– Electronics Engineering Technology –
2014-15 Assessment Report

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Contents

1 Introduction

1.1 Program Location

The Bachelor of Science in Electronics Engineering Technology (BSEET) is offered at the Oregon Tech Wilsonville Campus on the south side of the Portland metropolitan area. The campus is situated in a wooded business park setting among several technology companies including Mentor Graphics, Rockwell Collins, and Xerox. The campus is conveniently located off Interstate 5 and a short walk away from the Wilsonville Station on the Westside Express Service (WES) commuter rail line that connects to Beaverton and the MAX Light Rail. In addition, several of the core courses for the degree and technical electives are available at the Willow Creek Center (WCC) in the Portland Westside to better accommodate degree-seeking professionals working for high-tech companies in the Hillsboro and Beaverton area. The WCC is located in the heart of the high-tech industry cluster (Silicon Forest), minutes away from companies such as Intel, Tektronix, MAXIM, Credence, Lattice, Synopsis, Quorvo, and ESI. Some of the core courses and technical electives are also available online.

1.2 Program Goals and Design

The program is designed to prepare graduates to assume engineering and technology positions in the electronics industry. Graduates of the Electronics Engineering Technology program fulfill a wide range of functions within industry. Bachelor's degree graduates are currently placed in positions such as component and system design, test engineering, product engineering, field engineering, manufacturing engineering, sales or market engineering, and quality control engineering. The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, and M.B.A.s. Employers of Electronics Engineering Technology graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, semiconductor companies, and automated electronic controlled processing companies. Recent graduates have been employed at companies such as MAXIM, Quorvo, Tektronix, MSEI-Biotronik, and Intel.

The BSEET degree at Oregon Tech Wilsonville is especially suited for working professionals with an associate's degree in Electronics Engineering Technology, Microelectronics Technology, or equivalent coursework. Students entering the B.S. degree in Electronics Engineering Technology program by transfer are requested to contact the EET Program Director concerning transfer of technical coursework. An accredited Associate of Applied Science (A.A.S.) degree in Electronics or Microelectronics and Calculus-level math is adequate preparation to start the BSEET upper-division coursework. Alternatively, students can transfer into the program after completing college-level coursework on DC circuit analysis, AC circuit analysis, combinational and sequential logic (digital circuits), semiconductor devices, and other technical and general education courses provides adequate preparation. Oregon Tech's BSEET program has articulation agreements with the Electronics and Microelectronics programs at Portland Community College, Clackamas Community College, Chemeketa Community College. It is recommended that students start the advising process with Oregon Tech right after they complete the first year of their A.A.S. degree.

1.3 Program Brief History

The BSEET program at Oregon Tech was first accredited by ABET in 1970. The last ABET accreditation visit took place in Fall 2014.

Oregon Institute of Technology has offered a Bachelor of Science in Electronics Engineering Technology (BSEET) degree since 1970. The EET program served a need in the state for many years and was successful and highly regarded. Since the 1990's industries' needs began to shift more towards hiring graduates of full electrical engineering programs and the BSEET program started to experience significant enrollment declines. A department committee, in consultation with the industry advisory board, recommended that the program change from EET to EE in Klamath Falls, but continue as the BSEET program at OIT-Portland to continue serving degree completion students and working professionals with A.A.S. EET degrees. Once the decision to discontinue the BSEET program from Klamath Falls was made, the BSEET program underwent a major revision in order to optimize it to address the needs of working professionals and transfer students at OIT-Portland. These revisions were approved by the Curriculum Planning Commission (CPC) in 2008. In 2011, a decision was made by the department, in consultation with the industry advisory board, to enhance the upper division EET curriculum by converting some of the EET courses to traditional EE courses with a strong lab component. This change was implemented to better achieve the program educational objectives of preparing graduates to assume diverse roles in the engineering and engineering technology fields, as well as improve their access to graduate education. These changes were approved by the Curriculum Planning Commission (CPC) in 2011 and implemented in the 2011-12 academic year.

In Fall 2012 the Oregon Tech Wilsonville campus opened as a result of the consolidation of the university's four Portland metro area sites. The BSEET courses are offered at the Wilsonville campus, and they also continue to be offered at the Willow Creek Center (on the Westside), in order to accommodate professionals working in the high-tech industry cluster in the Beaverton/Hillsboro area. In Fall 2012, a partnership with Portland State University (PSU) was launched, which provides a path for students to complete the BSEET program at Oregon Tech, and gain direct admission to PSU's MS Electrical and Computer Engineering program by meeting a set of specified requirements. Both programs are co-located at the Willow Creek Center.

