Academic Cycle 2018-2019

Engineering Technology (BS, EET)

College of Business and Technology

Prepared by: Nabin Sapkota/Adam Jannik **Date: 6/12/2019**

Approved by: Margaret Kilcoyne **Date: 7/9/2019**

Northwestern Mission. Northwestern State University is a responsive, student-oriented institution that is committed to the creation, dissemination, and acquisition of knowledge through teaching, research, and service. The University maintains as its highest priority excellence in teaching in graduate and undergraduate programs. Northwestern State University prepares its students to become productive members of society and promotes economic development and improvements in the quality of life of the citizens in its region.

College of Business and Technology Mission. The College of Business and Technology is dedicated to providing a high quality – market responsive business and technology education, preparing our diverse student population for successful careers and enriched lives in the public, private and nonprofit sectors, and enhancing our students' academic experiences through our research and scholarly activities. (Adopted September 28, 2015, 04/13/2018)

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 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 and 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 Electronic 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 2017-2018 show that targets were met or exceeded. Most of the students' performance indices for all SLOs were found to be satisfactory.

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

SLO 1. Ability to apply the electronics engineering technology knowledge, skills, and tools to real-world problem solving (ETAC of ABET Outcome a).

Course Map: Tied to course syllabus objectives.

EET 1331: DIGITAL ELECTRONICS I LABORATORY
EET 3340: ADVANCED ELECTRONICS

Measure 1.1. (Direct – Knowledge)

Every fall semester, students' grades on the EET 1331 Final Exam are used to assess the attainment of SLO 1. The acceptable target is 80% of students scoring a C or better on the final examination.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. Students' performance index in AY 17-18 was 100% (21 out of 21 scored a C or better). In AY 18-19, 24 out of 25 (96 %) scored a C or better on the final examination (Spring 2019). Year-to-year, the results were about the same with only a minimal decrease in AY 18-19, but the target was met.

Based on the analysis of the AY 16-17 and 17-18 results, the faculty discussed raising the assessment target to 80% (a B) on the assignment instead of a 70% (a C). However, no consensus was reached, and the results decreased slightly in AY 18-19. In the classroom, the faculty again held pre-lab reviews of the experiment and used the lab report format, but also held a question and answer period before each experiment to further enhance student learning.

Action - Decision or Recommendation: Based on the results of the AY 2018-2019 assessment, in AY 2019-2020, the EET faculty agreed to implement the following practices:

1. The instructor will explain in depth, different kinds of relevant electronic components and their configurations as a part of pre-lab review.
2. The faculty will emphasize how to construct a real working circuit based on the schematics. For some of the students, this practice was hard at the beginning, however, after the midterm, majority of the students got a better understanding of real circuit construction based on the schematics.
3. To drive continuous improvement, the acceptable target for student performance may need to be raised. The faculty will again initiate a discussion about changing the target to 70% of students scoring to 70% of students scoring a B or better in the final examination. With a third year of scores at or approaching 100%, the faculty will consider whether the target needs to be raised.

Measure 1.2. (Direct – Knowledge/Skill)

Every spring semester, students' grades on the EET 3340 Test 1 are used to assess the attainment of SLO 1. The acceptable target is 80% of students scoring a C or better on Test 1.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 17-18, 13 out of 14 (93%) had scored a C or better on Test 1. AY 18-19, 16 out of 19 (84%) scored a C or better on Test 1. Based on the instructor's assessment, two students did not take the first test despite being reminded to take the make-up test for test 1. So, of those who did take the test, 16 out of 17 students (94%) score a C or better in their first tests which are above the performance target of 80% for this assessment.

Based on the AY 17-18 assessment results, the faculty spent additional time reviewing the last concept covered in the class before teaching newer concepts. This practice was enhanced over the previous year with even more time spent on review and a focus on teaching the materially at a pace that students could more easily learn. This ensured that students were more familiar with basic concepts before moving on to more complex material. The decrease in results could be based on the differing sample sizes or natural year-to-year variability.

Action - Decision or Recommendation: Based on the results of the AY 18-19 assessment, the faculty decided to incorporate the following items:

1. Students will first solve the problem using Boolean algebra and then verify their findings using MultiSim software to solve operational amplifier-based questions.
2. Instructor will also introduce Power Amplifiers (different classes) using Multisim software.

SLO 2. Ability to perform tests, measurements and experiments (ETAC of ABET Outcome b).

Course Map: Tied to course syllabus objectives.

