) of the students scoring at least 9 out of 12 (75%) on the rubric-based assessment of FM Modulator design. The timing of the lab was on the 14th week of the semester, and the students had no problems handling the increased technical rigor of the lab.

Decision: In AC 2024-2025, the target was met. Based on the analysis of AC 2024-2025, the faculty will implement the following changes in AC 2025-2026 to drive the cycle of improvement. In the 2025-2026 academic year, the instructor will conduct this experiment one week after mid-term. If necessary, two consecutive lab times will be allocated to complete the assignment. Students will submit their draft reports to the instructor for review at least two weeks before the final submission. The instructor will remind students weekly about the draft report submissions and offer technical assistance for report writing. This change will improve the students' practical skills designing FM modulators.

SLO 3. Ability to design systems, components, or processes meeting specifiedneeds for broadly defined engineering problems appropriate to the discipline (ETAC of ABET Outcome 2).

Measure 3.1. Every fall semester, students in EET 4311 are graded using a rubric designed to measure their ability to design FM Modulator. The acceptable target is that 80% of students score 9 out of 12 (75%) on rubric-based assessment of laboratory assignments.

Finding: Target was met.

Analysis: In AC 2023-2024, the target was met with 5 out of 6 (83.3%) of the students scoring at least 9 out of 12 (75%) on the rubric-based assessment of AM Modulator design. Based on the results of the AC 2023-2024 assessment, in AC 2024-2025, the faculty made the following changes. The instructor first prepares the students for this lab by initiating the conceptual steps necessary for designing FM modulator circuits in the theory class (EET 4310) with examples before performing the lab exercise. The rigor of the project was increased as well, by including various design components for a high-efficiency FM Modulator.

As a result of these changes in AC 2024-2025, the target was met with 10 out of 10 (100%) of the students scoring at least 9 out of 12 (75%) on the rubric-based assessment of AM Modulator design.

Decision: In AC 2024-2025, the target was met. Based on the analysis of AC 2024-2025, the faculty will implement the following changes in AC 2025-2026 to drive the cycle of improvement. At the beginning of the lab experiment, the instructor will review the theory once more and address the experiment results individually.

Measure 3.2. Every spring semester, students in EET 4351 are graded using a rubric designed to measure their ability to design Two-way Traffic Controllers with PLCs. The acceptable target is that 80% of students score 9 out of 12 (75%) on the rubric-based assessment of the project.

Finding: The target was met.

Analysis: In AC 2023-2024, the target was met with 6 out of 6 students (100%) of the students scoring at least 9 out of 12 (75%) on the rubric-based assessment of the project to design two-way traffic controllers using PLCs. Based on the results of the AC 2023-2024 assessment, in AC 2024-2025, the faculty made the following changes. The project included the implementation of latch, unlatch, timers, and counters instructions, which they learned over the first ten weeks of the semester. The instructor also required grammar and spelling checks for the final laboratory project report.

As a result of these changes, in AC 2024-2025, the target was met with 8 out of 9 students (89%) of the students scoring at least 9 out of 12 (75%) on the rubric-based assessment of the project to design of two-way traffic controllers using PLCs.

Decision: In AC 2024-2025, the target was met. Based on the analysis of AC 2024-2025, the faculty will implement the following changes in AC 2025-2026 to drive the cycle of improvement. The instructor will allow one complete lab time for the students to work on the semester project. The instructor will also review the draft copy of the report with the suggested edits, one week before the final submission. These changes will broaden the students' ability to implement new devices using PLCs, thereby continuing to push the cycle of improvement forward.

SLO 4. Ability to function effectively as a member of a team or as its leader (ETAC of ABET Outcome 5).

Measure 4.1. Every spring semester, the instructor of the course rates students in EET 4950 (or IET 4960) based on their ability and skill as a member or a leader of the team using a checklist-based review survey. The instructor uses the overall impression of the team based on asemester-long interaction with the team to rate the team members and leaders. The acceptable target is that 80% of students are rated at least 20 out of 25 on the checklist-based survey.

