Assessment Cycle

Academic Year 2016 – 2017

Engineering and Technology (IET, BS)

Division or Department: College of Business and Technology

Prepared by: Ali Ahmad **Date: 6/19/2017**

Approved by: Margaret Kilcoyne **Date: 6/19/2017**

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 students 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.

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.

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

Purpose: The Bachelor of Science in Industrial Engineering Technology program will prepare students to: 1) Analyze, test, build, operate and maintain industrial systems (equipment, warehouse operations, safety management, plant operations, etc.), and 2) Manage manufacturing facilities, systems and operations to include installation, motion and time, safety and efficiency. 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 Industrial Engineering Technology program is as follows:

Assessment Cycle

Academic Year 2016 – 2017

(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):

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

Course Map: Tied to course syllabus objectives.

IET 2020: METALS MACHINING I
EET 4950 or IET 4960: PROJECT DESIGN II

Measure 1.1. (Direct – Knowledge)

Every spring semester, students' grades on the IET 2020 Final Exam are used to assess the attainment of SLO 1. The acceptable target is 80% of students score C or better in final examination.

Finding: Target met. 24 out of 27 (88.89%) students scored C or better in the final exam.

Analysis: Students are consistently meeting assessment targets. However, progress has stalled around 85%. Revision of target can be considered once target is consistently above 90% for at least a couple of years.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

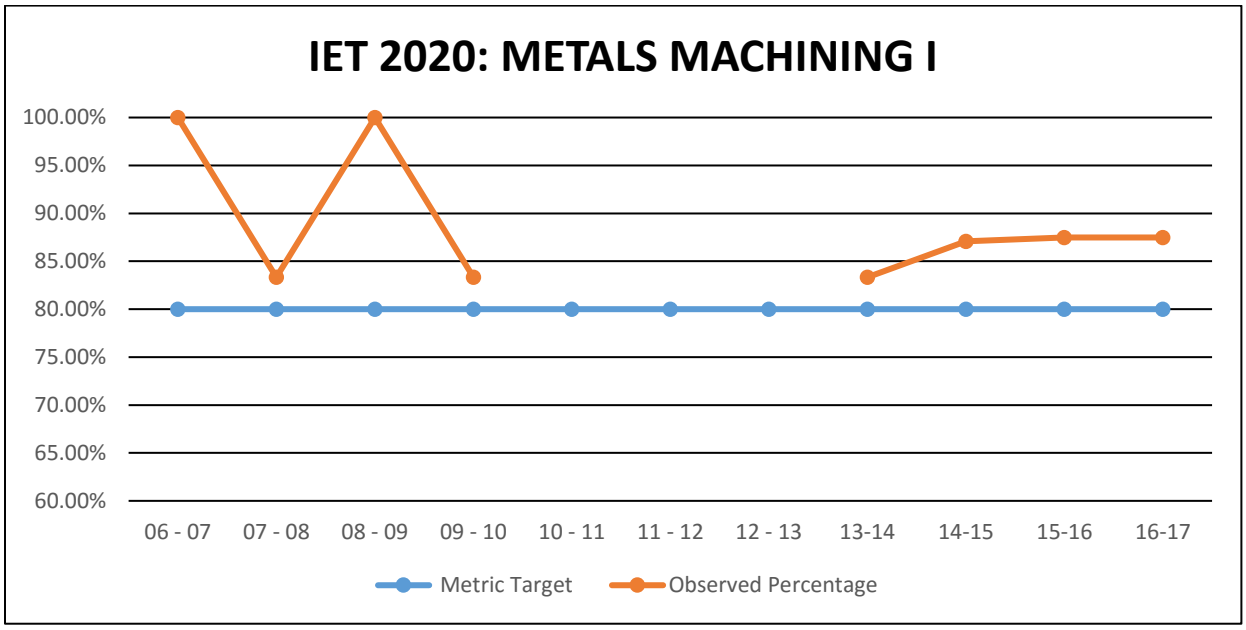

Figure 1.Percentage of students scoring 80% or better in the final exam.

Measure 1.2. (Indirect – Knowledge/Ability/Skill)

Every semester, upon presentation of capstone projects, ET faculty evaluate student performance with respect to ability to apply the industrial engineering technology knowledge, skills, and tools to real-world problem solving. The acceptable target is 80% of IET students rated at least 4 of 7.

Finding: Target met. 9/9 (100%) of IET students rated at least 4 out of 7 by ET faculty on ability to apply the industrial engineering technology knowledge, skills, and tools to real-world problem solving in IET 4960 in the fall of 2016. 13/13 (100%) of IET students rated at least 4 out of 7 by ET faculty on ability to apply the industrial engineering technology knowledge, skills, and tools to real-world problem solving in IET 4960 in the spring of 2017.

Analysis: For capstone projects, students and advising faculty meet two hours every week and discuss the engineering problems they are trying to solve. Students also meet with the clients (industrial partners) multiple times to get relevant information to help them understand and apply their learning and research findings to these problems. They conduct research, discuss potential solutions among themselves, and agree upon and formulate the problem solution, which they present before ET faculty. Well-structured requirements and teamwork along with commitment from both students and faculty can be attributed to performance of these courses over the past several years.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

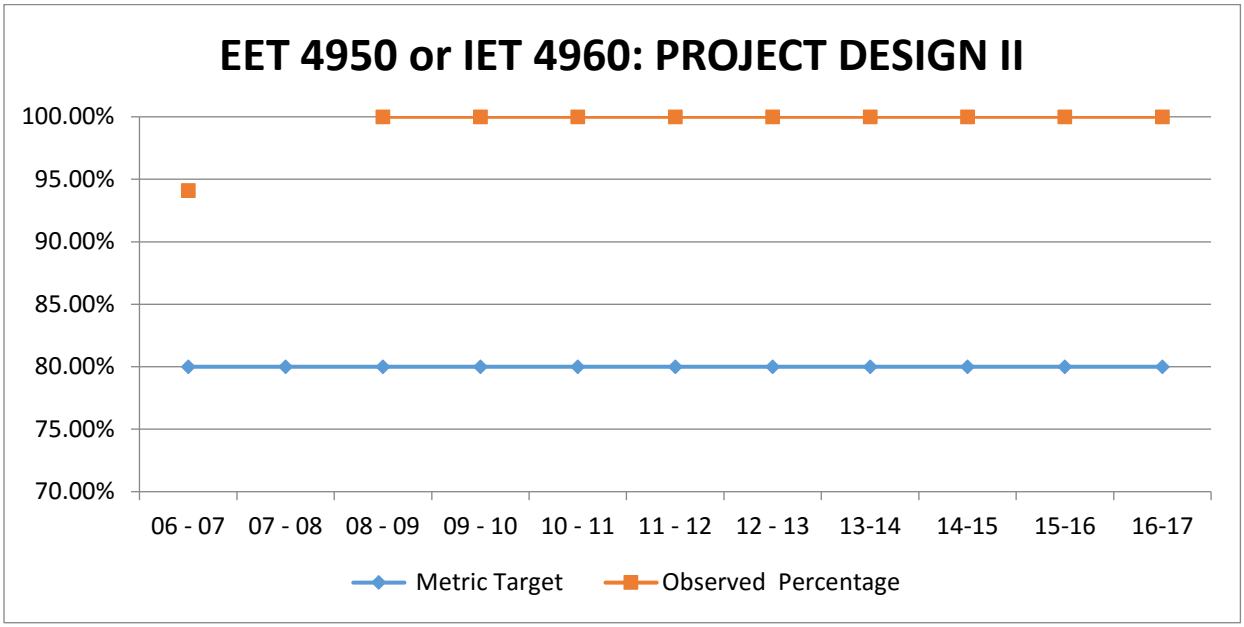

Figure 2.Percentage of IET students rated at least 4 out of 7 by ET faculty on ability to apply the industrial engineering technology knowledge, skills, and tools to real-world problem solving

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

Course Map: Tied to course syllabus objectives.

IET 3570: ENGINEERING ECONOMICS
IET 4700: MANUFACTURING FACILITIES

Measure 2.1. (Direct – Knowledge/Skills)

Every spring semester, students' grades on the IET 3570 Final Exam are used to assess the attainment of SLO 2. The acceptable target is 80% of students score C or better on final examination.