The BSEET program also has strong relationships with industry, particularly through its program-level Industry Advisory Committee and alumni from the EET program. These relationships allow the BSEET program to meet a third institutional mission objective, "Develop and maintain partnerships with public and private institutions, business and industry, and government agencies to ensure quality programs that meet the needs of students and the organizations that employ them."

2 Program Mission, Educational Objectives, and Outcomes

2.1 Program Mission

The mission of the EET Program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electronics. The department will be a leader in providing career ready candidates for various electronics technology fields. Faculty and students will engage in applied research in emerging technologies and provide professional services to their communities.

2.2 Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of OIT's Bachelor of Science in Electronics Engineering Technology are:

- The graduates of the program will possess a strong technical background as well as analytical and problem solving skills, and will contribute in a variety of technical roles within the electronics and high-tech industry. Within three years of graduation, BSEET graduates are expected to be employed as test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, and similar engineering technology positions within this industry.
- The graduates of the program will be working as effective team members with excellent oral and written communication skills, assuming technical and managerial leadership roles throughout their career.
- The graduates of the program will be committed to professional development and lifelong learning by engaging in professional and/or graduate education in order to stay current in their field and achieve continued professional growth.

2.3 Relationship Between Program Educational Objectives and Institutional Objectives

The BSEET PEOs map strongly to the mission and core themes for the university. Specifically, the program objective relating to "strong technical background as well as analytical and problem solving skills" is tightly linked to the mission of offering "rigorous applied degree programs" in a "hands-on learning environment, focusing on application of theory to practice."

2.4 Program Outcomes

The BSEET Program Outcomes include ABET's ETAC $a - k$ outcomes as well as the electronics specific $l - n$ outcomes. These are listed below:

a an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.

b an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.

c an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.

d an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.

e an ability to function effectively as a member or leader on a technical team.

f an ability to identify, analyze, and solve broadly-defined engineering technology problems.

g an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.

h an understanding of the need for and an ability to engage in self-directed continuing professional development.

i an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.

j a knowledge of the impact of engineering technology solutions in a societal and global context.

k a commitment to quality, timeliness, and continuous improvement.

l the ability to analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems.

m the ability to apply project management techniques to electrical/electronic(s) systems.

n the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of electrical/electronic(s) systems.

3 Cycle of Assessment for Program Outcomes

3.1 Introduction and Methodology

Assessment of the program outcomes is conducted over a three year-cycle. Table 1 shows the outcomes assessed each year. The assessment cycle was changed during the 2014/15 assessment year. This change was implemented at an assessment coordination meeting on February 2, 2014. At this meeting, assessment coordinators representing each program within the Electrical Engineering and Renewable Energy (EERE) department aligned their assessment cycles so that each program assesses similar outcomes on the same years. The intention for this change is to better organize the assessment process and produce more meaningful data for comparison between different programs in the EERE Department.

As a second change, effective this year (2014/15) the assessment year runs Spring through Winter. In previous years, the assessment year ran Fall through Spring. This change reflects a shift on an institutional level to begin data collection in the spring term. In 2012-13 the Assessment Commission Executive Committee began recommending this new timeline, in order to give sufficient time for all the yearly assessment data to be reviewed and the assessment report generated by the end of Spring term, to meet the institutional assessment deadlines.

3.2 Assessment Cycle

Table 1: BSEET Student Outcome Assessment Cycle

Outcome	2014/15	2015/16	2016/17
a. Fundamentals	–	–	√
b. Application	√	–	–
c. Experimentation	–	√	–
d. Design	√	–	–
e. Teamwork	√	–	–
f. Problem Solving	–	–	√
g. Communication	–	–	√
h. Lifelong Learning	–	–	√
i. Eithics	–	√	–
j. Impact	–	√	–
k. Continuous Improvement	√	–	–
l. Electronic Systems	–	√	–
m. Project Management	–	–	√
n. Advanced Mathematics	√	–	–

3.3 Summary of Assessment Activities & Evidence of Student Learning

3.3.1 Introduction

The Electronics Engineering Technology faculty members conducted formal assessment of five student outcomes during the 2014-2015 academic year using direct measures such as course projects and assignments. Additionally, indirect assessment of student outcomes a–n was conducted via a senior exit survey.