Finding: The target was not met.

Analysis: In AC 2023-2024, the target was met with 6 out of 6 (100%) EET students receiving a score of at least 80%. However, one IET student, who scored 70%, joined late with a group of EET students in the Spring 2024 semester. This student had not been registered in the previous semester due to personal circumstances, leading to miscommunication and issues with group integrity.

Based on the analysis of the AC 2023-2024 results, the instructor communicated individually with all students to ensure there were no significant issues within the group. This was achieved by continuously monitoring performance through a bi-weekly self-report form. As a result, the team leader was changed, and a more proactive and self-motivated member was assigned to take the lead. No new students registered for Project Design II (EET 4950 or IET 4960) after a year/semester break; however, the instructor was prepared to ensure that any new student joining the group fully understood the ongoing projects and

that existing members communicated effectively with the new participant.

Despite these changes, the target was not met in AC 2024-2025, as 3 out of 4 (75%) EET students scored above 80%. However, one student in the group exhibited poor communication, missing group meetings, and failing to meet submission deadlines.

Decision: In AC 2024-2025, the target was not met. Based on the analysis of the AC 2024-2025 results, and to drive the cycle of improvement, the faculty will implement the following change in AC 2025-2026. The instructor will collect feedback on team collaboration every two weeks and require a mandatory weekly team meeting with the instructor. Additionally, the course grading policy will incorporate regional and/or national conference attendance.

Measure 4.2. Every Fall semester, students in IET / EET 4940 assesses their peers in a technical team with respect to their ability and skill as a member or a leader of the team using a checklist-based peer-review survey. The acceptable target is that 80% of EET students are rated at least 20 out of 25 on a checklist-based peer-review survey.

Finding: The target was not met.

Analysis: In AC 2023-2024, the target was met with 6 out of 6 (100%) of the students rated at least 20 out of 25 (80%) on the checklist-based peer-review survey.

Based on the analysis of AC 2023-2024, the faculty made the following changes in AC 2024-2025. Peer review forms were submitted for pre-evaluation two weeks before the final report submission deadline. Furthermore, students were encouraged to attend multiple professional and academic conferences together, which promoted interaction, team cohesiveness, and teamwork among them.

Despite these changes, in 2024-2025, the target was not met with 6 out of 8 (75%) of the students being rated at least 20 out of 25 (80%) on the checklist-based peer-review survey. One group of four students struggled with poor communication and a lack of self-motivation from two members. As a result, the group was unable to meet their project deadline, leading to an incomplete grade for the entire team. The group leader was changed to enhance functionality. After this change, the instructor noted a positive shift in team dynamics, with increased responsibility, greater self-awareness of individual contributions, and improved cohesiveness.

Decision: In AC 2024-2025, the target was not met. Based on the analysis of the AC 2024-2025 results and to drive the cycle of improvement, the following changes will be applied in AC 2025-2026. Peer review forms will be administered six weeks before the finals and again during the final report submission deadline. The instructor of the course will look for opportunities for the team to participate in or attend professional or academic conferences together.

SLO 5. Ability to apply written, oral, and graphical communication in broadly defined

technical and non-technical environments; and an ability to identify and use appropriate technical literature (ETAC of ABET Outcome 3).

Measure 5.1. Every fall semester, upon presentation of capstone projects in IET / EET 4940, ET faculty evaluate student performance concerning the ability to communicate effectively in the oral presentation of the technical report. The acceptable target is that 80% of EET students score at least 80 out of 100 (80%) on a checklist-based assessment of the oral presentation.

Finding: The target was not met.

Analysis: In AC 2023-2024, the target was met with 6 out of 6 (100%) of the students being rated at least 80 out of 100 (80%) on the checklist-based assessment of an oral presentation by the ET faculty.

