

AY 2017-2018 Assessment

College of Business and Technology

Division or Department: **Engineering and Technology (EET, BS)**

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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.

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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 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 AY 17-18, 21 out of 21 (100%) scored a C or better on the final examination (Spring 2018). Students' performance index in AY 16-17 was also 100%

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(22 out of 22 scored a C or better). The target was met at 100% in both academic years.

Based on the AY 2016-2017 assessment, in AY 2017-2018, the instructor of the course started every lab by explaining in depth, different kinds of electronic components, their configurations, and the overall circuit instead of asking them to refer to the laboratory manual. Additionally, the instructor introduced a new reporting format for the laboratory reports. These changes were meant to streamline the course by making the reporting format more intuitive and the introduction of new material easier for students to initially understand.

Action - Decision or Recommendation: The target was met with a performance index of 100% for the second year in a row, and results from the assessment were discussed with EET faculty. This is a laboratory course where teamwork is emphasized. Faculty recommended continuing the practices of holding a pre-lab review of the experiment as well as using the newly introduced lab report format. Faculty agreed to review the performance index in AY 18-19. To drive continuous improvement, the acceptable target for student performance may need to be raised. The faculty will initiate discussion about changing the target to 70% of students scoring to 70% of students scoring a B or better in final examination.

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: AY 17-18, 13 out of 14 (93%) scored a C or better on Test 1. In the previous AY (16-17), this performance index was 95% (16 out of 17 students). Results from the assessment were discussed with EET faculty. The former faculty member teaching this course left after Spring 2017. This course was outside their area of expertise. The new faculty member teaching this course taught it for the first time this year, but it is in his area of expertise. The distribution of the grades were A's, 50%, B's 35.7%, and C's 7%. Based on the instructor's assessment of teaching a similar course in another institution, the instructor used a significant number of simple to advanced problems in the topic's area to engage students in problem solving. The instructor also briefly reviewed the last concept covered in the class before teaching newer concepts. Therefore, the distribution of the grades is on the higher side (though exact distribution from the last AY is not available since the professor had left the institution).

Action - Decision or Recommendation: Target was met with a performance index of 93%. Results from the assessment were discussed with EET faculty. After meeting with the faculty, it was decided that the target assessment would be changed to '80% of students score B or better on Test 1' if the distribution of the grades shows improvement

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in the next assessment cycle. Additionally, it was also recommended to introduce relevant software (MultiSim) to solve operational amplifier based questions in future semesters when the course is offered.

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 2 are used to assess the attainment of SLO 2. The acceptable target is 80% of students correctly applying calculus to the solution of integrator and differentiator problems on Test 2.

Finding: The target was not met.

Analysis: 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%. 11 out of 14 (79%) students correctly applied calculus to the solution of integrator and differentiator problems on Test 2. However, in the prior year, AY 16-17, the target was met. The performance index was 82% (14 out of 17 students).

In AY 17-18, the faculty introduced a review session before every test. These practices enhanced students learning and improved their understanding of the subject.

This minor year-to-year decrease (-3%) in student achievement could be a random event perhaps due to the differing sample sizes. However, continual monitoring of the performance is necessary to evaluate accordingly for any decision or recommendation for the course in future. No major changes were recommended to this course in the prior assessment cycle, but the faculty recognize that similar year-to-year results that simply meet or nearly meet acceptable targets leave room for improvement.

Action - Decision or Recommendation: As the target (80%) was only missed by one percentage point, substantial changes are not deemed necessary. However, after meeting with the EET faculty, it was decided that in the next AY (18-19), the instructor would put more emphasis on the skill/knowledge required to reach the solution of integrator and differentiator problems before Test 2. Spending more time on this content will hopefully lead to improved evidence of student learning above the range of 79% to 82%, which has been stable for the last two years.

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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 demonstrate the ability to do Fourier series and Bessel functions on the final exam.

Finding: The target was met.

Analysis: In AY 17-18, 12 out of 14 (86%) students demonstrated the ability to do Fourier series and Bessel functions in the final exam. In AY 16-17, (12/14, 86%), students demonstrated the ability to do Fourier series and Bessel functions in the final exam. The target was met both years, and results were identical from year-to-year.

Based on the AY 16-17 assessment, in AY 17-18 the instructor of the course adopted a new course textbook, which contains newer concepts and materials. Additionally, the instructor also introduced Power Point presentations into class lectures. In the instructor's opinion, the combination of solving problems on the board augmented using PowerPoint would be more effective in teaching highly technical and mathematical course like the current course. These changes were made to enhance student learning, but the assessment results stayed stable.

Upon review of the AY 17-18 final test, it was determined that this year's questions on Fourier series and Bessel functions were relatively more difficult compared to those from the last year (AY 16-17).