Finding: Target met. 30 out of 35 students scored C or better on the final examination. (86%)

Analysis: Over the past five years, five different instructors taught this course. Out of those five years, in three recent years, students' performance was found to be satisfactory. Variation in performance could be attributed to teaching style or just a couple of random events. This course will have to be monitored for a coming academic year. Based on the future performance, the recommendation may be changed.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

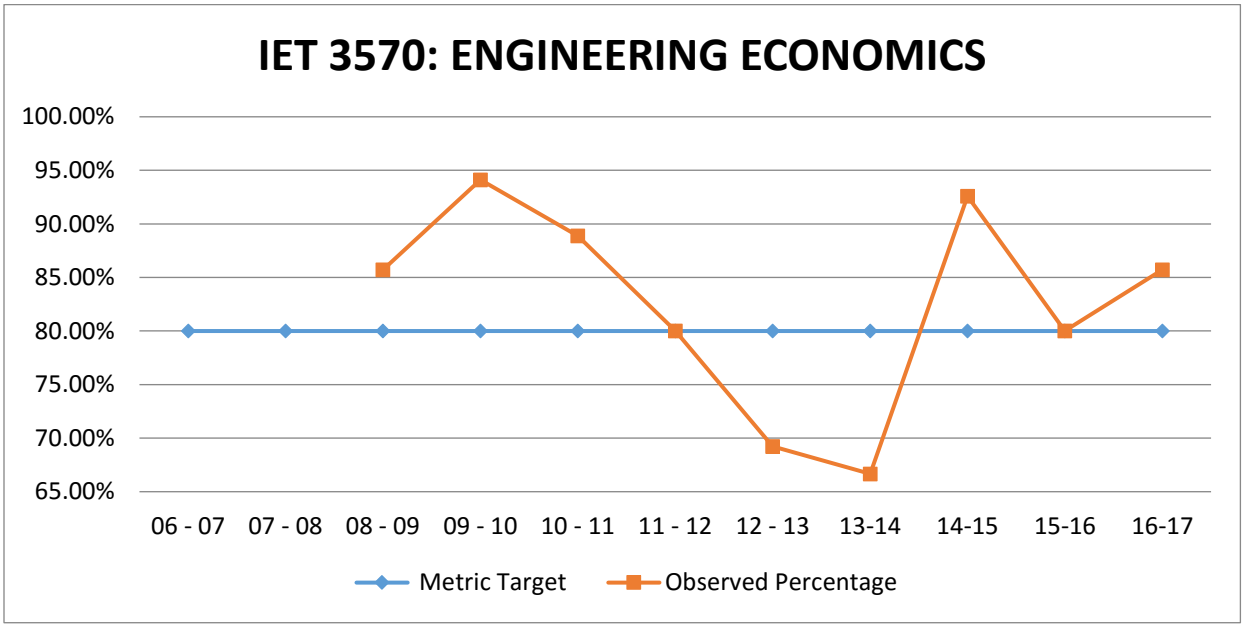

Figure 3. Percentage of students scoring C or better on the final examination.

Measure 2.2. (Direct – Knowledge/ Skill)

Every spring semester, students' grades on the IET 4700 Final Exam are used to assess the attainment of SLO 2. The acceptable target is 80% of students score C or better on embedded questions.

Finding: Target met. 23 out of 28 (82 %) of students scored C or better on embedded questions and assignments.

Analysis: The last two years of students' performances are satisfactory; however, for the academic year 2016-17, it barely met the target. There is also no evidence that performance is consistent. This course will have to be continually monitored for coming academic years before any changes can be recommended.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

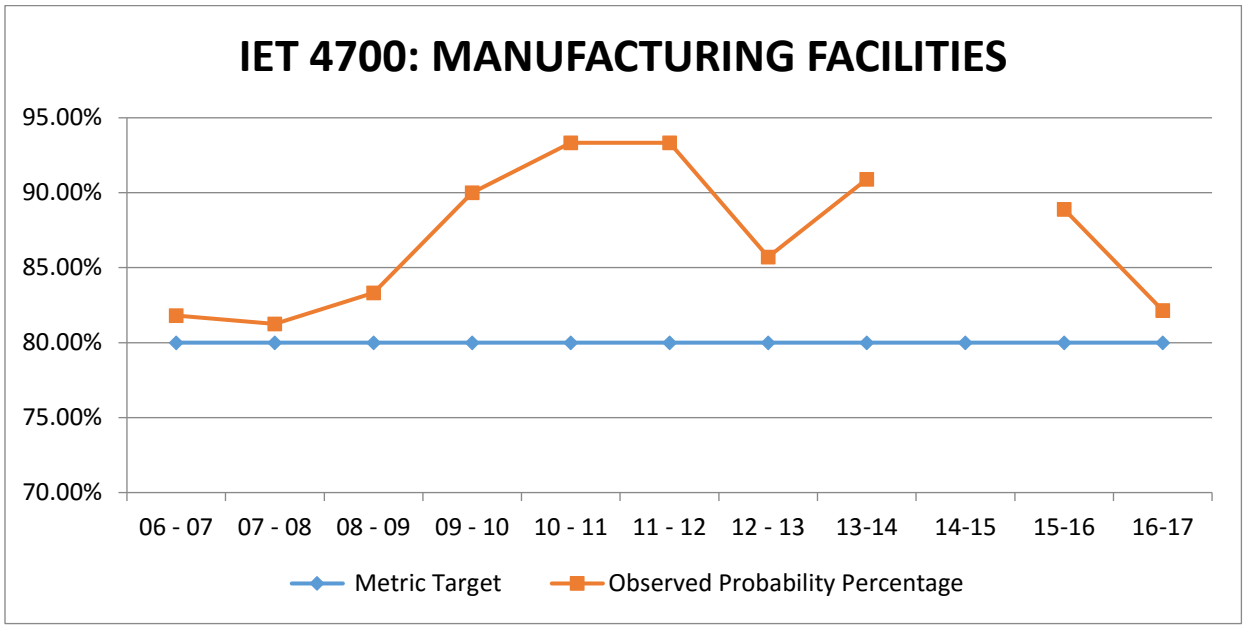

Figure 4.Percentage of students score C or better on embedded questions in the final exam.

Measure 2.3. (Direct – Knowledge/ Skill)

Every spring semester, students' grades on the IET 4700 Design Project are used to assess the attainment of SLO 2. The acceptable target is 85% of students score B or better on Team Timed Lighting design project.

Finding: Target met. 28 out of 28 of students scored B or better on the Team Timed Lighting design project.

Analysis: Due to the team format, grades are higher by virtue of individual expertise within teams. Hence, the target for school year 2013 - 14 was changed from 80% to 85% of students will score B or better. Since 13-14, performance of the students has been very consistent. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017 and the decision will be made based on the committee's recommendation.

Action - Decision or Recommendation: No program changes were recommended. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017.