Based on the analysis of the AC 2023- 2024 results, the faculty implemented the following changes in AC 2024-2025 to drive the cycle of improvement. Students were encouraged to attend professional and academic conferences for oral and/or poster presentations before their final presentation in the ET department. The ULS and Research Day conferences are scheduled for the spring, so students did not have the opportunity to attend any conferences before their final presentations. However, a mock presentation session was organized prior to the final presentations.

Despite these changes, the target was not met in AC 2024-2025 with 4 out of 8 (50%) of the students rated at least 80 out of 100 (80%) on the checklist-based assessment of an oral presentation by the ET faculty. One of the groups, consisting of four members, did not attend the mock presentation. Additionally, one of their members was absent during the final presentation. Furthermore, this group appeared unprepared and lacked effective team collaboration.

Decision: In 2024-2025, the target was not met. Based on the analysis of the AC 2024-2025 results and to drive the cycle of improvement, faculty will implement the following change in AC 2025-2026. The dates for the final and mock presentations will be announced at least two months in advance. Additional undergraduate research conferences held in October or November during the fall will also be considered. A separate training session on professional presentation skills will be organized.

Measure 5.2. Every spring semester, upon submission of capstone project, reports in EET 4950 or EET 4960, ET faculty evaluate students with respect to their ability to write a technical report using relevant literature, graphs, charts, results, and recommendations adhering to the format prescribed by the instructor to assess the attainment of SLO 5. The acceptable target is that 80% of EET students are rated at least 80 out of 100 (80%) on the checklist-based assessment of the written project report.

Finding: The target was not met.

Analysis: In AC 2023-2024, the target was met with 6 out of 6 (100%) of the students

scoring at least 80 out of 100 (80%) on the checklist-based assessment of the written project report. Based on the analysis of the AC 2023-2024 results, in AC 2024-2025, the instructors of the course the instructors of the course encouraged students to use AI apps to help them write effectively—for example, AI-Powered Writing Assistant by Grammarly and the AI-Document Editor by Canva.

Despite these changes in AC 2023-2024, 0 out of 4 (0%) of the students scored at least 80 out of 100 (80%) on the checklist-based assessment of the written project report. Four out of four students (100%) in this single group scored slightly below 80% (~78.8%) on the checklist-based evaluation of the written project report. This was partly due to the initial leader's lack of participation, which led to a change in leadership, along with another member's lack of engagement and an overreliance of the group on a generative AI tool without proper verification of the generated content.

Decision: In AC 2024-2025, the target was not met. Based on the analysis of the AC 2024-2025 results and to drive the cycle of improvement, the following changes will be implemented in AC 2025-2026. The instructor will include a training session on the effective use of AI tools for data analysis, graph plotting, grammar and language checking, referencing, and reference verification.

Comprehensive Summary of Key evidence of seeking improvement based on the analysis of the results. The program faculty made several decisions after examining the results of data analysis from AC 2023-2024 which resulted in improved student learning and program improvement in AC 2024-2025.

- In EET 2350 (SLO 1.1), the instructor worked with every student to ensure they completed their assignments on time in terms of designing more comprehensive projects and problems in integrator and differentiation circuits, comparators circuits, and oscillators.

- In EET 4310, (SLO 1.2), the instructor mandated that students submit written status reports on semester projects at the end of the 12th week of the semester. The instructor gave feedback and extra lectures to students based on these interim reports. The instructor sent a reminder email to students on the 14th week of the semester about the upcoming deadline for the semester project and encouraged them to submit the final semester report on time.

- In EET 2351 (SLO 2.1), the instructor demonstrated powerful trouble shooting principles, including half splitting method and the divide and conquer method.

- In EET 4311 (SLO 2.2), the instructor put more weight on key design steps and components required to obtain the optimal solution for an FM modulator. Students were asked to submit a rough draft during the beginning of the 13th week of the semester about this important lab project to get feedback from the instructor. This has provided an opportunity for students to take corrective actions on their data collection, tests, measurements, experiments, analysis, and interpretation.