Action - Decision or Recommendation: Target was met with a performance index of 100%. Results from the assessment were discussed with EET faculty. After meeting with the faculty, several recommendations were made.

1. It was agreed to use both PowerPoint and board for lecture.
2. Instructor will investigate if there are open source or relevant videos available for academic use on Fourier series and Bessel functions. If available instructor will start using such videos in the learning module.
3. It was decided that final tests will be more closely reviewed to see that that rigor across finals is of a similar level.

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 technical component of formal laboratory report.

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Finding: The target was met.

Analysis: 14 out of 14 (100 %) students received C or better on laboratory tests. In AY 16-17 cycle, this index was 100% (6 out of 6). This is the second time in last three years performance index has been 100%. For AY 15-16, it was 83.4% (5 out of 6).

Based on the AY 16-17 assessment, the instructor of the course started every lab in AY 17-18 by explaining in-depth, different kinds of electronic components, their configurations, and the overall circuit instead of asking students to refer to the laboratory manual. Additionally, the instructor also introduced a new reporting format for the laboratory reports. Similar to the changes made in SLO1 measure 1.1 in EET 1331, these changes to EET 4311 were meant to streamline the course by making the reporting format more intuitive and the introduction of new material easier for students to initially understand.

Action - Decision or Recommendation: The faculty noted that the performance indices for this measure are very sensitive to small sample sizes. Therefore, this index will be monitored for one more year to further examine the data trend. If the trend continues similarly, with 100% of students achieving the target, the EET faculty will change the target to 70% of students receiving a B or better on technical component of formal laboratory report. Increasing the target from a C to a B would increase our assessment rigor and help drive continuous improvement in student learning and in our program.

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 technical component of formal laboratory report.

Finding: The target was met.

Analysis: In AY 17-18, 14 out of 14 (100%) students received C or better on technical component of formal laboratory reports. In AY 16-17 cycle, this index was 100% (6 out of 6). Comparing the last two AY's results, 16.6% of the students scored 'C's in AY 16-17 whereas 14.28% of the students scored 'C's in AY 17-18 in the formal laboratory report. The target was met in AY 16-17 and AY 17-18.

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Based on the AY 16-17 assessment, in AY 17-18, the instructor of the course introduced 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 more than doubled year-to-year (n=6 vs n-14), the results stayed stable. Two possible explanations for this result are that changes to the course are working to maintain the results even with a greater number of students or that the assessment target is not rigorous enough.

Action - Decision or Recommendation: The positive results from the assessment were discussed with EET faculty. This is a laboratory course where teamwork is emphasized. Faculty recommended continuing the practice of distributing hand-notes of examples and enforcing standardized format for formal lab reports. This practice was introduced in AY 17-18 and seems to have been beneficial in maintaining student performance even though the number of students assessed more than doubled. 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.

This is the second time in last three years that the performance index has been 100%. For AY 15-16, it was 83.4% (5 out of 6). These performance indices are very sensitive to small sample sizes. Therefore, this index will be monitored for one more year before changing the target to 70% of students receiving a B or better on technical component of formal laboratory report. This would change the target student score from a C to a B. In a drive to continuous improvement, the EET faculty will consider making the target more difficult to achieve.

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 technical component of formal laboratory report.

Finding: The target was met.

Analysis: In AY 17-18, 10 out of 11 (91%) students scored a C or better on technical component of formal laboratory reports. A slight decrease in performance year-to-year could be because of the relatively larger sample size in AY 17-18 (10 out of 11, 91%) compared to AY 16-17 (4 out 4, 100%). The target was met in both academic years.

To improve the course and enhance student learning in AY 17-18, the instructor used new equipment (AMATROL PLC Trainers bought through funds awarded by Board of Regents) for the first time in this course. All EET faculty were trained by the vendor to use these trainers in March 2018. Students' experiences were very positive, but there was a learning curve to using these trainers for both faculty and students. However, their implementation into the course was a success and the target was met.

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Action - Decision or Recommendation: The target was met with a performance index of 91%. Results from the assessment were discussed with EET faculty. This is a laboratory course where teamwork is emphasized. It was recommended by the faculty that if the performance index in the next AY shows declining trend, then faculty will discuss action/plans to improve on this index. In the meantime, it is recommended that faculty develop a student manual for the new trainer so that the learning curve that students experience when dealing with the new equipment can be lessened. Additionally, the faculty will look for ways to further use the new equipment to enhance student learning.

It is evident that the performance index is very sensitive to the sample size. Therefore, faculty agreed to monitor this performance index for one more cycle before discussing possible alterations to the assessment target.