EET 3340: ADVANCED ELECTRONICS
EET 4310: COMMUNICATION ELECTRONICS
EET 4311: COMMUNICATION ELECTRONICS LABORATORY

Measure 2.1. (Direct – Knowledge/Skill)

Every spring semester, students' grades on the EET 3340 Test 1 are used to assess the attainment of SLO 2. The acceptable target is 80% of students scoring a C or better on Test 2.

Finding: The target was not met.

Analysis: In both AY 17-18 and AY 18-19, the target was not met. In AY 17-18, the target was not met by one percentage point. The performance index was 79%, which is below the target of 80%. In AY 18-19, the target was not met by six percentage point (14 out of 19). The performance index was 74%, which is below the target of 80%.

Based on the 17-18 assessment results, in AY 18-19, the instructor put more emphasis on the skill/knowledge required to reach the solution of integrator and differentiator problems before Test 2. However, in the AY 18-19 assessment cycle, 2 of the 5 students who could not perform above 80% had medical issues and as per the instructor, they would have scored 80% or above, had they taken the test. The results likely declined as a result of these problems with the students' health. The faculty also placed more emphasis on integrator and differentiator problems before Test 2.

Action - Decision or Recommendation: Based on the AY 18-19 assessment results, the faculty decided to do the following:

1. In AY 19-20, the instructor will put more emphasis on the skill/knowledge required to reach the solution of integrator and differentiator problems before Test 2. While this was the recommendation from AY 17-18, the medical problems that some

students had made it difficult to tell if the additional emphasis was helpful. Therefore, this practice will be performed again in AY 18-19.

2. Instructor will slow down the pace of integrator and differentiator basics, working from simple problems to more complicated ones.
3. Students will be provided with nongraded work problems to test out their skill in the subject matter before the actual test.

Measure 2.2. (Direct – Knowledge/Skill)

Every fall semester, students' grades on the EET 4310 Final Test are used to assess the attainment of SLO 2. The acceptable target is 80% of students score to demonstrate the ability to do Fourier series and Bessel functions on the final exam.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 17-18, (12/14, 86%), students demonstrated the ability to do Fourier series and Bessel functions in the final exam. In AY 18-19, 8 out of 10 (80%) students demonstrated the ability to do Fourier series and Bessel functions in the final exam. While the results slightly declined in AY 18-19, the target was met.

Based on the AY 17-18 assessment, in AY 18-19 the instructor made further modifications to class to align it with a recent adoption of a new course textbook, which contains newer concepts and materials. Additionally, the instructor also introduced PowerPoint presentations in class lectures. In the instructor's opinion, the combination of solving problems on the board augmented with PowerPoint would be more effective in teaching a highly technical and mathematical course like the current course. These changes were made to enhance student learning, but the assessment results declined by 6%.

Upon review of the AY 18-19 final test, it was observed that tougher questions in the area of assessment were given to the students. Since the sample size has decreased from the previous year from 14 to 10, though the same 2 students failed to perform above par in the current assessment cycle, percentagewise the attainment was comparatively lower.

Action - Decision or Recommendation: Based on the AY 18-19 assessment results, in AY 19-20, a short quiz will be administered to assess student use of the additional videos. The quiz will help the faculty assess the pedagogical benefit of the videos. PowerPoints and chalkboards will be again used in combination for all lectures, and the addition of relevant subject matter videos posted on Moodle will be resumed in AY 19-20, but the content will be updated as necessary as faculty continue to develop their courses.

Measure 2.3. (Direct – Ability/Skill)

Every fall semester, students' grades on the EET 4311 Laboratory Reports are used to assess the attainment of SLO 2. The acceptable target is 80% of students receive C or better on the technical component of the formal laboratory report.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 17-18 cycle, the target was met by 100% (14 out of 14) of students. Meanwhile, in AY 18-19, 9 out of 10 (90 %) students received C or better on laboratory tests. Therefore, the performance slightly declined in the current assessment.

Based on the results of the AY 17-18 assessment results, the faculty discussed increasing the measurement target to 80% (a B). However, the 18-19 assessment results decreased slightly, and a consensus was not reached. The slight decrease in performance can likely be attributed to small sample size. In fact, upon further investigation, one student was not committed to the course and had missed several other laboratory exercises. However, due to the small sample sizes in this measure, the faculty did not feel comfortable increasing the target in AY 18-19.

Action - Decision or Recommendation: Based on the results of the AY 18-19 assessment, in AY 19-20, the following strategies will be implemented.

1. The instructor will stay on course regarding the prelab briefing that was implements in AY 18-19. The trend of the performance will be monitored for the next AY and only then required actions will be planned and implement if necessary.
2. Instructor will have informal survey of student regarding their experience and difficulty in carrying out lab assignments to understand where if anywhere, that can enhance their learning during the lab exercises can be collected. This will help to devise better strategy at the end of AY 19-20.