3.3.2 Methodology for Assessment of Program Outcomes

At the beginning of the assessment cycle, an assessment plan was generated by the Assessment Coordinator in consultation with the faculty. This plan included the outcome to be assessed during that assessment cycle, as well as the courses and terms in which these outcomes will be assessed.

The BSEET assessment process uses assignments and projects in BSEET courses specifically to assess programmatic student outcomes. These assignments are assessed based on rubrics created by Oregon Tech BSEET faculty. A systematic, rubric-based process is used to assess the level of attainment of a given program outcome, based on a set of performance criteria. The work produced by each student is evaluated according to the different performance criteria, and assigned a level of 1-developing, 2-accomplished, or 3-exemplary. The results for each outcome are then summarized in a table, and reviewed by the faculty at the annual Closing-the-Loop meeting. The acceptable performance level is to have at least 80% of the students obtain a level of accomplished or exemplary in each of the performance criteria for any given program outcome. If any of the direct assessment methods reflects a performance below the established level, that triggers the continuous improvement process, where all the direct and indirect assessment measures associated with that outcome are evaluated by the faculty, and based on the evidence, the faculty decides the adequate course of action. The possible courses of action are:

- Collect more data (if there is insufficient data to reach a conclusion as to whether the outcome is being attained or not); this may be the appropriate course of action when assessment was conducted on a class with low enrollment, and it is recommendable to re-assess the outcome on the following year, even if it is out-of-cycle, in order to obtain more data.

- Make changes to the assessment methodology (if the faculty believe that missing the performance target on a specific outcome may be a result of the way the assessment is being conducted, and a more proper assessment methodology may lead to more accurate numbers); for example, this could be the suggested course of action if an outcome was assessed in a lower-level course, and the faculty decide that the outcome should be assessed in a higher-level course before determining whether curriculum changes are truly needed.

- Implement changes to the curriculum (if the faculty conclude that a curriculum change is needed to improve attainment of a particular outcome). A curriculum change will be the course of action taken when the performance on a given outcome is below the target level, and the evidence indicates that there is sufficient data and an adequate

assessment methodology already in place, and therefore there is no reason to question the results obtained.

If the faculty decide to take this last course of action and implement curriculum changes, the data from the direct assessments is analyzed and the faculty come up with a plan for continuous improvement, which specifies what changes will be implemented to the curriculum to improve outcome performance.

In addition to direct assessment measures, indirect assessment of the student outcomes is performed on an annual basis through a senior exit survey.

The results of the direct and indirect assessment, as well as the conclusions of the faculty discussion at the Closing-the-Loop meeting are included in the annual BSEET Assessment Report, which is reviewed by the Department Chair and the Director of Assessment for the university. The suggested changes to the curriculum are presented and discussed with all the department faculty at the annual Convocation meeting in Fall, as well as with the Industry Advisory Board at the following IAB meeting. If approved, these changes are implemented in the curriculum and submitted to the University Curriculum Planning Commission (if catalog changes are required) for the following academic year.

The sections below describe the 2014?15 targeted assessment activities and detail the performance of students for each of the assessed outcomes. The tables report the number of students performing at a developing level, accomplished level, and exemplary level for each performance criteria, as well as the percentage of students performing at an accomplished level or above.

3.3.3 2014-2015 Targeted Assessment Activities

The sections below describe the 2014-2015 targeted assessment activities and detail the performance of students for each of the assessed outcomes. The tables report the number of students performing at a developing level, accomplished level, and exemplary level for each performance criteria, as well as the percentage of students performing at an accomplished level or above.

3.3.4 Targeted Assessment for Outcome b: an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.

This outcome was assessed in EE 321 - Electronics I in Fall 2014 and EE 341 - Electricity and Magnetism with Transmission Lines in Fall 2014.

Outcome (b) : EE 321, Fall 2014, Dr. Cristina Crespo

This outcome was assessed in EE 321 - Electronics I in Fall 2014 by means of a project. The project consisted of designing, simulating, implementing, and experimentally testing an AC-to-DC power supply and linear regulator with current boosting to provide an adjustable

regulated output voltage with short-circuit/overload protection. Students were provided with a series of design specifications and design constraints. Calculation of component values to meet the design specifications, as well as characterization of circuit performance requires the application of mathematical tools. The design, implementation, and integration of the different sub-circuits requires knowledge and application of science and engineering principles. Students were required to write a complete report following the guidelines of the IEEE Transactions Journals (IEEE Transactions Publication-Ready Template and Instructions for Authors).