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

Every semester, upon presentation of capstone projects, ET faculty evaluate student performance with respect to ability to design electronic components and systems. The acceptable target is 80% of EET students rated at least 4 of 7.

Finding: The target was met.

Analysis: 1/1 (100%) of students rated 4 or better with respect to design electronic components and systems in IET 4960 in AY 17-18. In AY 16-17, 7/7 (100%) of students rated 4 or better with respect to ability to design electronic components and systems in IET 4960. The target was met in both AY 16-17 and AY 17-18.

Based on a review of the AY 16-17 assessment, the instructor of the course encouraged students to conduct research in the areas of their project scope to acquire knowledge on recent technology or components that are available in market. This update for AY 17-18 was made to improve student designs and make them more relevant/current. This activity helped students not only to learn about new availability of the technologies or components but also forced them to learn their working principles to be able to use them in their designs.

Action - Decision or Recommendation: The target was met with a performance index of 100%. Results from the assessment were discussed with EET faculty. This is a senior design project course where teamwork is emphasized along with the ability to apply the body of knowledge learned in 3½ years of study. The continued high results should be achieved because instructor spreads level of prior knowledge and students' individual interests evenly among groups. The recommendation was to continue the practice of research on latest relevant technology and electronic components within the project scope. As new technologies or components become available, the instructor will continue to introduce students to these changes to keep their projects and learning up-to-date and maintain the cycle of continuous improvement.

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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 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: 1/1 (100%) of students rated 4 or better with respect to ability to function effectively on a team in IET 4960 in Fall 2017 and 1/1 (100%) of students rated 4 or better with respect to ability to function effectively on a team in IET 4960 in Spring 2018. The target was met in AY 17-18 and AY 16-17, and the results were discussed with EET faculty.

Based on the evidence from the AY 16-17 assessment cycle, the instructor of the course introduced mandatory meeting agendas whenever student groups met among themselves. Team leaders were assigned to each group for the first time. Meeting minutes were made mandatory for student group meeting. This allowed students to prioritize their tasks and guide themselves to achieve a few goals. The intent was for students to move deliberately towards solving the main goal (objective) of the project at their own pace, motivation, and direction.

For capstone projects, the final presentation by a team was made before EET faculty followed by a questions and answers session at the end of the presentation. This project is a team effort. Well-structured and thought-out preparation and presentations can be attributed to group's ability to function as a team. The introduction of meeting agendas and "mock" presentations with the instructor was found to be essential in achieving this target.

Action - Decision or Recommendation: The target was met. Results were discussed with the faculty teaching this course. This is a senior design project course where teamwork is emphasized. It was recommended to continue emphasizing team effort to achieve a common goal in solving engineering problems by assigning requiring team leaders, meeting agenda, and meeting minutes. Other measures to encourage efficient and prosperous group work will also be researched and introduced by the faculty.

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Measure 4.2. (Direct –Skill/Ability)

Every semester, upon presentation of capstone projects, students evaluate each other (i.e., peer evaluation) with respect to 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 AY 17-18, 5/5 (100%) of students rated 4 or better for ability to function effectively in teams by their peers on capstone projects (EET 4940). In the previous year, AY 16-17, 6/6 (100%) of students rated 4 or better for 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 17-18, 1/1 (100%) of students rated 4 or better for ability to function effectively in teams by their peers on capstone projects (EET 4950), and in AY 16-17 7/7 (100%) of students rated 4 or better for ability to function effectively in teams by their peers on capstone projects (EET 4950).

Based on classroom observations and assessment results from AY 2016-2017, which demonstrated some inequities in group member participation the instructor updated the course in AY 2017-2018 and assigned a team leader for the first time in every group in these courses.

The team leader's responsibility (in addition to functioning as a group member) is to oversee each task assigned to each member in a group is progressing as per the project guideline. Further, the leader's responsibilities include calling meetings, reviewing progress, and preparing revised action plans until the final report and presentation is delivered to the client. These changes were made to enhance student learning and functioning in a group environment and drive continuous improvement. These changes also likely played a role in the continuous attainment of assessment targets.

Action - Decision or Recommendation: The target was met with a performance index of 100%. This is a senior design project course where teamwork is emphasized along with the ability to apply the body of knowledge learned in 3½ years of study. It was recommended to continue emphasizing team work to achieve a common goal in solving engineering problems. It was also recommended to continue team meeting with an agenda and minutes lead by a leader for future semesters as well. The responsibilities of the students performing as team leaders will be defined in a written document and monitored to ensure that team leaders are not overloaded with responsibilities or work as compared to their peers.

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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 AY 17-18, 1 out of 1 (100%) students scored a C or better on the technical portion of the written proposal in IET 4960. 7/7 (100%) students scored a C or better on oral presentation and written proposal in IET 4960 in AY 16-17.