SLO 3. Ability to design electronic components and systems (ETAC of ABET Outcome c).

Course Map: Tied to course syllabus objectives.

EET 4311: COMMUNICATION ELECTRONICS LABORATORY
EET 4351: AUTOMATION AND CONTROL LABORATORY
EET 4950 or IET 4960: PROJECT DESIGN II

Measure 3.1. (Direct – Ability/Skill)

Every fall semester, students' grades on the EET 4311 Laboratory Reports are used to assess the attainment of SLO 3. The acceptable target is 80% of students receive C or better on the technical component of the formal laboratory report.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 17-18 cycle, 100% (14 out of 14) of students met the target. Meanwhile in AY 18-19, 9 out of 10 (90%) students received C or better on the technical component of formal laboratory reports. Comparing the last two AY's results, 10% of the students (1 student) scored less than 'C's in AY 18-19 whereas none of the students scored less than 'C's in AY 17-18 in the formal laboratory report. While the results declined slightly from AY 17-18, the target was met AY 18-19. The decrease can likely be attributed to the small sample size.

Based on the AY 17-18 assessment, the instructor of the course implemented a standardized format for the formal lab report in the course. Additionally, the instructor also distributed handwritten notes with solved examples of electronic laboratory exercises to enhance students' learning. While the number of students assessed slightly decreased (n=14 vs n=10), the targets were met.

Action - Decision or Recommendation: Based on the AY 18-19 assessment results, in AY 19-20 the faculty will review the handout and see if any other additions to the handwritten problems could be made that would further help improve student learning. Faculty will examine what questions students struggle with the most, and place special emphasis on those. The target has been consistently met, and this is the first time in the last three years that the performance index has been 90%. These performance indices are very sensitive to small sample sizes. Therefore, the decrease is not seen as the beginning of a trendline. Additional data is needed before large changes to the measure or instructional methodology are made.

Measure 3.2. (Direct – Ability/Skill)

Every fall semester, students' grades on the EET 4351 Laboratory Reports are used to assess the attainment of SLO 3. The acceptable target is 80% of students receive C or better on the technical component of the formal laboratory report.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 17-18, 10 out of 11 (91%) students scored a C or better on the technical component of formal laboratory reports. In AY 18-19 14 out of 14 (100%) students scored a C or better on the technical component of the formal laboratory report.

Based on the results of the AY 17-18 assessment results, the faculty increased one-on-one time with the students in the laboratory. Additionally, the instructor used new equipment (AMATROL PLC Trainers bought through funds awarded by Board of Regents) for the second time in this course and had learned a better way to explain the equipment and course material to the students. Past students' experiences were very helpful in designing the experiments and the way to explain to the new batch of students.

Action - Decision or Recommendation: Based on the AY 18-19 assessment results, in AY 19-20 students will be advised to properly run grammar and spell check before submitting their reports and they will be advised about the existence of the writing center and availability of writing tutors. The faculty noted that the results increased from 91% to 100%, and therefore, one more AY of results will be gathered before any drastic modifications are proposed.

Measure 3.3. (Indirect – Knowledge/Ability/Skill)

Every semester, upon presentation of capstone projects (IET 4960), ET faculty evaluate student performance with respect to the ability to design electronic components and systems. The acceptable target is 80% of EET students rated at least C.

Finding: The target was met**.**

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 17-18, 14/14 (100%) of students rated at least C or better with respect to the ability to design electronic components and systems in IET 4960. Meanwhile, in AY 18-19, 11/11 (100%) of students (1 in fall 2018 and 10 students in spring 2019) rated C or better with respect to design electronic components and systems in IET 4960.

Based on a review of the AY 17-18 assessment, the instructor of the course made mandatory for student to conduct research using library resources in the areas of their project scope. Each member in a group should review at least one published scholarly paper and summarize it as a part of a formal graded assignment. This has added to the students' learning in their project content area about the existing body of knowledge.

Action - Decision or Recommendation: Based on the successful AY 18-19 assessment results, the faculty decided to the following:

1. Routinely require students to research current published research articles relevant to their project scope and technology.
2. Faculty will decide during weekly meetings if the selected reference materials are appropriate for the current project scope or not and accordingly advise students.

SLO 4. Ability to function effectively on a team (ETAC of ABET Outcome d).