- In EET 4311 (SLO 3.1), the instructor first prepared the students for this lab by initiating the conceptual steps necessary for designing an FM modulator circuits in the theory class (EET 4310) with examples before performing the lab exercise. The rigor of the project was increased as well, by including various design components for a high-efficiency FM Modulator.

- In EET 4351 (SLO 3.2), The project included the implementation of latch, unlatch, timers, and counters instructions, which they learned over the first ten weeks of the semester. The instructor also required grammar and spelling checks for the final laboratory project report.

- In EET 4950 / IET 4960 (SLO 4.1), the instructor communicated individually with all students to ensure there were no significant issues within the group. This was achieved by continuously monitoring performance through a bi-weekly self-report form. As a result, the team leader was changed, and a more proactive and self-motivated member was assigned to take the lead. No new students registered for Project Design II (EET 4950 or IET 4960) after a year/semester break; however, the instructor was prepared to ensure that any new student joining the group fully understood the ongoing projects and that existing members communicated effectively with the new participant.

- In IET / EET 4940 (SLO 4.2), peer review forms were submitted for pre-evaluation two weeks before the final report submission deadline. Furthermore, students were encouraged to attend multiple professional and academic conferences together, which promoted interaction, team cohesiveness, and teamwork among them.

- In IET / EET 4940 (SLO 5.1), students were encouraged to attend professional and academic conferences for oral and/or poster presentations before their final presentation in the ET department. The ULS and Research Day conferences are scheduled for the spring, so students did not have the opportunity to attend any conferences before their final presentations. A mock presentation session was organized prior to the final presentations.

- In EET 4950 / IET 4960 (SLO 5.2), the instructors of the course the instructors of the course encouraged students to use AI apps to help them write effectively—for example, AI-Powered Writing Assistant by Grammarly and the AI-Document Editor by Canva.

Plan of action moving forward

- In EET 2350 (SLO 1.1), the instructor will emphasize both theoretical analysis and MultiSim simulation to explore circuit systems. The instructor will request students

to apply more extensive use of algebra and calculus in the analysis and design of circuit systems.

- In EET 4310 (SLO 1.2), the instructor will include new topics on FM communication with wider applications. The instructor will explain the new materials with more practical examples. More exercises will be given during class time and instantaneous feedback will be provided for the students to accelerate learning.

- In EET 2351 (SLO 2.1), the instructor will also introduce mathematical software Desmos and AI tool GPT to students to analyze the issues of circuit systems. This change will improve the practical skills of the students.

- In EET 4311 (SLO 2.2), the instructor will conduct this experiment just after the mid-term. Students will submit their draft reports to the instructor for review at least two weeks before the final submission. Toward the end of the semester, the instructor will remind students weekly about the draft report submissions and offer technical assistance for report writing.

- In EET 4311 (SLO 3.1), at the beginning of the lab experiment, the instructor will review the theory once more and address the experiment results individually.

- In EET 4351 (SLO 3.2), The instructor will allow one complete lab time for the students to work on the semester project. The instructor will also review the draft copy of the report with the suggestions needed one week before the final submission. These changes will broaden the students' ability to implement new devices using PLCs thereby continuing to push the cycle of improvement forward.

- In EET 4950 / IET 4960 (SLO 4.1), the instructor will collect feedback on team collaboration every two weeks and require a mandatory weekly team meeting with the instructor. Additionally, the course grading policy will incorporate regional and/or national conference attendance.

- In IET / EET 4940 (SLO 4.2), peer review forms will be administered six weeks before the finals and again during the final report submission deadline. The instructor of the course will look for opportunities for the team to participate in or attend professional or academic conferences together.

- In IET / EET 4940 (SLO 5.1), the dates for the final and mock presentations will be announced at least two months in advance. Additional undergraduate research conferences held in October or November during the fall will also be considered. A separate training session on professional presentation skills will be organized.

- In EET 4950 / IET 4960 (SLO 5.2), the instructor will include a training session on the effective use of AI tools for data analysis, graph plotting, grammar and language checking, referencing, and reference verification.