Eleven BS EET students were assessed in Fall 2014 using the performance criteria listed in the table below. The minimum acceptable performance level was to have above 80% of the students performing at the accomplished or exemplary level in all performance criteria.

Table 2 summarizes the results of this targeted assessment. The results indicate that the minimum acceptable performance level of 80% was met on all performance criteria for this program outcome, that is, over 80% of students were able to apply knowledge of mathematics, science, and engineering to the solution of an engineering problem.

Outcome (b) : EE 341, Fall 2014, Dr. Aaron Scher

This outcome was assessed in EE 341 - Electricity and Magnetism with Transmission Lines in Fall 2014 by means of an in-depth homework assignment on magnetic fields and force. The homework assignment contained nine questions, where students had to select and apply knowledge of mathematics, science, engineering, and technology to applied electromagnetic problems.

A total of six students were assessed in Fall 2014 using the performance criteria listed in Table 2. The minimum acceptable performance level was to have above 80% percent of the students performing at the accomplished or exemplary level in all performance criteria. The results indicate that the minimum acceptable performance level of 80% was met on all performance criteria.

Table 2: Targeted Assessment for Outcome b: 1) Criterion 1-an ability to select and apply a knowledge of mathematics, and 2) Criterion 2-an ability to select and apply a knowledge of science, engineering and technology.

Outcome (b) : EE 321, Fall 2014, Dr. Cristina Crespo

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Mathematics	1	5	5	90.9%
2 - Science/Engr.	1	5	5	90.9%

Outcome (b) : EE 341, Fall 2014, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Mathematics	1	2	3	83.33%
2 - Science/Engr.	1	2	3	83.33%

3.3.5 Targeted Assessment for Outcome d: an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.

This outcome was assessed in is EE325 - Electronics III in Spring 2014 and ENGR465 Capstone Project in Spring 2014.

Outcome (d) : EE 325, Spring 2014, Dr. Cristina Crespo

This outcome was assessed using a project. The project involved the design, simulation, implementation, and characterization of an electronic circuit. Students were required to select an application of interest, and submit a project proposal. Once the project proposal was approved, the students were to design and simulate their electronic circuit, build it on a PCB layout, and experimentally verify and characterize the functionality of their design. Additionally, the students were required to generate a technical poster presentation, and deliver a 10-minute oral presentation of their design and a working demo to the rest of the class. The assessment of the students' ability to design and implement an electronic system was based on the quality of the overall design, as well as the students' ability to effectively do project definition, background research, creative design, simulation/modeling and implementation, test and troubleshoot, and presentation/demo of their work to the rest of the class.

Fourteen BSEET students were assessed in Spring 2014 in the course EE325 Electronics III using the performance criteria listed in Table 3. The minimum acceptable performance level to have above 80% of the students performing at the accomplished or exemplary level was met in all performance criteria.

Outcome (d) : ENGR 465, Spring 2014, Dr. Aaron Scher

This outcome was assessed in the ENGR 465 - Capstone Project, in Spring 2014. The Capstone Project is a year-long (three-term) project that students complete in their senior year, which involves a major design experience. Throughout the year, students are required to complete the definition, design, implementation, and verification of a major engineering design project. During the initial stage, students work under the supervision of their capstone project advisor to select a project of adequate scope, and submit a project proposal.The proposal typically includes an explanation of the project relevance, a project definition or specification, a timeline with major milestones, a list of resources needed to complete the project, and a projected cost analysis. Once the proposal is approved by the academic advisor, students go through the different phases of design, implementation, and verification of their project. During this time, students have regular meetings with their project advisor in order to report progress, notify of plan changes if needed, present results, and perform prototype demonstrations. Once the design, implementation, and verification process is completed, and there is a final working prototype, students are required to generate a poster for inclusion in the annual Student Project Symposium, deliver an oral presentation, and submit a formal written report. These three deliverables are used to determine the students' ability to design systems, components, or processes for broadly-defined engineering

technology problems according to the performance criteria listed in the table below.