Course Map: Tied to course syllabus objectives.
EET 4940 (PROJECT DESIGN I)
EET 4950 or IET 4960: PROJECT DESIGN II

Measure 4.1. (Indirect – Knowledge/Ability/Skill)

Every semester, upon presentation of capstone projects, ET faculty evaluate student performance with respect to the ability to function effectively on a team. The acceptable target is 80% of EET students rated at least 4 of 7.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. 1/1 (100%) of students rated 4 or better with respect to the ability to function effectively on a team in IET 4960 in Fall 2018 and 8/8 (100%) of students rated 4 or better with respect to the ability to function effectively on a team in IET 4960 in Spring 2019. The target was met in AY 18-19 and AY 17-18, and the results were discussed with EET faculty.

In AY 18-19, for IET 4960 the acceptable target was exceeded. The previous performance level (100%) was maintained in the AY 18-19 assessment cycle.

Based on the results of the AY 18-19 assessment cycle, the faculty provided improved guidance and support for the group project and helped students better coordinate teamwork during their final presentation. Additionally, mock presentations, team leader assignments, and weekly group meeting also helped to maintain 100% result for this measure.

Action - Decision or Recommendation: Based on the evidence from the AY 18-19 assessment cycle, the following items will be implemented starting in AY 19-20.

1. Student group must communicate with the instructor with their weekly meeting agenda/minutes.
2. Any conflicts within the group will be brought forward to the instructor only after formal resolution is attempted within the group meetings and either minutes or communication (email).

Measure 4.2. (Direct –Skill/Ability)

Every semester, upon presentation of capstone projects, students evaluate each other (i.e., peer evaluation) with respect to the ability to function effectively on a team. The acceptable target is 80% of EET students rated at least 4 of 7.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 18-19, 11/11 (100%) of students rated 4 or better for the ability to function effectively in teams by their peers on capstone projects (EET 4940). In the previous year, AY 17-18, 2/2 (100%) of students rated 4 or better for the ability to function effectively on teams by their peers on capstone projects (EET 4940). The target was met in both academic years

Similarly, in AY 18-19, 9/9 (100%) of students rated 4 or better for the ability to function effectively in teams by their peers on capstone projects (EET 4950), and in AY 17-18

2/2 (100%) of students rated 4 or better for the ability to function effectively in teams by their peers on capstone projects (EET 4950).

Based on the AY 17-18 assessment results, the team leader coordinated tasks among team members and updates were made available after each weekly meeting to all group members. This change was made to enhance student learning and functioning in a group environment and perhaps played a role in the continuous attainment of assessment targets.

Action - Decision or Recommendation: Based on the evidence from the AY 18-19 assessment cycle, in AY 19-20 team leaders will be assigned by the instructor in all project groups. Students will no longer pick their own group leaders. Building on the practices of AY 17-18, team leaders will be informed that they must share in work breakdown structure to ensure that students performing team leader duties are not overloaded with work as compared to their peers. A new written document outlining group leader responsibilities will be created and improved based on the results of AY 18-19. While the addition of team leaders has been successful, another year of data and experience with this practice will help find ways that the team leader role may be improved for the enhancement of the student learning process for all students.

Measure 4.3. (Direct – knowledge)

Every semester, students are evaluated on the technical portion of the written proposal (report). The acceptable target is 80% of students score C or better on the technical portion of the written proposal.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 18-19, 9 out of 9 (100%) students scored a C or better on the technical portion of the written proposal in IET 4960. 2/2 (100%) students scored a C or better on oral presentation and written proposal in IET 4960 in AY 17-18.

Based on the AY 17-18 assessment results, the instructor of the course held weekly meetings with each group and provided feedback to the groups on all aspects of the projects including technical portion. This was in addition to the changes from AY 17-18, where the final report was reviewed by all faculty and feedbacks were provided to the groups. Overall, the weekly meetings helped students make the technical portion more logical, systematic and well formatted.

Action - Decision or Recommendation: Based on the evidence from the AY 18-19 assessment cycle, the following strategies were recommended:

1. Groups will be required to submit written reports at least two weeks before formal presentation so that faculty can make written comments and provide feedback about the technical portion of the report.

2. Students will be advised to properly run grammar and spell check before submitting their reports. They will also be advised about the Academic Success Center (writing center) in case they need additional writing help.
3. Lastly, faculty will make to use writing style (APA or IEEE) mandatory for the project report.

SLO 5. Ability to communicate effectively (ETAC of ABET Outcome e).

Course Map: Tied to course syllabus objectives.