After the AY 16-17 assessment cycle, in this AY, the instructor reviewed the final reports by all IET faculty before the final submission of the report for grading. All IET faculty provide feedback on group reports. These reports include feedback on technical content as well as formatting and grammar. Each group then incorporates recommendations by faculty into their report to make a final report. This additional round of review by faculty has contributed to maintaining the performance index for this SLO.

In AY 17-18, the instructor also introduced “mock” presentations for the students, which they have do several times before the final presentation. This additional presentation practice is meant to help them perform better during the final presentation. While the year-to-year results were consistent, the faculty felt that the practice was helpful to the students.

For capstone projects, a final presentation by a team before ET faculty followed by a questions and answers session at the end of the presentation is considered a team effort. A well-structured and thought-out preparation and presentation can be attributed to group’s ability to function as a team. Introduction of mock presentations with the instructor is evidently very helpful in achieving this target. Overall, the performance by students is satisfactory.

Action - Decision or Recommendation: The target was met with a performance index of 100%. This is a senior design project course where teamwork is emphasized. Results from the assessment were discussed with EET faculty. It was recommended to continue emphasizing team effort to achieve a common goal in solving engineering problems. Additional presentation practice in the form of mock presentations will be continued, and other enhancements to the presentation process will be considered as well. Lastly, faculty will monitor the assessment results in AY 18-19 and if the trend of a plateau in the results continues, the faculty will consider upping the target from 80% scoring a C or better to 80% of students scoring a B or better. This change would be in alignment with our drive for continuous improvement in our program and in student learning.

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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 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: 1/1 (100%) of students rated 4 or better for the ability to function effectively on teams by their peers on capstone projects in Fall 2017. 1/1 (100%) of students rated 4 or better for ability to function effectively on teams by their peers on capstone projects in Spring 2018. Therefore, in AY 17-18, the target was met and all students rated 100% on the target. In AY 16-17, 3/3 (100%) of students rated 4 or better for the ability to function effectively on teams by their peers on capstone projects in the Fall of 2016. 4/4 (100%) of students rated 4 or better for the ability to function effectively on teams by their peers on capstone projects in the Spring 2017. Thus, the AY 16-17 target was also met at 100%. Year-to-year, the target was met and student performance was stable at 100%.

In fact for the past six years, the performance targets were met consistently at 100% level for IET 4960.

Action - Decision or Recommendation: The target was met for with a performance index of 100%. This is a senior design project course where teamwork is emphasized. Results from the assessment were discussed with ET faculty. It was recommended to continue emphasizing team effort to achieve a common goal in solving engineering problems. As the target has been consistently met for several years, the faculty will review this measure to see if it needs to be revised to drive improvement.

Measure 5.2. (Direct –Skill)

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

Finding: The target was met.

Analysis: 27 out of 32 (84%) of the students graded C or better in EET 1321 in Spring 2018. This is a new course for this performance indicator. In the last assessment cycle (AY 16-17) COMM 1010 (Communication) was used to assess this SLO. It was a

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course offered by the university in a different department and was a holistic assessment of the course merely looking at the final grade of the student. Upon reflection, this was not thought appropriate for the assessment. Therefore, in AY 17-18, faculty decided to change course for the assessment of this SLO to EET 1321 laboratory report, which is more specific to our degree program communication needs.

Based on the changed criterion, a standardized format for lab reports was developed. The proportion of students performing at level 'C' (9.4%), at level 'B' (34.4 %), and at level 'A' (40.6%) was found satisfactory as far as communicating technical data and experimental procedure and results. How the performance will evolve will be closely monitored to assess any changes required in assessment criteria. For the time-being performance is satisfactory.

Action - Decision or Recommendation: It was decided to continue using standardized format for lab report and assessing this course and students' performance so that at the end of the next assessment cycle, faculty could review the progress and make any necessary action plan to consistently achieve this target.

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 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 1.

Finding: The target was met.

Analysis: In AY 17-18, 18 out of 19 (95%) scored a C or better in Test 1. In AY 16-17, 36 out of 39 (92%) scored a C or better in Test 1. This is a freshmen level class where standardized tests are used to assess students. So far, student performance is satisfactory. The target was met in AY 16-17 and AY 17-18.

Based on the last AY's assessment analysis, the instructor of the course decided to introduce a new engineering tool - Matlab® software. Some of the students struggled in programming the software in AY 17-18. However, the assessment target was still met and students benefitted from the exposure to a new engineering tool.

Action - Decision or Recommendation: The target was met and assessment results were discussed with the faculty teaching this course. It is recommended that more Matlab examples be introduced in subsequent semesters. These examples should

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demonstrate programming simple problems using Matlab that will help students become better acclimated to the software with fewer problems.