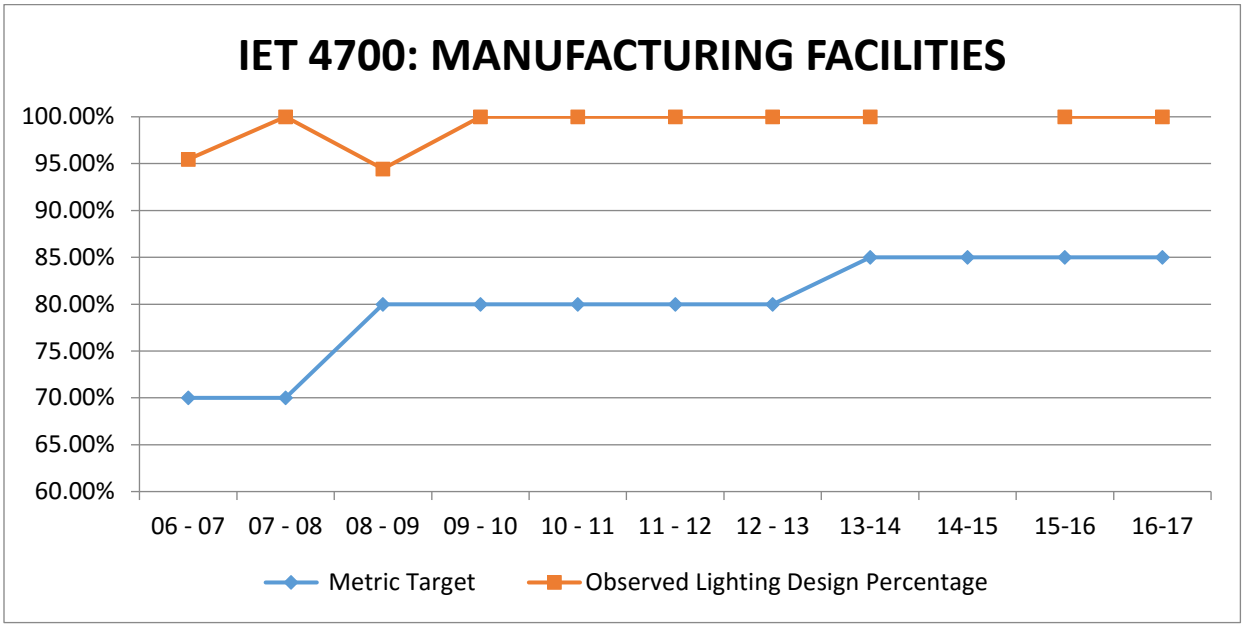

Figure 5. Percentage of students scored B or better on Team Timed Lighting Design Project.

SLO 3. Ability to conduct continuous improvement projects (ETAC of ABET Outcome c).

Course Map: Tied to course syllabus objectives.

IET 3150: FLUID POWER
IET 3510: MOTION AND TIME STUDY

Measure 3.1. (Direct – Knowledge/Skills)

Every fall semester, students' grades on the IET 3150 Fluid Power circuit experiment are used to assess the attainment of SLO 3. The acceptable target is 80% of students score C or better on fluid power circuit experiment.

Finding: Target met. 24 out of 25 (96%) students scored B or better on Test 3 in fluid power circuit experiment in fall 16.

Analysis: Student performance in 2016-17 exceeded the target by considerable margin; however, due to a lack of sufficient recent data, this performance has to be monitored in coming years and a decision or recommendation will be made based of future performance of the students in the course.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

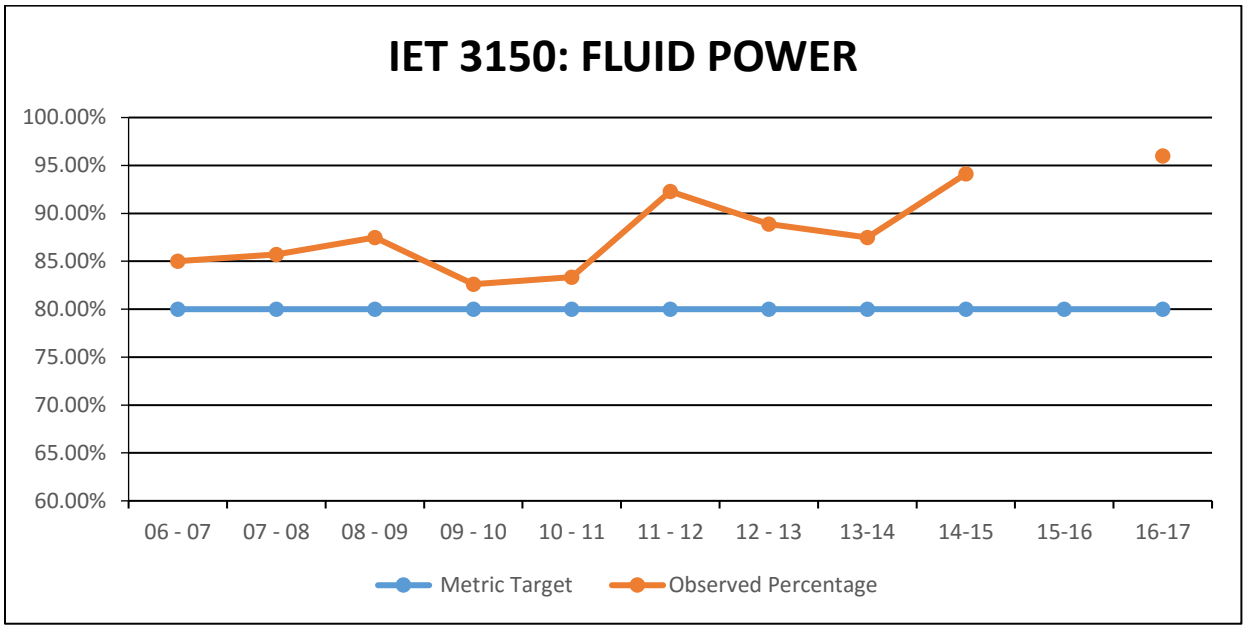

Figure 6. Percentage of students scored B or better on Test 3 in fluid power circuit experiment.

Measure 3.2. (Direct – Knowledge/Skills)

Every fall semester, students' grades on the IET 3510 Final Project are used to assess the attainment of SLO 3. The acceptable target is a final class project score rated at 70% or better by client and faculty.

Finding: Target met. 26 out of 30 rated 70% or better by client and faculty (86.6%)

Analysis: Students in groups of three to four submitted their semester project reports to both clients (industrial or community partners) and faculty. These reports are graded by both faculty and clients. Grades are based on students' knowledge and application of course learning and ability to apply continuous improvements and strategies. Over the past three years, the performance of the students was not consistent; however, the target was always met, sometimes with considerable margin. Randomness could be attributed to clients' expectation as well as the students' fondness of the projects they were assigned.

Action - Decision or Recommendation: No program changes were recommended

Assessment Cycle

Academic Year 2016 – 2017

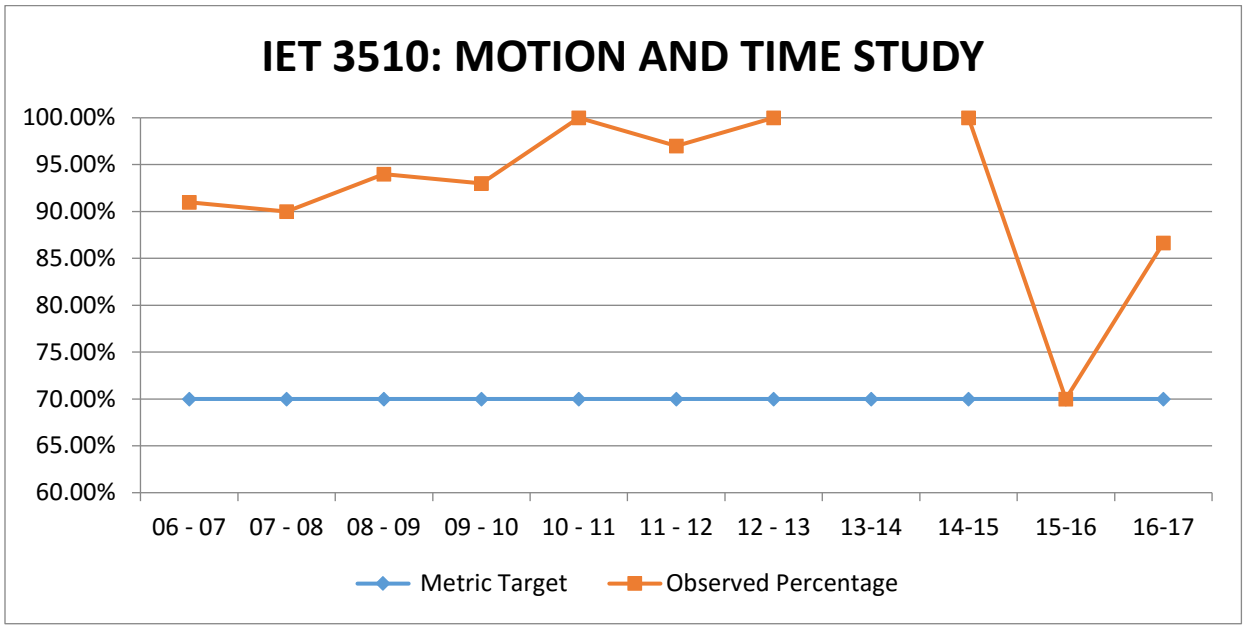

Figure 7. Percentage of students' final class projects rated at least 70% or better by client and faculty.