EET 4950 or IET 4960: PROJECT DESIGN II
EET 1321: ELECTRONICS PRINCIPLES LAB

Measure 5.1. (Direct –Skill/Ability)

Every semester, upon presentation of capstone projects, students evaluate each other (i.e., peer evaluation) with respect to the ability to communicate effectively. The acceptable target is 80% of EET students rated at least 4 out of 7.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. 9/9 (100%) of students rated 4 or better for the ability to function effectively on teams by their peers on capstone projects in AY 18-19. In AY 17-18, 2/2 (100%) of students rated 4 or better for the ability to function effectively on teams by their peers on capstone projects.

Based on the AY 17-18 assessment, the faculty discussed increasing the target but recent efforts to emphasize the importance of working well in groups had led to the continued positive results. Small sample sizes also made changing the target a debatable proposition. Therefore, the target was not changed.

Action - Decision or Recommendation: Based on the evidence from the AY 18-19 assessment cycle, the following strategies were recommended:

1. Fully implement requirement of the itemized budget in the project report.
2. Students should be participating in the mock presentations at least twice before their final oral presentation.
3. To emphasize coherent team effort to achieve a common goal in solving engineering problems, it was determined that the projects teams must use MS Office 365 software ‘Teams’ or any equivalent platform.

Measure 5.2. (Direct –Skill)

Every semester, student’s Laboratory reports on EET 1321 are evaluated. The acceptable target is 80% of EET students graded C or better in laboratory reports.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. 15 out of 16 (94%) of the students graded C or better in EET 1321 in 18-19 whereas 27 out of 32 (84%) of the students graded C or better in EET 1321 in AY 17-18. Year-to-year, the results improved.

Based on the results of the AY 17-18 assessment, the faculty spent more time explaining why each part of the standardized assessment report was important and should be followed exactly. However, the much larger sample size (16 in AY 17-18 vs 32 in AY 18-19) likely lead a decrease in results.

Action - Decision or Recommendation: Based on the AY 18-19 assessment results, the faculty will implement the following strategies:

1. Reference citations will be another required item in already existing standard format for the laboratory report.
2. Students will be advised to properly run grammar and spell check before submitting their reports. Students needing additional help may also visit the Academic Success Center (writing center) to get additional help.

SLO 6. Ability to perform self-directed professional development (ETAC of ABET Outcome f).

Course Map: Tied to course syllabus objectives.

IET 1700: INTRODUCTION TO ENGINEERING TECHNOLOGY
EET 4950 or IET 4960: PROJECT DESIGN II

Measure 6.1. (Direct –Skill/Ability)

Every spring semester, students' grades on IET 1700 Test 1 are used to assess the attainment of SLO 6. The acceptable target is 80% of students score C or better on Test

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. In AY 18-19, 16 out of 17 (94%) scored a C or better in Test 1. In AY 17-18, 18 out of 19 (95%) scored a C or better in Test 1.

Based on the AY 17-18 assessment results, more MATLAB® software example problems were introduced into the course. After this change, the assessment results slightly improved. Students are slowly but steadily seeing the need and importance of computing and programing tools such as MATLAB® software. Students were excited to learn new tool and be able to use it to solve problems and see how they could plot data in the subsequent courses they have to take in the EET degree program.

Action - Decision or Recommendation: Based on the AY 18-19 assessment results, it was recommended to implement the following strategies,

1. More worked out MATLAB examples will be integrated into the course, and those examples will have comments to make them even clearer.
2. Emphasize in 2D and 3D plots for engineering data to display the results.

Measure 6.2. (Indirect – Knowledge/Ability/Skill)

Every semester, upon presentation of capstone projects, ET faculty evaluate student performance with respect to their ability to perform self-directed professional development. The acceptable target is 80% of EET students rated at least 4 out of 7.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. 9/9 (100%) of students rated 4 or better on faculty evaluation of student performance with respect to the ability to perform self-directed professional development in IET 4960 in AY 18-19. In AY 17-18, 2/2 (100%) of students rated 4 or on faculty evaluation of student performance with respect to the ability to perform self-directed professional development in IET 4960.

Based on the AY 17-18 assessment results, in AY 18-19, a Team Leader responsibility instructional document was developed to help student's fulling this role. The faculty emphasized team effort to achieve a common goal in solving engineering problems by requiring team leaders, meeting agendas, and meeting minutes. The responsibilities of the students performing as team leaders were monitored to ensure that team leaders were not comparatively overloaded with responsibilities or work as compared to their peers. In AY 18-19,

Action - Decision or Recommendation: Based on the results of the AY 18-19 assessment, that instructor will refine the process of assigning team members, appointing team leaders, and requiring weekly meetings, meeting agendas, and meeting minutes. Previously, students had had more freedom in picking these processes. Additional instructional documents, examples, guides, or templates will be created where necessary. Based on the AY 18-19 assessment results, efforts will be also made to ensure that team leaders are not unfairly overburdened with responsibilities as compared to their peers. While this was a recommendation for AY 17-18, and the faculty will make a point to speak to team leaders directly to gauge how difficult their workload is and make adjustments as necessary. The faculty will also research other methods of enhancing the group learning experience.