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 of 7.

Finding: The target was met.

Analysis: 1/1 (100%) of students rated 4 or better on faculty evaluation of student performance with respect to ability to perform self-directed professional development in IET 4960 in Spring 2018. In AY 16-17, 7/7 (100%) of students rated 4 or on faculty evaluation of student performance with respect to ability to perform self-directed professional development in IET 4960.

Based on the assessment from the AY 16-17 cycle, the instructor of the course introduced mandatory meeting agendas whenever student groups met among themselves. Team leaders were assigned to each group for the first time. Meeting minutes were made mandatory for student group meetings. This allowed students to prioritize their tasks and guide themselves to achieve a few goals at a time towards solving the main goal (objective) of the project in their own pace, motivation, and direction.

Action - Decision or Recommendation: The target was met and results were discussed with the faculty teaching this course. This is a senior design project course where teamwork is emphasized. Results from the assessment were discussed with EET faculty. It was recommended to continue emphasizing team effort to achieve a common goal in solving engineering problems by assigning requiring team leaders, meeting agenda, and meeting minutes. The responsibilities of the students performing as team leaders will be monitored to ensure that team leaders are not comparatively overloaded with responsibilities or work as compared to their peers. A Team Leader responsibility instructional document will be developed to help students fulfilling this role.

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 4750: ELEMENTS OF OCCUPATIONAL SUPERVISION
EET 4950 or IET 4960: PROJECT DESIGN II
ENGL 3320: TECHNICAL COMPOSITION

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Measure 7.1. (Direct – Knowledge)

Every semester, students' grades on IET 4750 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: 7 out of 7 (100%) scored a C or better on course evaluations in IET 4750 in AY 17-18. 2 out of 2 (100%) scored a C or better on course evaluations in IET 4750 in AY 16-17. The target was met. In AY 16-17, 2 out of 2 (100%) scored a C or better on course evaluations in IET 4750. The target was met in both academic years.

Steady performance at 100% can be attributed to well-structured MOODLE shells developed by the faculty. The shells encourage weekly activities and engagement on the part of the students. Based on class examination and a review of AY 16-17 assessment results, each module now has a structured 'forum', a 'case study', and various activities for the students whenever applicable. At the beginning of the semester, faculty lay out how the course has been structured and what are the expectations from the students. Every week, the faculty remind students of the upcoming activities and due dates via announcement and emails.

Action - Decision or Recommendation: The target was met with a performance index of 100% and results from the assessment were discussed with ET faculty. A change in assessment target will be revisited based on the AY 18-19 performance evaluation. Until then, faculty are highly encouraged to continue developing weekly engagement activities for this online course. If the results remain stable in AY 18-19, changing the target level of performance from 70% of students scoring a C or better to a B or better on Test 2 will be discussed. If necessary, this updated target would be more difficult to achieve and would improve the rigor of our program as well as student learning outcomes.

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: 1/1 (100%) of students rated 4 or better by faculty on oral presentation and written proposal of capstone projects in IET 4960 in Spring 2018. In AY 16-17, 3/3 (100%) of students rated 4 or better by faculty on oral presentation and written proposal of capstone projects in IET 4960 in fall 2016, and 4/4 (100%) in Spring 2017.

Based on the AY 16-17 assessment, in AY 17-18, the instructor reviewed the final report by all IET faculty before the final submission of the report for grading. All IET

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faculty provide feedback on technical content as well as formatting and grammar for each group's report. Each group then incorporated recommendations by faculty into their report to make a final report. This additional round of review by faculty has contributed to maintaining the performance index for this SLO.

The instructor also introduced "mock" presentations for the students, which they have done several times before the final presentation.

For capstone projects, final presentation by a team before ET faculty followed by a questions and answers session at the end of the presentation is considered a team effort. Well-structured and thought-out preparation and presentation can be attributed to group's ability to function in a team. The introduction of mock-up presentations with the instructor was evidently helpful in achieving this target. Overall, the performance by students met the target.

Action - Decision or Recommendation: Target was met for with a performance index of 100%. This is a senior design project course where teamwork is emphasized along with the ability to apply the body of knowledge learned in 3½ years of study. It was recommended to continue mock presentations several times before the actual presentation and feedback from the faculty on written report before final submission. The faculty will also research other pedagogical methods of enhancing the presentation results and student learning.

Measure 7.3. (Direct –Skill)

Every semester, student's final grades on ENGL 3230 (Technical Composition) are obtained through institutional research. The acceptable target is 80% of graduating EET students graded C or better in course ENGL 3230.

Finding: The target was met.