A total of four students were assessed in Spring 2014 using the performance criteria listed in Table 3. The minimum acceptable performance level was to have above 80% percent of the students performing at the accomplished or exemplary level in all performance criteria. The results indicate that the minimum acceptable performance level of 80% was met on all performance criteria.

Table 3: Targeted Assessment for Outcome d: 1) Criterion 1- an ability to establish the need and relevance of the project, 2) Criterion 2 - an ability to define the project, 3) Criterion 3 - an ability to gather necessary information, 4) Criterion 4 - an ability to apply creativity in the design of systems, components, or processes, 5) Criterion 5 - an ability to apply modeling techniques and tools to evaluate the design, 6) Criterion 6 - an ability to implement the design, 7) Criterion 7 - an ability to test and troubleshoot the final design, 8) Criterion 8 - an ability to present their design both in oral and written form.

Outcome (d) : EE 325 Spring 2014, Dr. Cristina Crespo

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Relevance	1	9	4	92.9%
2 - Definition	1	10	3	92.9%
3 - Information	0	10	4	100%
4 - Design	1	9	4	92.9%
5 - Modeling	1	9	4	92.9%
6 - Implementation	1	8	5	92.9%
7 - Testing	1	10	3	92.9%
8 - Presentation	2	9	3	85.7%

Outcome (d) : ENGR 465, Spring 2014, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Relevance	0	4	0	100%
2 - Definition	0	4	0	100%
3 - Information	0	2	2	100%
4 - Design	0	4	0	100%
5 - Modeling	0	2	2	100%
6 - Implementation	0	2	2	100%
7 - Testing	0	2	2	100%
8 - Presentation	0	2	2	100%

3.3.6 Targeted Assessment for Outcome e: an ability to function effectively as a member or leader on a technical team.

This outcome was assessed in EE 320 - Advanced Circuits and Systems Analysis in Fall 2014 and EE 321 - Electronics I in Fall 2014.

Outcome (e) : EE 320, Fall 2014, Dr. Aaron Scher

This outcome was assessed in EE 320 -Advanced Circuits and Systems Analysis in Fall 2014 by means a project where students worked in teams to research and present the function of a useful circuit or subcircuit using methods learned in class (frequency response, transfer functions, Laplace technique in circuit analysis, etc.) In addition to the presentation, each student also wrote a one-long page essay describing their experience on the team and how their team functioned in terms of decision-making, member participation, team communication, and meeting management.

A total of seven students were assessed in Fall 2014 using the performance criteria listed in Table 4. The minimum acceptable performance level was to have above 80 % percent of the students performing at the accomplished or exemplary level in all performance criteria. The results indicate that the minimum acceptable performance level of 80 % was met on all performance criteria.

Outcome (e) : EE 321, Fall 2014, Dr. Cristina Crespo

This outcome was assessed in EE 321 - Electronics I in Fall 2014 by means of five lab assignments. At the beginning of the quarter, student teams were created. Each student team consisted of two or three students. Students were required to work as a team to complete the five lab assignments, covering the design, simulation, and experimental test of various electronic circuits. Teams were required to generate and submit a PPT file with their lab results for each lab. Each team was also assigned to do an oral presentation for one of the labs. The presentations were scheduled on the last lab meeting of the term, and student teams were asked to also evaluate the presentations of other teams.

Eleven BS EET students were assessed in Fall 2014 using the performance criteria listed in Table 4. The minimum acceptable performance level was to have above 80% of the students performing at the accomplished or exemplary level in all performance criteria.

Table 4 summarizes the results of this targeted assessment. The results indicate that the minimum acceptable performance level of 80% was met on all performance criteria for this program outcome, that is, over 80% of students showed the required level of proficiency at being able to function as a member or leader on a technical team.

Table 4: Targeted Assessment for Outcome e: 1) Criterion 1- team participation, 2) Criterion 2- team communication, 3) Criterion 3- team decision making, 4) Criterion 4- team management

Outcome (e) : EE 320, Fall 2014, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Participation	0	0	7	100%
2 - Communication	0	0	7	100%
3 - Decision	0	2	5	100%
4 - Management	0	0	7	100%

Outcome (e) : EE 321, Fall 2014, Dr. Cristina Crespo

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Participation	1	5	5	90.91%
2 - Communication	2	3	6	81.82%
3 - Decision	1	6	4	90.91%
4 - Management	1	5	5	90.91%

3.3.7 Targeted Assessment for Outcome k: a commitment to quality, timeliness, and continuous improvement.

This outcome was assessed in is EE 325 - Electronics III in Spring 2014, and ENGR 465 - Capstone Project in Spring 2014.