SLO 7. A commitment to address ethical considerations involved in solving electronic engineering technology problems (ETAC of ABET Outcome g).

Course Map: Tied to course syllabus objectives.

IET 3740: ELEMENTS OF OCCUPATIONAL SUPERVISION
EET 4950 or IET 4960: PROJECT DESIGN II

Measure 7.1. (Direct – Knowledge)

Every spring semester, students' grades on IET 3740 Test 2 are used to assess the attainment of SLO 7. The acceptable target is 80% of students score C or better on Test 2.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. 8 out of 10 (80%) scored a C or better on course evaluations in IET 3740 in AY 18-19. 7 out of 7 (100%) scored a C or better on course evaluations in IET 3740 in AY 17-18. The target was met in both AYs.

Based on the AY 17-18 results, the faculty make small adjustments to the Moodle shell to enhance student learning on Test 2. These small adjustments mainly took the form of adjustments and developments in weekly engagement activities, which faculty sometimes adjust from semester-to-semester. However, in AY 18-19, two students, even upon repeated request from the instructor, failed to complete the test. These two students account for the decline in assessment results. Based on the AY 17-18 assessment results, the faculty also discussed changing the assessment target, but the small sample sizes (7 in AY 17-18, and 8 in AY 18-19) made some faculty skeptical of making drastic changes to the measure.

Action - Decision or Recommendation: Based on the results of the AY 18-19 assessment, despite the continued small sample sizes, a change in the assessment target will be revisited again. In AY 19-20, faculty will develop even more weekly engagement activities for this online course. Some new activities may be better than activities developed in past years, and faculty will be encouraged to experiment and research new online pedagogical methods and exercise types. To assist with this, the faculty will be encouraged to reach out to faculty in other disciplines to discuss online education techniques in a variety of disciplines to see which may be applicable to our program.

Measure 7.2. (Direct – Knowledge/Ability/Skill)

Every semester, upon presentation of capstone projects, ET faculty evaluate student performance on the oral presentation and written proposal (report). The acceptable target is that 80% of students score C or better on the oral presentation and written proposal.

Finding: The target was met.

Analysis: In both AY 17-18 and AY 18-19, the target was met. 9/9 (100%) of students rated 4 or better by faculty on oral presentation and written proposal of capstone projects in IET 4960 in AY 18-19. In AY 17-18, 2/2 (100%) of students rated 4 or better by faculty on oral presentation and written proposal of capstone projects in IET 4960.

Based on the AY 17-18 results, in AY 18-19, the instructor enhanced the mock presentation process for the students with additional feedback required students to present several times before the final presentation. These mock presentations have better-prepared students for the final report by giving them more practice in speaking about their projects in front of faculty or other students. Students also received feedback from the faculty on written report before final submission.

Action - Decision or Recommendation: Based on the AY 18-19 assessment report, the faculty will develop a best practices sheet for students to review before presentations. These best practices sheets may be improved and edited throughout the semester to better address issues discovered during mock presentations.

A comprehensive summary of the key evidence of continuous improvement based on analysis of results.

SLO 1. Ability to apply the electronics engineering technology knowledge, skills, and tools to real-world problem solving (ETAC of ABET Outcome a).

- For measure 1.1, the faculty discussed raising the assessment target to 80% (a B) on the assignment instead of a 70% (a C). However, no consensus was reached, and the results decreased slightly in AY 18-19. In the classroom, the faculty again held pre-lab reviews of the experiment and the lab report format, but also held a question and answer period before each experiment to further enhance student learning. The target was met.
- Also, for measure 1.1, the faculty had previously agreed to review if the performance index in the AY 18-19 is also 100% to initiate discussion on changing the target to 70% of students score B or better in the final examination. The target was met at 95%, and therefore, the current target was left unchanged.
- For measure 1.2, the instructor of the course EET 3340 started teaching a significant number of simple to advanced problems to engage students in problem-solving. The faculty spent additional time reviewing the last concept covered in the class before teaching newer concepts. This practice was enhanced over the previous year with even more time spent on review and a focus on teaching the material at a pace that students could more easily learn. Some concepts can be particularly troublesome but are essential content. This ensured that students were more familiar with basic concepts before moving on to more complex material. Even though the target was met (84%), it could have been much higher (95%) had two students who missed the test had taken it.