Analysis: This measure comes from English 3230, which is a technical composition course. 9 out of 9 (100 %) scored a C or better in Fall 2017. The performance index increased from 80% (Spring 2016) to 100% (Fall 2017). The target was met, and the performance index increased by 20%. This data is collected at the university level. Until consistent higher performance is observed, the overall performance is satisfactory with no need for any immediate changes.

Since the ET department has no direct impact on the ENGL 3230 course, faculty decided that senior design instructor will provide ENGL 3230 instructor with copies of senior design projects in order to have an idea about the quality of reports and to focus on areas that students are lacking. In addition, faculty recommended to investigate if the 6th semester is still proper to introduce this course.

Action - Decision or Recommendation: This course is offered by a different department. Until consistent higher performance is observed, the overall performance is

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satisfactory with no immediate change required. The performance will be continually monitored and will be visited in next AY.

Comprehensive summary of key evidence of 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).

- The instructor started every lab by explaining in-depth, different kinds of electronic components, their configurations, and the overall circuit, instead of asking students to refer to the laboratory manual. Additionally, the instructor introduced a new reporting format for the laboratory reports. These changes were meant to streamline the course by making the reporting format more intuitive and the introduction of new material easier for students to initially understand.
- The university hired a new faculty member to teach EET 3340. The course is in his area of expertise. The instructor used a significant number of simple to advanced problems in the topic area to engage students in problem solving. The instructor also briefly reviewed the last concept covered in the class before teaching newer concepts. The resulting grade distribution improved greatly, A's, 50%, B's 35.7%, and C's 7%.
- The faculty revised the practice of the pre-lab review of the experiment by introducing a standardized lab report format in EET 1331. These practices enhanced students learning and improved their written reports. Faculty agreed to review if the performance index in the next AY 18-19 is also 100% to initiate discussion on changing the target to 70% of students score B or better in final examination

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

- Faculty introduces review sessions before every test for EET 3340. These practices enhanced students learning and improved their understanding of the subject.
- The instructor of the EET 4310 course adopted a new course textbook, which contains newer concepts and materials. Additionally, the instructor also introduced Power Point presentations into class lectures. In the instructor's opinion, the combination of solving problems on the board augmented using PowerPoint would be more effective in teaching highly technical and mathematical course like the current course. These changes were made to enhance student learning, but the assessment results stayed stable.

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- The instructor of the EET 4310 determined that this year's questions on Fourier series and Bessel functions were relatively more difficult compared to those from the last year (AY 16-17). This change may have affected the assessment results and will be re-evaluated as more data is gathered.
- The instructor of the EET 4311 course started every lab in AY 17-18 by explaining in-depth, different kinds of electronic components, their configurations, and the overall circuit instead of asking students to refer to the laboratory manual. Additionally, the instructor also introduced a new reporting format for the laboratory reports. Similar to the changes made in SLO1 measure 1.1 in EET 1331, these changes to EET 4311 were meant to streamline the course by making the reporting format more intuitive and the introduction of new material easier for students to initially understand.
- The faculty noted that the performance indices for this measure are very sensitive to small sample sizes. Therefore, this index will be monitored for one more year to further examine the data trend. If the trend continues similarly, with 100% of students achieving the target, the EET faculty will change the target to 70% of students receiving a B or better on technical component of formal laboratory report. Increasing the target from a C to a B would increase our assessment rigor and help drive continuous improvement in student learning and in our program.

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

- The instructor of the EET 4311 course introduced 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 more than doubled year-to-year (n=6 vs n-14), the results stayed stable. Two possible explanations for this result are that changes to the course are working to maintain the results even with a greater number of students or that the assessment target is not rigorous enough.
- For EET 4311, this is the second time in last three years that the performance index has been 100%. For AY 15-16, it was 83.4% (5 out of 6). These performance indices are very sensitive to small sample sizes. Therefore, this index will be monitored for one more year before changing the target to 70% of students receiving a B or better on technical component of formal laboratory report. This would change the target student score from a C to a B. In a drive to continuous improvement, the EET faculty will consider making the target more difficult to achieve.
- The instructor of EET 4351 used new equipment (AMATROL PLC Trainers bought through funds awarded by Board of Regents) for the first time in this

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course. All EET faculty were trained by the vendor to use these trainers in March 2018. Students' experiences were very positive, but there was a learning curve to using these trainers for both faculty and students. However, their implementation into the course was a success and the target was met.