Outcome (k) : EE 325, Spring 2014, Dr. Cristina Crespo

This outcome was assessed using a project. The project involved the design, simulation, implementation, and characterization of an electronic circuit. Students were required to select an application of interest, and submit a project proposal. Once the project proposal was approved, the students were to design and simulate their electronic circuit, build it on a PCB layout, and experimentally verify and characterize the functionality of their design. Additionally, the students were required to deliver a 10-minute oral slide presentation of their design and a working demo to the rest of the class. The assessment of the students' commitment to quality, timeliness, and continuous improvement was based on the quality of the overall design, the ability of students' to meet all required deadlines and follow the timeline in their project proposal, as well as the design process, including the iterations required to improve the final design and the students' willingness to improve their design, process, or documentation based on the feedback received.

Fourteen students were assessed in Spring 2014 in the course EE325 Electronics III using the performance criteria listed in the table below. The minimum acceptable performance level was to have above 80% of the students performing at the accomplished or exemplary level in all performance criteria.

Table 5 summarizes the results of this targeted assessment. The results indicate that the minimum acceptable performance level of 80% was met on all performance criteria for

this program outcome, that is, over 80% of students showed a commitment to quality, timeliness, and continuous improvement.

Outcome (k) : ENGR 465, Spring 2014, Dr. Aaron Scher

This outcome was assessed in the ENGR 465 - Capstone Project, in Spring 2014. The Capstone Project is a year-long (three-term) project that students complete in their senior year, which involves a major design experience. Throughout the year, students are required to complete the definition, design, implementation, and verification of a major engineering design project. During the initial stage, students work under the supervision of their capstone project advisor to select a project of adequate scope, and submit a project proposal.The proposal typically includes an explanation of the project relevance, a project definition or specification, a timeline with major milestones, a list of resources needed to complete the project, and a projected cost analysis. Once the proposal is approved by the academic advisor, students go through the different phases of design, implementation, and verification of their project. During this time, students have regular meetings with their project advisor in order to report progress, notify of plan changes if needed, present results, and perform prototype demonstrations. Once the design, implementation, and verification process is completed, and there is a final working prototype, students are required to generate a poster for inclusion in the annual Student Project Symposium, deliver an oral presentation, and submit a formal written report. These three deliverables are used to determine the students' commitment to quality, timeliness, and continuous improvement according to the performance criteria listed in the table below.

A total of four students were assessed in Spring 2014 using the performance criteria listed in Table 5. The minimum acceptable performance level was to have above 80 % percent of the students performing at the accomplished or exemplary level in all performance criteria. The results indicate that the minimum acceptable performance level of 80 % was met on all performance criteria.

Table 5: Targeted Assessment for Outcome k: 1) Criterion 1 - commitment to quality, 2) Criterion 2 - timeliness, and 3) Criterion 3 - continuous improvement.

Outcome (k) : EE 325, Spring 2014, Dr. Cristina Crespo

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Quality	2	9	3	86%
2 - Timeliness	2	9	3	86%
3 - Cont. Improvement	1	9	4	93%

Outcome (k) : ENGR 465, Spring 2014, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Quality	0	2	2	100%
2 - Timeliness	0	3	1	100%
3 - Cont. Improvement	0	4	0	100%

3.3.8 Targeted Assessment for Outcome n: the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of electrical/electronic(s) systems.

This outcome was assessed in EE 320 - Advanced Circuits and Systems Analysis in Fall 2014.

Outcome (n) : EE 320, Fall 2014, Dr. Aaron Scher

This outcome was assessed using a mini lab project. The project involved the design, analysis, and implementation of bandpass filters using RLC circuit configurations. Students were required to find the transfer function (using the Laplace Transform), frequency response, impulse response, step response, and ramp response of each of their bandpass filters. Students plotted their responses by hand-sketching and plotting using MATLAB. Students also constructed their circuits and compared experimental results with theory.

Seven students were assessed in Spring 2014 in the course EE 320 - Advanced Circuits and Systems Analysis using the performance criteria listed in Table 6. The minimum acceptable performance level was to have above 80% of the students performing at the accomplished or exemplary level in all performance criteria.