SLO 2. Ability to perform tests, measurements and experiments (ETAC of ABET Outcome b).

- For measure 2.1, the instructor put more emphasis on the skill/knowledge required to reach the solution of integrator and differentiator problems before Test 2. However, a small sample size and multiple students with medical problems caused the target to not be met.
- For measure 2.2, the instructor made further modifications to class to align it with a recent adoption of a new course textbook, which contains newer concepts and materials. Additionally, the instructor also introduced PowerPoint presentations in class lectures. In the instructor's opinion, the combination of solving problems on the board augmented with PowerPoint would be more effective in teaching a highly technical and mathematical course. These changes were made to enhance student learning, but the assessment results declined by 6%. Upon review of the AY 18-19 final test, it was observed that tougher questions in the area of assessment were given to the students. Since the sample size has decreased from the previous year from 14 to 10, though the same 2 students failed to perform above par in the current assessment cycle, percentagewise the attainment was comparatively lower, even though the target was met.
- For measure 2.3, the faculty discussed increasing the measurement target to 80% (a B). However, the 18-19 assessment results decreased slightly, and a consensus was not reached. The slight decrease in performance can likely be attributed to small sample size. In fact, upon further investigation, one student was not committed to the course and had missed several other laboratory exercises. However, due to the small sample sizes in this measure, the faculty did not feel comfortable increasing the target in AY 18-19. The target was met.

SLO 3. Ability to design electronic components and systems (ETAC of ABET Outcome c).

- In EET 4311 the instructor distributed handwritten notes with solved examples of electronic laboratory exercises to enhance students' learning. This was in addition to the recently implemented standardized lab report format. While the number of students assessed slightly decreased (n=14 vs n=10), the targets were met.
- The faculty increased one-on-one time with the students in the laboratory. Additionally, the instructor used new equipment (AMATROL PLC Trainers bought through funds awarded by Board of Regents) for the second time in this course and had learned a better way to explain the equipment and course material to the students. Past students' experiences were very helpful in designing the experiments and the way to explain to the new batch of students. The target was met.
- For measure 3.3, the instructor of the course made mandatory for student to conduct research using library resources in the areas of their project scope. Each member in a group should review at least one published scholarly paper and

summarize it as a part of a formal graded assignment. This has added to the students' learning in their project content area about the existing body of knowledge. The target was met.

SLO 4. Ability to function effectively on a team (ETAC of ABET Outcome d).

- The faculty provided improved guidance and support for the group project and helped students better coordinate teamwork during their final presentation. Additionally, mock presentations, team leader assignments, and weekly group meeting also helped to maintain 100% result for measure 4.1.
- After faculty instruction, the team leader coordinated tasks among team members and updates were made available after each weekly meeting to all group members. This change was made to enhance student learning and functioning in a group environment and perhaps played a role in the continuous attainment of assessment targets. For measure 4.2, the target was met.
- For measure 4.3, the instructor of the course held weekly meetings with each group and provided feedback to the groups on all aspects of the projects including technical portion. This was in addition to the changes from AY 17-18, where the final report was reviewed by all faculty and feedbacks were provided to the groups. Overall, the weekly meetings helped students make the technical portion more logical, systematic and well formatted. The target was met.

SLO 5. Ability to communicate effectively (ETAC of ABET Outcome e).

- For measure 5.1, the faculty discussed increasing the target but recent efforts to emphasize the importance of working well in groups had led to the continued positive results. Small sample sizes also made changing the target a debatable proposition. Therefore, the target was not changed.
- For measure 5.2, the faculty spent more time explaining why each part of the newly implemented standardized assessment report was important and should be followed exactly. However, the much larger sample size (16 in AY 17-18 vs 32 in AY 18-19) likely lead a decrease in results. The target was met.

SLO 6. Ability to perform self-directed professional development (ETAC of ABET Outcome f).

- More MATLAB® software example problems were introduced into IET 1700. After this change, the assessment results slightly improved. Students were excited to learn new tool and be able to use it to solve problems and see how they could plot data in the subsequent courses they have to take in the EET degree program. The target for measure 6.1 was met.
- The faculty emphasized team effort to achieve a common goal in solving engineering problems by requiring team leaders, meeting agendas, and meeting

minutes. The responsibilities of the students performing as team leaders were monitored to ensure that team leaders were not comparatively overloaded with responsibilities or work as compared to their peers. In AY 18-19, a Team Leader responsibility instructional document was developed to help student's fulling this role.

SLO 7. A commitment to address ethical considerations involved in solving electronic engineering technology problems (ETAC of ABET Outcome g).