- It is recommended that instructor of EET 4351 develop a student manual for the new trainer so that the learning curve that students experience when dealing with the new equipment can be lessened. Additionally, the faculty will look for ways to further use the new equipment to enhance student learning.
- It is evident that the performance index for EET 4351 is very sensitive to the sample size. Therefore, faculty agreed to monitor this performance index for one more cycle before discussing possible alterations to the assessment target.
- The instructor of IET 4960 encouraged students to conduct research in the areas of their project scope to acquire knowledge on recent technology or components that are available in market. This update for AY 17-18 was made to improve student designs and make them more relevant/current. This activity helped students not only to learn about new availability of the technologies or components but also forced them to learn their working principles to be able to use them in their designs.
- In IET 4960, it was recommended to continue the practice of research on latest relevant technology and electronic components within the project scope. As new technologies or components become available, the instructor will continue to introduce students to these changes to keep their projects and learning up-to-date and maintain the cycle of continuous improvement.

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

- The instructor of the IET 4960 course introduced mandatory meeting agendas whenever student groups met among themselves. Team leaders were assigned to each group for the first time. Meeting minutes were made mandatory for student group meeting. This allowed students to prioritize their tasks and guide themselves to achieve a few goals. The intent was for student to move deliberately towards solving the main goal (objective) of the project at their own pace, motivation, and direction.
- For capstone projects, the final presentation by a team was made before EET faculty followed by a questions and answers session at the end of the presentation. This project is a team effort. Well-structured and thought-out preparation and presentations can be attributed to group's ability to function as a team. The introduction of meeting agendas and mock presentations with the instructor was found to be essential in achieving this target.
- The instructor updated the EET 4940 course in AY 17-18 and assigned a team

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leader for the first time in every group in these courses. The team leader's responsibility (in addition to functioning as a group member) is to oversee each task assigned to each member in a group is progressing as per the project guideline. Further, the leader's responsibilities include calling meetings, reviewing progress, and preparing revised action plans until the final report and presentation is delivered to the client. These changes were made to enhance student learning and functioning in a group environment. These changes also likely played a role in the continuous attainment of assessment targets.

- It was recommended in EET 4940 to continue emphasizing team effort to achieve a common goal in solving engineering problems by assigning requiring team leaders, meeting agenda, and meeting minutes. Other measures to encourage efficient and prosperous group work will also be researched and introduced by the faculty.
- It was recommended to continue emphasizing team work in capstone projects to achieve a common goal in solving engineering problems. It was also recommended to continue team meeting with an agenda and minutes lead by a leader for future semesters as well. The responsibilities of the students performing as team leaders will be defined in a written document and monitored to ensure that team leaders are not overloaded with responsibilities or work as compared to their peers.
- The instructor reviewed the final capstone projects by all IET faculty before the final submission of the report for grading. All IET faculty provide feedback on group reports. These reports include feedback on technical content as well as formatting and grammar. Each group then incorporates recommendations by faculty into their report to make a final report. This additional round of review by faculty has contributed to maintaining the performance index for this SLO.
- The instructor introduced “mock” presentations in capstone projects for the students, which they have do several times before the final presentation. This additional presentation practice is meant to help them perform better during the final presentation. While the year-to-year results were consistent, the faculty felt that the practice was helpful to the students.
- The final presentation in capstone projects by a team before ET faculty followed by a questions and answers session at the end of the presentation is considered a team effort. A well-structured and thought-out preparation and presentation can be attributed to group's ability to function as a team. Introduction of mock presentations with the instructor is evidently very helpful in achieving this target.
- The faculty decided that they will monitor the assessment results in AY 18-19 and if the trend of a plateau in the results continues, the faculty will consider upping the target from 80% scoring a C or better to 80% of students scoring a B

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or better. This change would be in alignment with our drive for continuous improvement in our program and in student learning.

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

- It was recommended for capstone projects to continue emphasizing team effort to achieve a common goal in solving engineering problems. As the target has been consistently met for several years, the faculty will review this measure to see if it needs to be revised to drive improvement.
- A new course, EET 1321, was used to assess communication skills instead of old course. The old course (COMM 1010) was offered by the university in a different department and was a holistic assessment of the course merely looking at the final grade of the student. Upon reflection, this was not thought appropriate for the assessment. Therefore, in AY 17-18, faculty decided to change course for the assessment of this SLO to EET 1321 laboratory report, which is more specific to our degree program communication needs.
- The faculty decided to continue using standardized lab format for EET 1321 and assess this course and students' performance so that at the end of the next assessment cycle, faculty could review the progress and make any necessary action plan to consistently achieve this target.

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

- The instructor of the IET 1700 decided to introduce a new engineering tool - Matlab® software. Some of the students struggled in programming the software in AY 17-18. However, the assessment target was still met and students benefitted from the exposure to a new engineering tool.
- The instructor of the capstone course introduced mandatory meeting agendas whenever student groups met among themselves. Team leaders were assigned to each group for the first time. Meeting minutes were made mandatory for student group meetings. This allowed students to prioritize their tasks and guide themselves to achieve a few goals at a time towards solving the main goal (objective) of the project in their own pace, motivation, and direction.
- It was recommended to continue emphasizing team effort in capstone projects in order to achieve a common goal in solving engineering problems by assigning requiring team leaders, meeting agenda, and meeting minutes.