Table 6 summarizes the results of this targeted assessment. The results indicate that the minimum acceptable performance level of 80% was met on all performance criteria for this program outcome.

Table 6: Targeted Assessment for Outcome n: 1) Criterion 1- ability to identify appropriate and relevant concepts of mathematics to solve problems related to electrical/electronic(s) systems, 2) Criterion 2- an ability to apply mathematics to solve problems related to electrical/electronics systems

Outcome (n) : EE 320, Fall 2014, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Identify	0	4	3	100%
2 - Apply	0	3	4	100%

3.3.9 2014-2015 Indirect Assessment

In addition to direct assessment measures, the student outcomes a – n were indirectly assessed through a senior exit survey.

Question 16 in the survey asked students "Below are the ABET student outcomes for the BS EET program. Please indicate how well the EET program prepared you in each of the following areas". Figures 1 and 2 show the results of the indirect assessment of the BSEET student outcomes for the 2014-2015 graduating class.

Seven BSEET graduating seniors completed the survey, with 100% of the respondents indicating that as a result of completing the BSEET program they feel prepared or highly prepared in each of the student outcomes. These results suggest that the BSEET graduating students feel they have attained the BSEET student outcomes, and agree with the direct assessment results (namely, that at least 80% of the students perform at the level of accomplished or exemplary in all performance criteria of the assessed outcomes.)

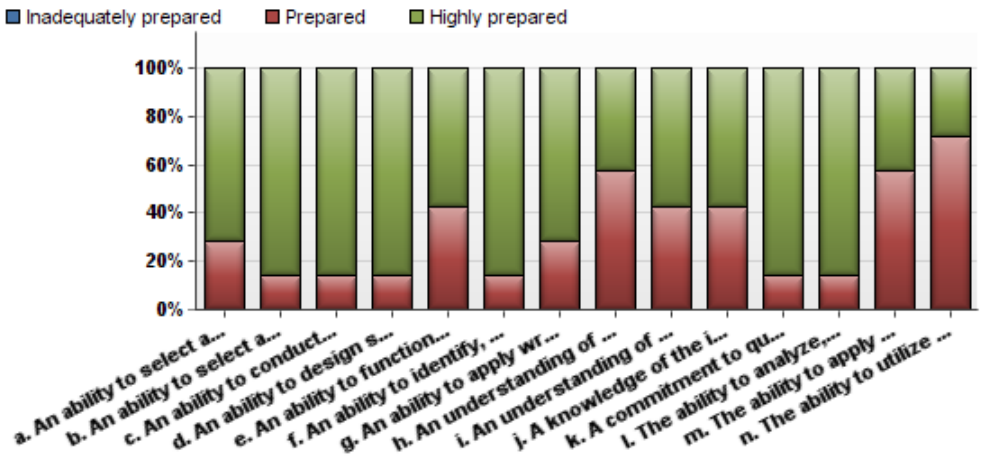

Figure 1: Graph of results of the indirect assessment for the BSEET Student Outcomes as reported in the Senior Exit Survey (AY 2014-15)

Question	Inadequately prepared	Prepared	Highly prepared
a. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.	0	2	5
b. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.	0	1	6
c. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.	0	1	6
d. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.	0	1	6
e. An ability to function effectively as a member or leader on a technical team.	0	3	4
f. An ability to identify, analyze, and solve broadly-defined engineering technology problems.	0	1	6
g. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.	0	2	5
h. An understanding of the need for and an ability to engage in self-directed continuing professional development.	0	4	3
i. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.	0	3	4
j. A knowledge of the impact of engineering technology solutions in a societal and global context.	0	3	4
k. A commitment to quality, timeliness, and continuous improvement.	0	1	6
l. The ability to analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems.	0	1	6
m. The ability to apply project management techniques to electrical/electronic(s) systems.	0	4	3
n. The ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of electrical/electronic(s) systems.	0	5	2

Figure 2: Table of results of the indirect assessment for the BSEET Student Outcomes as reported in the Senior Exit Survey (AY 2014-15)

4 Changes Resulting From Assessment

This section describes the changes resulting from the assessment activities carried out during the assessment year 2014-2015. It includes any changes that have been implemented based on assessment in previous assessment cycles, from this or last year, as well as considerations for the next assessment cycle.