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 (both Project Design I and II), ET faculty evaluate student performance with respect to ability to function effectively on a team. The acceptable target is 80% of IET students rated at least 4 of 7.

Finding: Target met for both courses, EET 4940 and IET 4960. 13 out of 13 (100%) students rated at least 4 of 7 for ability to function effectively on a team in fall 16 and 10 out of 10 (100%) students rated at least 4 of 7 for ability to function effectively on a team in spring 17 in EET 4940.

9/9 (100%) of students rated 4 or better for ability to function effectively on a team in IET 4960 in the fall of 2016. 13/13 (100%) of students rated 4 or better for ability to function effectively on a team in IET 4960 in the spring of 2017.

Analysis: For capstone projects, final presentation by a team before ET faculty followed by questions and answers 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. It is evident that graduating seniors' performance in Project Design II is better than the students in Project Design I; however, performance targets were met for several years in a row for both courses.

Action - Decision or Recommendation: No program changes were recommended.

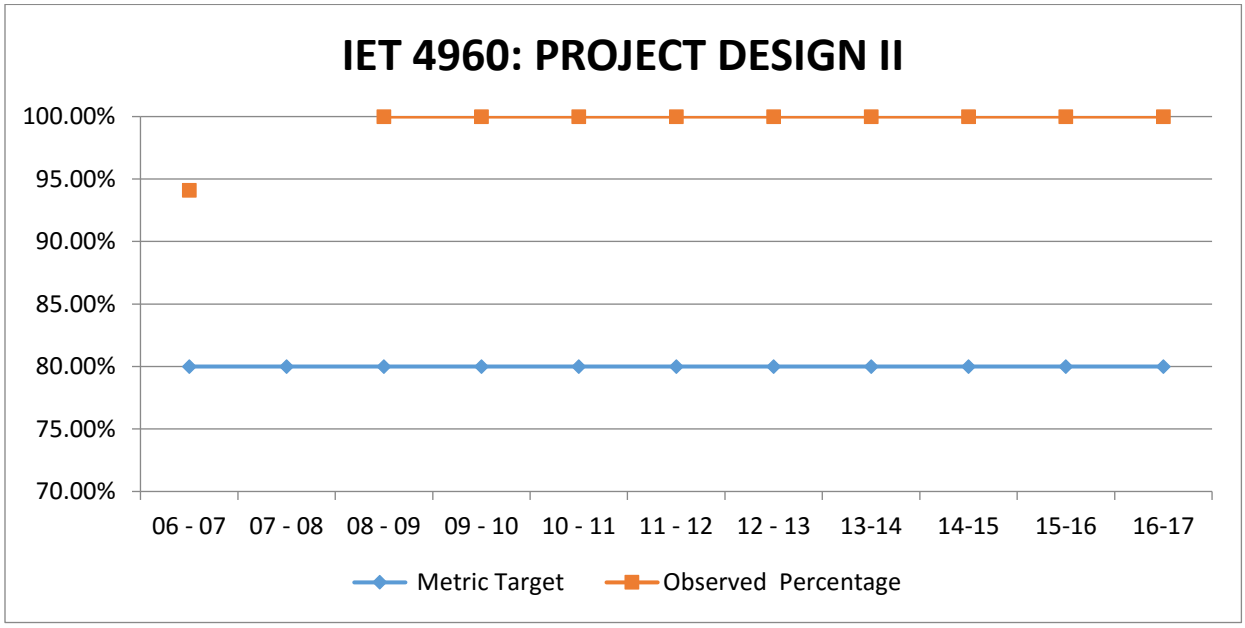

Figure 8. Percentage of capstone projects rated at least 4 out of 7 by ET faculty on ability to function effectively on a team.

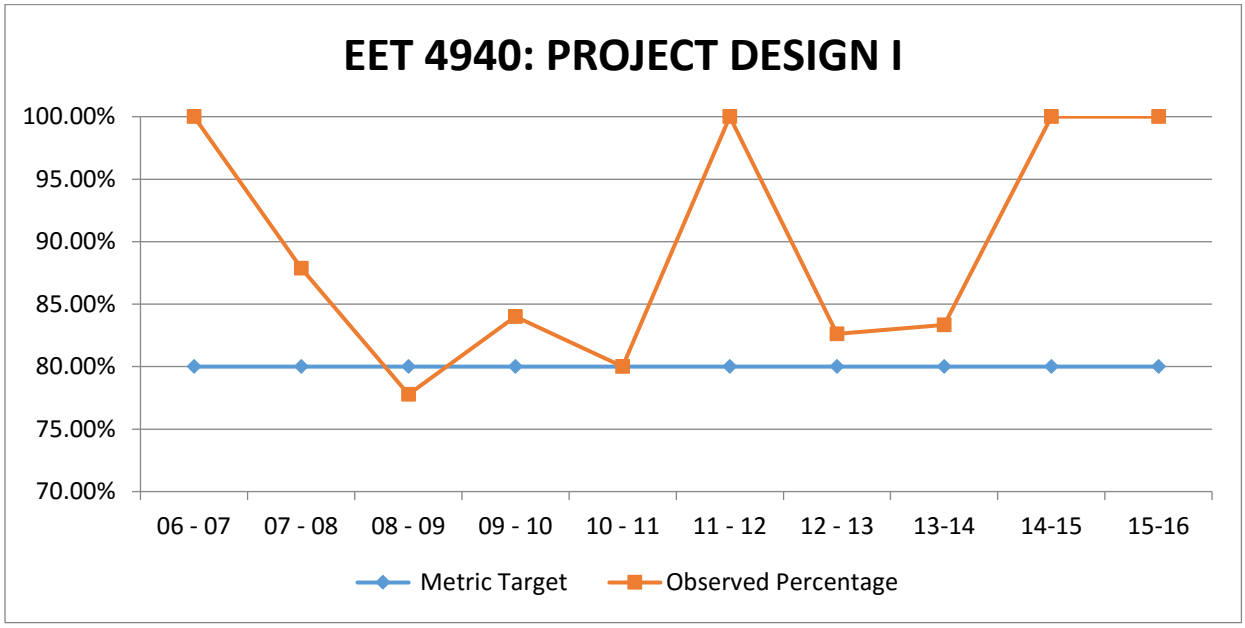

Figure 9. Percentage of capstone projects rated at least 4 out of 7 by ET faculty on ability to function effectively on a team.

Assessment Cycle

Academic Year 2016 – 2017

Measure 4.2. (Direct – Knowledge/Ability)

Every semester, students' grades on EET 4940 written proposal are used to assess the attainment of SLO 4. The acceptable target is 80% of students score C or better on the technical portion of the written proposal.

Finding: Targets met for both course, EET 4940 and IET 4960. 13 out of 13 (100%) students rated at least 4 of 7 on the technical portion of the written proposal in the fall of 2016 and 10 out of 10 (100%) students rated at least 4 of 7 on the technical portion of the written proposal in the spring of 2017.

9/9 (100%) of students rated 4 or better on the technical portion of the written proposal in IET 4960 in the fall of 2016 and 13/13 (100%) of students rated 4 or better on the technical portion of the written proposal in IET 4960 in the spring of 2017

Analysis: Students' performance in Project Design II has been very consistent (100%) for the past several years in a row. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017 and the decision will be made based on the committee's recommendation. Students' performance in Project Design I has met target several years in a row; however, the inconsistency can be attributed to their inexperience or a random event.

Action - Decision or Recommendation: No program changes were recommended. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017.