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

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- For capstone projects a well-structured MOODLE shells developed by the faculty. The shells encourage weekly activities and engagement on the part of the students. Based on class examination and a review of AY 16-17 assessment results, each module now has a structured 'forum', a 'case study', and various activities for the students. At the beginning of the semester, faculty lay out how the course has been structured and what are the expectations from the students. Every week, the faculty remind students of the upcoming activities and due dates via announcement and emails.
- The faculty was highly encouraged to continue developing weekly engagement activities for this IET 4750 online course. If the results remain stable in AY 18-19, changing the target level of performance from 70% of students scoring a C or better to a B or better on Test 2 will be discussed. If necessary, this updated target would be more difficult to achieve and would improve the rigor of our program as well as student learning outcomes.
- The instructor reviewed the final report of the capstone project by all IET faculty before the final submission of the report for grading. All IET faculty provide feedback on technical content as well as formatting and grammar for each group's report. Each group then incorporated recommendations by faculty into their report to make a final report. This additional round of review by faculty has contributed to maintaining the performance index for this SLO.
- The instructor introduced "mock" presentations for the students, which they have to do several times before the final presentation. The introduction of mock-up presentations with the instructor was evidently helpful in achieving this target
- Since the ET department has no direct impact on the ENGL 3230 course, faculty decided that senior design instructor will provide ENGL 3230 instructor with copies of senior design projects in order to have an idea about the quality of reports and to focus on areas that students are lacking. In addition, faculty recommended to investigate if the 6th semester is still proper to introduce this course.

Plan of action moving forward.

Electronic Engineering Assessment data for academic year 2017-2018 show that targets were met or exceeded. The Department of Engineering Technology is encouraged by the improvements made by faculty during the AY 17-18 and recognizes it is necessary to strive for continuous improvement needed every year to achieve model student learning outcomes. The following paragraphs summarize the changes for next cycle based on this year's analysis of the assessment results

In all classes students will be emphasized on being punctual and aware of their responsibility. Comprehensive review sessions will be provided to students in some classes such as EET 3340 to allow them focus on important topics and guide their study before the final exam.

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For courses, which assess communication skills such as EET 1321, the instructor will be using standardized lab format and provide students with a sample of well-written report as an example.

For lab courses with hands-on experiences such as EET 1331, EET 4311, EET 4351, pre-lab review will be practiced. A new lab report format will be introduced in EET 1331 and standardized lab report format will be used in EET 4311. In addition, hand-notes with examples will be distributed to students in EET 4311. An instruction manual will be developed for the new PLC trainers in EET 4351.

Faculty will discuss changing the target to 70% of students scoring a B or better on the final examination in EET 4311 and EET 1331.

In several classes, new apparatus, software, and teaching methodologies will be adopted in order to enhance student learning and utilize new technologies. In IET 1700, Matlab programming will be reviewed and introduced to students in simplified manner. In EET 3340, faculty will introduce MultiSim software to solve operations amplifier-based questions. In EET 4310, the instructor will be combining PowerPoint and board work while delivering his lecture. In addition, the faculty will open source relevant videos to explain Fourier series and Bessel functions further in EET 4310.

For senior design projects which include EET 4940, EET 4950, or IET 4960, the instructor will supervise group formation for the project so that each group can fulfill their project obligation in timely manner. In addition, different students' skills will complement each other and will enhance the quality of projects. Additionally, the instructor will be emphasizing team effort to achieve a common goal in solving engineering problems by assigning/requiring team leaders, meeting agenda, and meeting minutes. Students will continue mock presentations several times before the actual presentation in order to enhance their presentation skills. Instructors will continue productive practices such as assigning team leaders, providing an enhanced itemized budget in the project proposal and the final project report, and administering mock presentation before final presentation.

Performance indices which were at the 100% level will be continually monitored. A possible change in the performance targets will be discussed in faculty meetings and Industrial Advisory Committee meetings in Fall 2018 and decisions will be made based on the committee's recommendation for each of the performance targets.

Due to small sample size in some of the EET courses, it is evident that the performance index is very sensitive to the sample size. Enrollment in ET department has shown continuous increase, and this may be reflected on future results. However, faculty agreed to monitor performance index for small classes before discussing possible alterations in target as well as action plans development.

In conclusion, ET faculty has reflected on the assessment results from AY 17-18 as well as previous years and identified some explicit changes to improve student learning.

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Continued commitment and attention to assessment and evidence of student learning will improve the quality of education. Data will be continually analyzed to ensure continuous improvement moving forward.