- Regarding measure 7.1, the faculty made small adjustments to the Moodle shell to enhance student learning on Test 2. These small adjustments mainly took the form of adjustments and developments in weekly engagement activities, which faculty sometimes adjust from semester-to-semester. However, in AY 18-19, two students failed to complete the test and this likely lead to the decline in assessment results. The faculty also discussed changing the assessment target, but the small sample sizes (7 in AY 17-18, and 8 in AY 18-19) made some faculty skeptical of making drastic changes to the measure. The target was met.
- For measure 7.2, the instructor enhanced the mock presentation process for the students with additional verbal and written feedback and required students to present several times before the final presentation. The target was met.

Plan of action moving forward.

An examination of the Electronic Engineering Technology assessment data for AY 2018-2019 shows that targets were mostly stable with only a few targets still needing improvement. As a part of continuous improvement, the following action plans were identified.

- The faculty will emphasize how to construct a real working circuit based on the schematics and explain in-depth, different kinds of relevant electronic components and their configurations as a part of pre-lab review.
- In measure 1.1, to drive continuous improvement, the acceptable target for student performance may need to be raised. The faculty will again initiate a discussion about changing the target to 70% of students scoring to 70% of students scoring a B or better in the final examination. With a third year of scores at or approaching 100%, change may be necessary.
- Students will use Boolean algebra and then verify their findings using MultiSim software to solve operational amplifier-based questions. Instructors will also introduce Power Amplifiers (in various classes) using Multisim software.
- In EET 3340, instructors will put more emphasis on the skill/knowledge required to reach the solution of integrator and differentiator problems before Test 2. While this was the recommendation from AY 17-18, the medical problems that some students had made it difficult to tell if the additional emphasis was helpful. Therefore, this practice will be performed again in AY 18-19.

- In EET 3340, students will be provided with nongraded work problems to test out their skill in the subject matter before the actual test. Also, instructors will slow down the pace of integrator and differentiator basics, as well as reviews in other courses, working from simple problems to more complicated ones.
- In EET 4310 a short quiz will be administered to assess student use of the additional instructional videos.
- Instructors will have an informal survey of students regarding their experience and difficulty in carrying out lab assignments to understand where, if anywhere, that their lab experience and learning can enhanced.
- In EET 4311, the faculty will review the handwritten problems and see if any other additions could be made that would further help improve student learning. Faculty will examine what questions students struggle with the most, and place special emphasis on those.
- In EET 4351 and other courses involving written reports, the students will run grammar and spell check before submitting their reports. They will be advised about the existence of the Academic Success Center (writing center) and availability of writing tutors. Last APA or IEEE format will become mandatory for written reports, and this will include mandatory citations where necessary. These changes will increase the professionalism of written documents.
- In IET 4960, faculty will require students to research current published research articles relevant to their project scope and technology. Faculty will decide during weekly meetings if the selected reference materials are appropriate for the current project scope or not and accordingly advise students.
- Team leaders will be assigned by the instructor in all project groups. A new written document outlining group leader responsibilities will be created and improved based on the results of AY 18-19. While the addition of team leaders has been successful, another year of data and experience with this practice will help find ways that the team leader role may be improved for the enhancement of the student learning process for all students.
- Students should be participating in the mock presentations at least twice before their final oral presentation.
- To emphasize coherent team effort to achieve a common goal in solving engineering problems, project teams will use MS Office 365 software ‘Teams’ or any equivalent platform.
- Faculty will fully implement requirement of the itemized budget in the project report.
- IET 4960, groups will be required to submit written reports at least two weeks before formal presentation so that faculty can make written comments and provide feedback about the technical portion of the report.
- In IET 1700, more worked out MATLAB examples will be integrated into the course, and those examples will have comments to make them even clearer. Additionally, an emphasis will be placed on 2D and 3D plots for engineering data

results.

- For measure 7.1, faculty will develop even more weekly engagement activities in the online course. Faculty will be encouraged to reach out to faculty in other disciplines to discuss online education techniques in a variety of disciplines to see which may be applicable to our program.
- The faculty will develop a best practices sheet for students to review before presentations.

Overall, the ET faculty will implement the changes above to boost student learning. Going forward, changes in the administration of group projects, presentations, and assignments are meant to enhance student learning. Additionally, the faculty will include more software usage to improve various learning scenarios and material. These changes should keep the program up-to-date and encourage increased assessment results. And, other changes mentioned above will be implemented as well. In summary, the overreaching goal of the ET assessment process is continuous improvement and to increase student learning in all aspects of the program. We look forward to continuing this process in AY 19-20.