Assessment Cycle

Academic Year 2016 – 2017

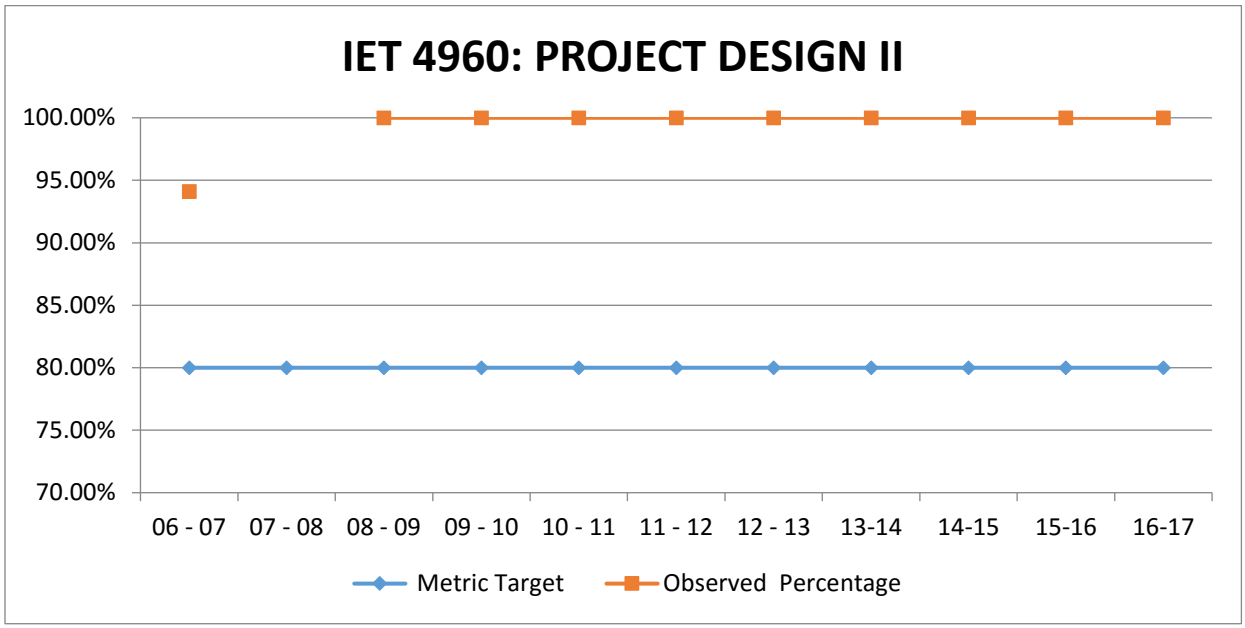

Figure 10. Percentage of student scoring C or better on the technical portion of the written proposal.

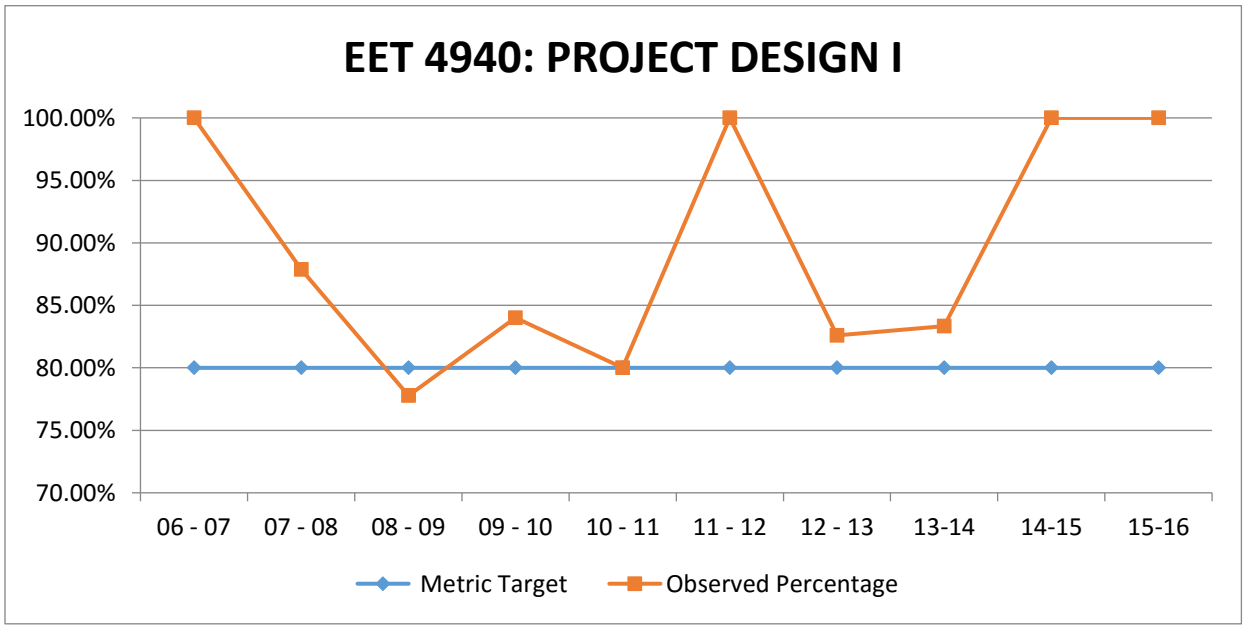

Figure 11. Percentage of student scoring C or better on the technical portion of the written proposal.

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

Course Map: Tied to course syllabus objectives.

Assessment Cycle

Academic Year 2016 – 2017

EET 4940: PROJECT DESIGN I
EET 4950 or IET 4960: PROJECT DESIGN II

Measure 5.1. (Indirect – Knowledge/Ability/Skill)

Every semester, upon presentation of capstone projects, ET faculty evaluate student performance with respect to ability to communicate effectively. The acceptable target is 80% of IET students rated at least 4 of 7.

Finding: Targets were met for both EET 4940 and IET 4960. 13 out of 13 (100%) students rated at least 4 of 7 with respect to ability to communicate effectively in EET4940 in fall 16 and 10 out of 10 (100%) students rated at least 4 of 7 with respect to ability to communicate effectively in EET4940 in spring 17.

9/9 (100%) of students rated 4 or better for creativity by faculty on capstone projects in IET 4960 with respect to ability to communicate effectively in the fall of 2016 and 13/13 (100%) of students rated 4 or better with respect to ability to communicate effectively in IET 4960 in the spring of 2017

Analysis: Students' performance in Project Design II has been very consistent (100%) for the past several years in a row. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017 and the decision will be made based on the committee's recommendation.

Action - Decision or Recommendation: No program changes were recommended. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017.

Assessment Cycle

Academic Year 2016 – 2017

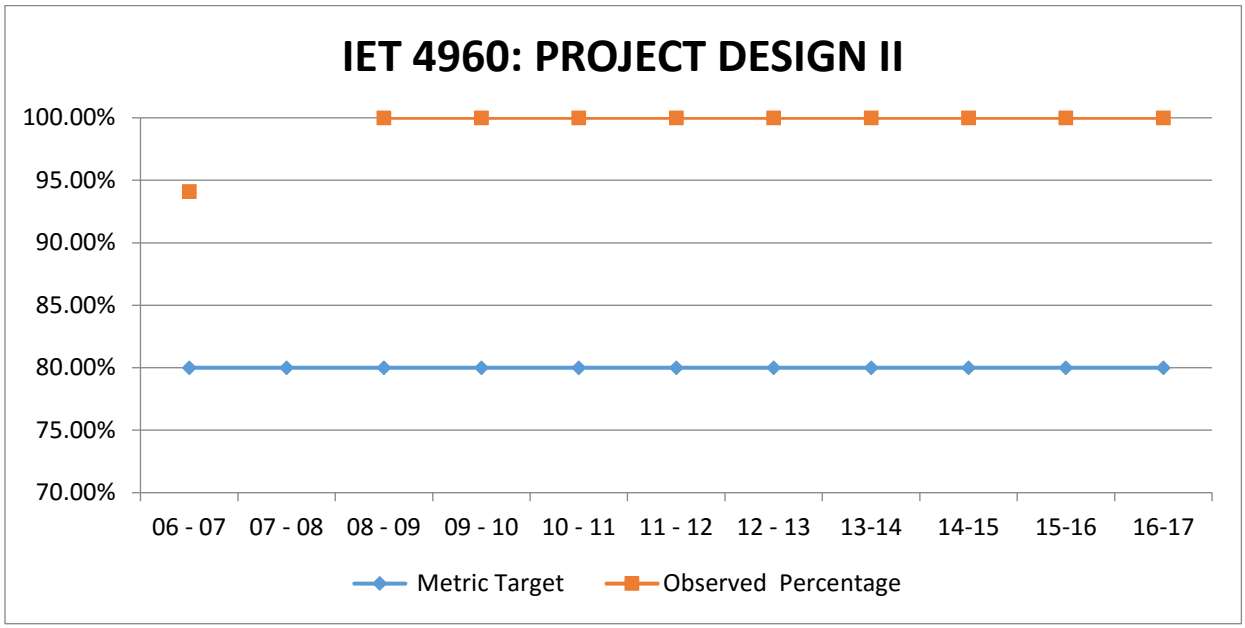

Figure 12.Percentage of rated 4 or better with respect to ability to communicate effectively.

Measure 5.2. (Direct –Skill/Ability)

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

Finding: Targets were met for both course, EET 4940 and IET 4960. 13 out of 13 (100%) students rated at least 4 of 7 by their peers in EET 4940 in fall 16 and 10 out of 10 (100%) students rated at least 4 of 7 by their peers in EET 4940 in the spring of 2017.

9/9 (100%) of students rated 4 or better by their peers in IET 4960 in the fall of 2016 and 13/13 (100%) of students rated 4 or better by their peers in IET 4960 in the spring of 2017

Analysis: Students' performance in Project Design II has been very consistent (100%) for the past several years in a row. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017 and the decision will be made based on the committee's recommendation. Students' performance in Project Design I has met target several years in a row; however, the inconsistency can be attributed to their inexperience or a random event.

Assessment Cycle

Academic Year 2016 – 2017

Action - Decision or Recommendation: No program changes were recommended. A possible change in target performance will be discussed in Industrial Advisory Committee in the fall of 2017.

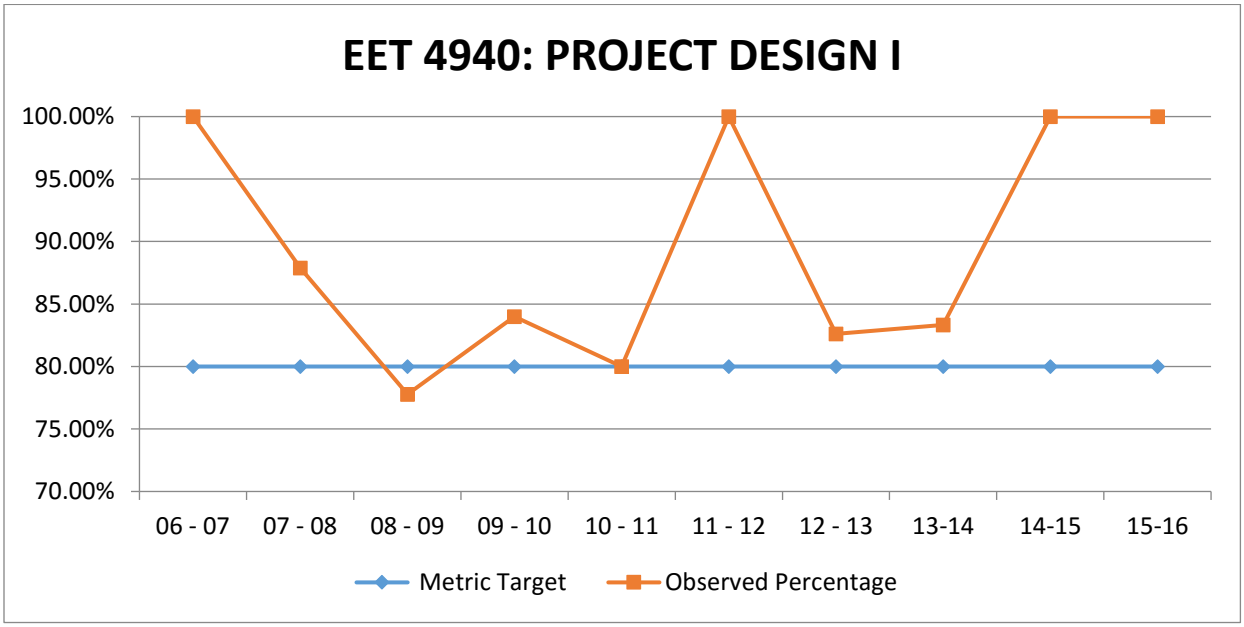

Figure 13.Percentage of students rated at least 4 of 7 by their peers.

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

Course Map: Tied to course syllabus objectives.

IET 3150: FLUID POWER
IET 4720: QUALITY CONTROL
EET 4950 or IET 4960: PROJECT DESIGN II

Measure 6.1. (Direct – Knowledge/Skills)

Every spring semester, students' grades on the IET 4720 Test 2 is used to assess the attainment of SLO 6. The acceptable target is 80% of students score C or better on Test 2.

Finding: The target was not met. 14 out of 26 (53.85%) students scored C or better in Test 2 in IET 4720.

Analysis: Acceptable target was not met.

Action - Decision or Recommendation: Incorporating an additional practice opportunity (such as an assignment or quiz) prior to Test 2 will better enable students to perform self-directed professional development.

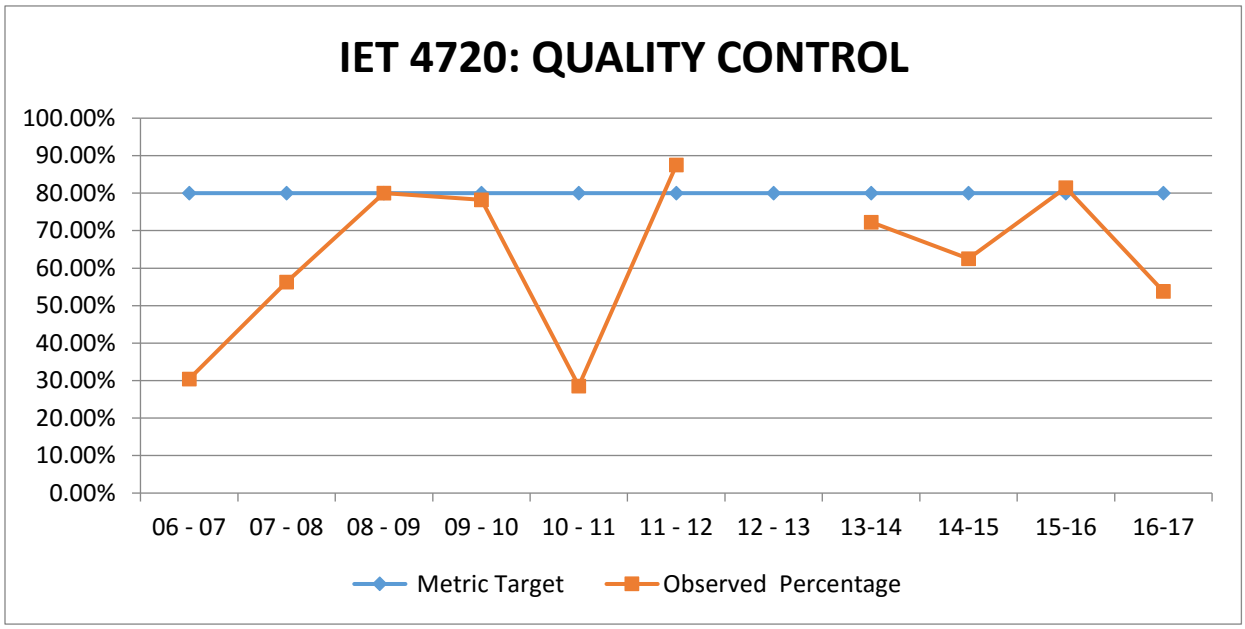

Figure 14. Percentage of students scoring C or better in Test 2.

Measure 6.2. (Direct – Knowledge/Skills)

Every fall semester, students' grades on the IET 3150 Tests 2 and 3 are used to assess the attainment of SLO 6. The acceptable target is 80% of students score C or better on Tests 2 and 3.

Finding: Target met. 22 out of 25 students (88%) scored B or better in Test2, and 24 out of 25 (96%) students scored B or better in Test3 in fall 16.

Analysis: Over the last two years, student performance has been 100%. This result may be due to year-to-year variation combined with random events. This course will be monitored for the next academic year, and based on student performance, faculty may recommend changing the target.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

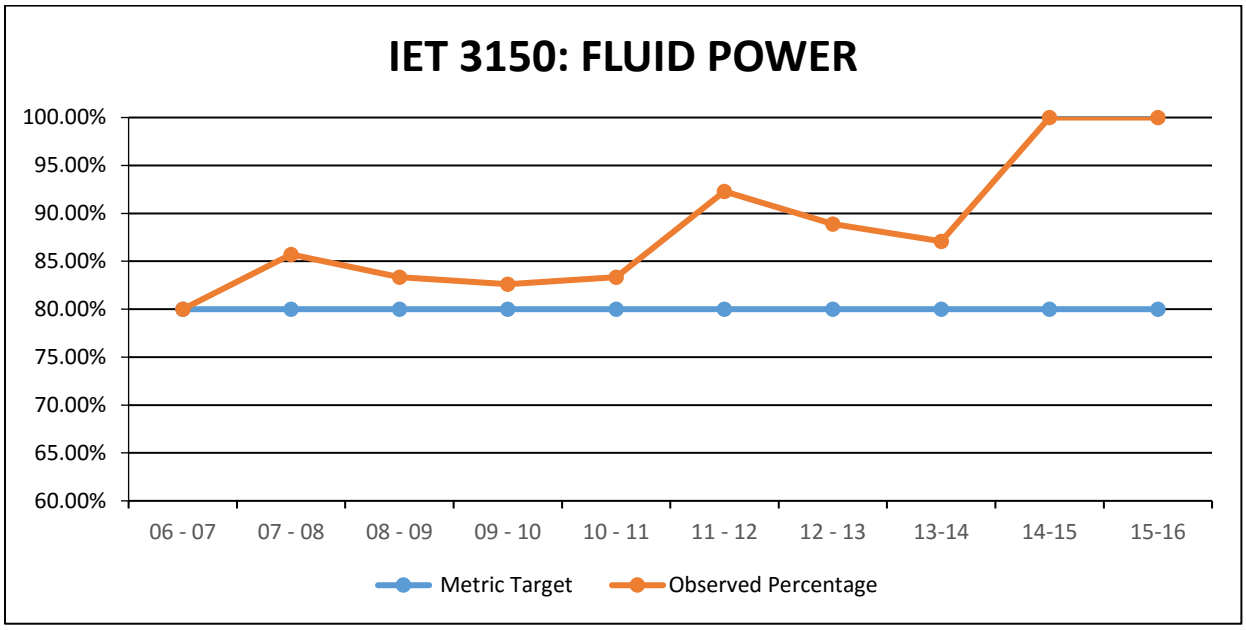

Figure 15. Percentage of students scoring B or better in Tes2 and Test 3.

Measure 6.3. (Indirect – Knowledge/Ability/Skill)

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

Finding: Target met. 9/9 (100%) of students rated 4 or better by faculty on student performance evaluation with respect to ability to perform self-directed professional development in IET 4960 in the fall of 2016 and 13/13 (100%) of students rated 4 or better by faculty on student performance evaluation with respect to ability to perform self-directed professional development in IET 4960 in the spring of 2017

Analysis: Students' performance in Project Design II has been very consistent (100%) for the past several years in a row. A possible change in target performance will be discussed in the Industrial Advisory Committee in the fall of 2017, and the decision will be made based on the committee's recommendation. A possible change in target performance will be discussed by the Industrial Advisory Committee in the fall of 2017.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

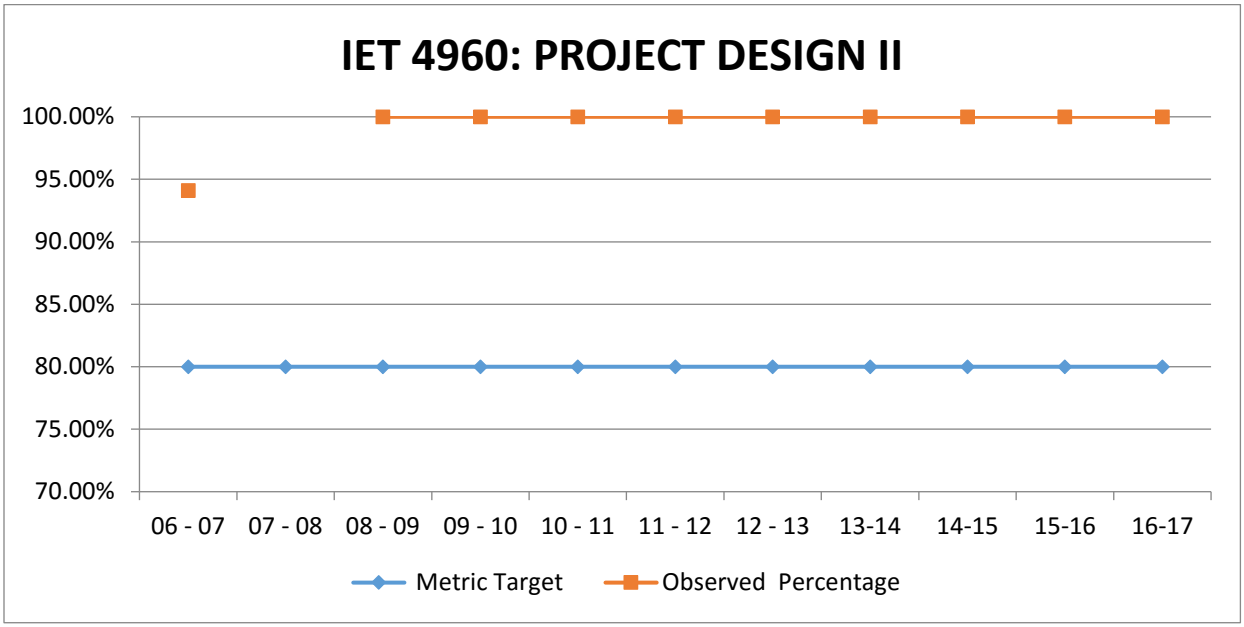

Figure 16. Percentage of students rated 4 or better by faculty on student performance evaluation with respect to ability to perform self-directed professional development.

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

Course Map: Tied to course syllabus objectives.

COMM 1010: FUNDAMENTALS OF SPEECH

ENGL 3320: TECHNICAL COMPOSITION
EET 4940: PROJECT DESIGN I

Measure 7.1. (Direct –Skill)

Every semester, student's final grades on COMM 1010 are obtained through institutional research. The acceptable target is 80% of graduating IET students graded C or better in course COMM 1010.

Finding: Target not met in the fall of 2016. Target met in the spring of 2017. 7 out of 13 (58.84%) of the students graded C or better in course COMM 1010 in the fall of 2016 and 18 out of 20 (90%) of the students graded C or better in course COMM 1010 in the spring of 2017.

Analysis: The average for the academic year is 75.8%. This result is very close to the target of 80%. There is an inconsistency in performance, and it is difficult to get a real picture of student learning across all COMM 1010 classes since this course is taught by

several faculty outside of this department. Since the latest performance has exceeded target by 10%, it is better to wait for some more data in coming semesters. If the persistent under-performance is observed in the future semesters, appropriate measures (e.g., notifying respective department and applying measures to facilitate student-learning experience) will be recommended.

Action - Decision or Recommendation: No program changes were recommended.

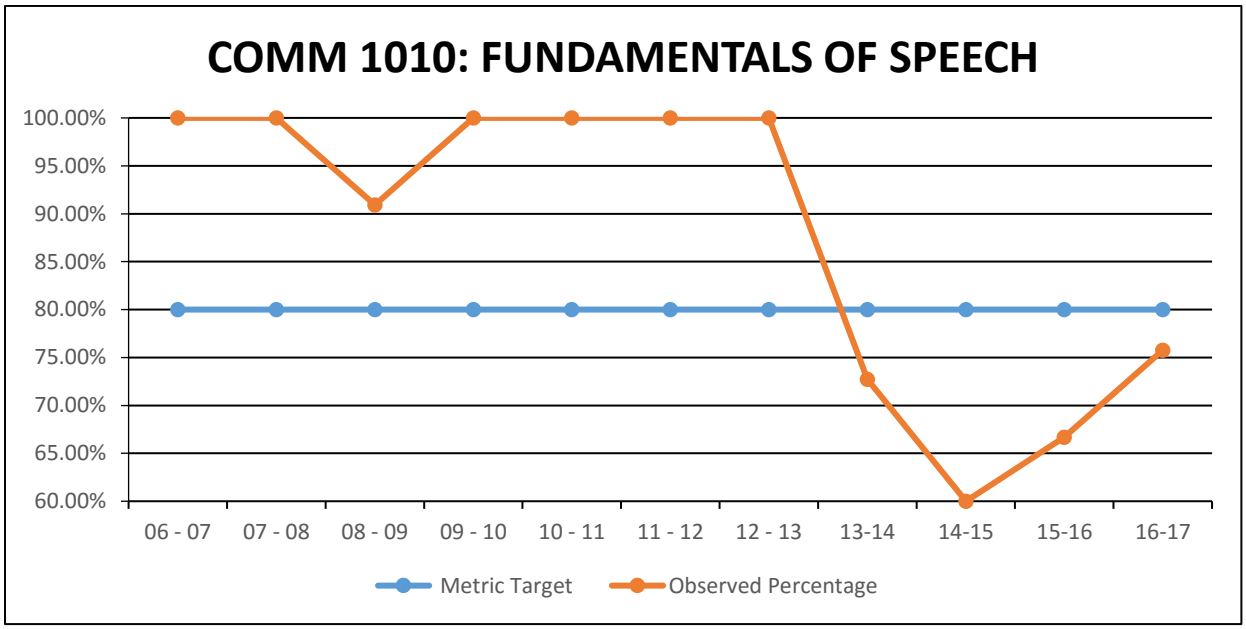

Figure 17. Percentage of students scoring C or better in the course.

Measure 7.2. (Direct –Skill)

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

Finding: Target met. 14 out of 16 (88 %) scored C or better in the fall of 2016 and 13 out of 13 (100 %) scored C or better in the spring of 2017.

Analysis: The performance data is collected at the university level. As per the existing trend, the performance of students has always met the target with a few fluctuations. Until consistent higher performance is observed, the overall performance is satisfactory with no need for immediate changes.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

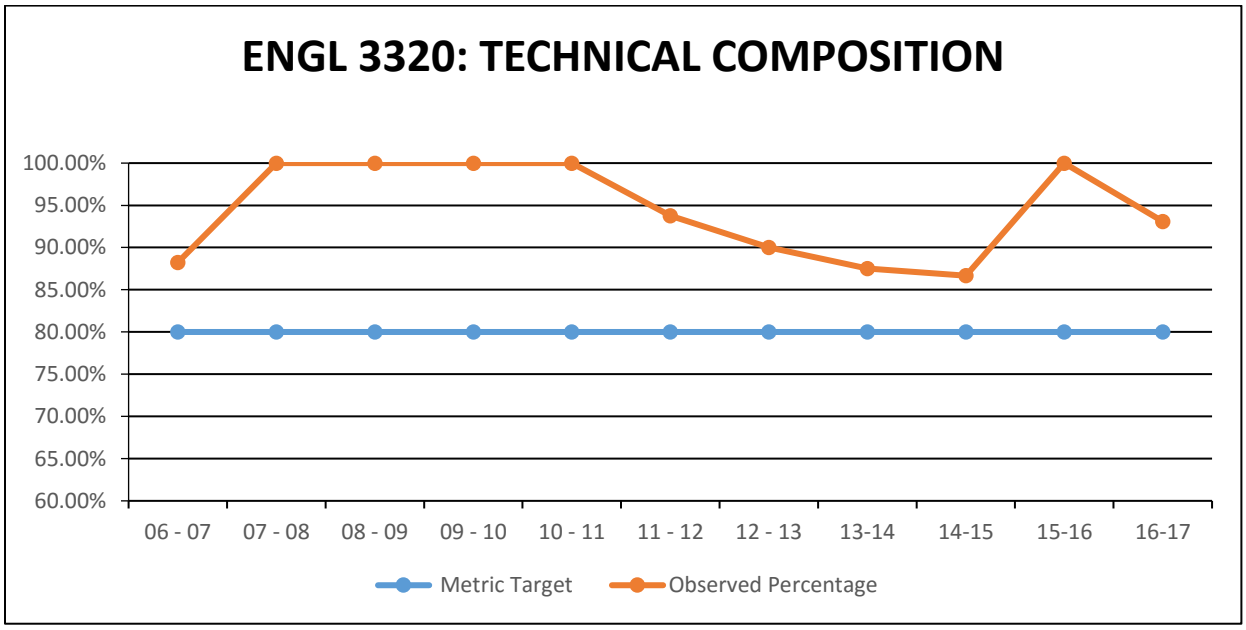

Figure 18. Percentage of students scoring C or better in the course.

Measure 7.3. (Direct – Knowledge/Ability/Skill)

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

Finding: Target met. 13/13 (100%) of students scored C or better on oral presentation and written proposal in EET 4940 in the fall of 2016 and 10/10 (100%) of students scored C or better on oral presentation and written proposal in EET 4940 in the spring of 2017.

Analysis: Fluctuating performance by the students may be attributed to their inexperience in oral presentation in front of the audience (faculty and students). Overall, the performance by students is satisfactory.

Action - Decision or Recommendation: No program changes were recommended.

Assessment Cycle

Academic Year 2016 – 2017

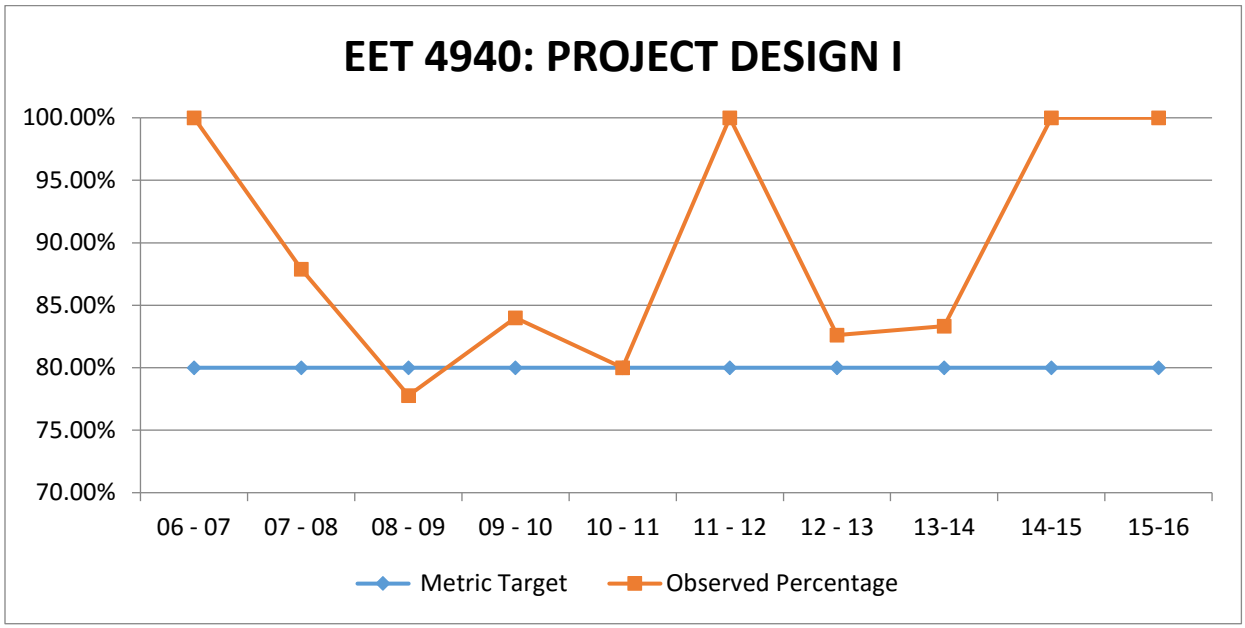

Figure 19.Percentage of student capstone projects evaluated by ET faculty on student performance with respect to oral presentation and written proposal (report).

Summary of key findings and or decisions.

Assessment data for academic year 2016-2017 shows that targets were met or exceeded. One recommendation was made to incorporate additional practice opportunities in one course.

The students' performance charts show the results of assessment over time. The majority of the students' performance indices for all SLOs were found to be satisfactory. There is no need to adjust assessment targets at this time; however, some of the performance indices were at 100% level for several years in a row. A possible change in the performance targets will be discussed in the Industrial Advisory Committee in the fall of 2017 and decisions will be made based on the committee's recommendation for each of the performance targets.