The BSEET faculty met on May 13, 2015 to review the assessment results and determine whether any changes are needed to the BSEET curriculum or assessment methodology based on the results presented in this document. The objective set by the BSEET faculty was to have at least 80% of the students perform at the level of accomplished or exemplary in all performance criteria of the assessed outcomes. Table 7 provides a summary of the 2014-15 assessment results for the outcomes which were directly assessed.

Table 7: Summary of BSEET direct assessment for AY2014-15

	Total Students	Students ≥ 2	% Students ≥ 2
b - Application (Crespo)			
1 - Mathematics	11	10	90.9%
2 - Science/Engr.	11	10	90.9%
b - Application (Scher)			
1 - Mathematics	6	5	83.33%
2 - Science/Engr.	6	5	83.33%
d - Design (Crespo)			
1 - Relevance	14	13	92.2%
2 - Definition	14	13	92.2%
3 - Information	14	14	100%
4 - Design	14	13	92.2%
5 - Modeling	14	13	92.2%
6 - Implementation	14	13	92.2%
7 - Testing	14	13	92.2%
8 - Presentation	14	12	85.7%
d - Design (Scher)			
1 - Relevance	4	4	100%
2 - Definition	4	4	100%
3 - Information	4	4	100%
4 - Design	4	4	100%
5 - Modeling	4	4	100%
6 - Implementation	4	4	100%
7 - Testing	4	4	100%
8 - Presentation	4	5	100%
e - Teamwork (Crespo)			
1 - Particpation	11	10	90.91%
2 - Communicaiton	11	9	81.82%
3 - Design	11	10	90.91%
4 - Management	11	10	90.91%
e - Teamwork (Scher)			
1 - Particpation	7	7	100%
2 - Communicaiton	7	7	100%
3 - Design	7	7	100%
4 - Management	7	7	100%
k - Continuous Improvement (Crespo)			
1 - Quality	15	13	86%
2 - Timeliness	15	13	86%
3 - Cont. Improvement	14	7	93%
k - Continuous Improvement (Scher)			
1 - Quality	4	4	100%
2 - Timeliness	4	4	100%
3 - Cont. Improvement	4	4	100%
n - Advanced Mathematics (Scher)			
1 -Identify	7	7	100%
2 - Apply	7	7	100%

4.1 Changes Resulting from the 2013-2014 Assessment

The results of the 2013-14 Assessment indicate that the minimum acceptable performance level of 80% was met on all performance criteria for all assessed outcomes. Areas of improvement to the curriculum were discussed during the Closing the Loop Meeting in May 2015 with respect to these results. These areas include:

- **Outcome b (Application):**
  - **Results:** The results show that the threshold of attainment of this outcome was exceeded in all performance criteria. These results are consistent with those obtained the last time this outcome was assessed in the 2011-12 assessment cycle.
  - **Recommendation:** The faculty identified no problem with this outcome, and therefore recommended no changes at this time.
- **Outcome d (Design):**
  - **Results:** The results show that the threshold of attainment of this outcome was exceeded in all performance criteria. These results are consistent with those obtained the last time this outcome was assessed in the 2011-12 assessment cycle.
  - **Recommendation:** The faculty identified no problem with this outcome, and therefore recommended no changes at this time.
- **Outcome e (Teamwork):**
  - **Results:** The results show that the threshold of attainment of this outcome was exceeded in all performance criteria. These results are consistent with those obtained the last time this outcome was assessed in the 2011-12 assessment cycle.
  - **Recommendation:** The faculty identified no problem with this outcome, and therefore recommended no changes at this time.
- **Outcome k (Continuous Improvement):**
  - **Results:** The results show that the threshold of attainment of this outcome was exceeded in all performance criteria. These results are consistent with those obtained the last time this outcome was assessed in the 2010-11 assessment cycle.
  - **Recommendation:** The faculty identified no problem with this outcome, and therefore recommended no changes at this time.
- **Outcome n (Advanced Mathematics):**
  - **Results:** The results show that the threshold of attainment of this outcome was exceeded in all performance criteria. These results are consistent with those obtained the last time this outcome was assessed in the 2011-12 assessment cycle.
  - **Recommendation:** The faculty identified no problem with this outcome, and therefore recommended no changes at this time.

4.2 Changes to Assessment Methodology

Based on the discussion at the 2015 BSEET Closing the Loop meeting, the EET faculty have no major recommendations with regards to improving the assessment methodology.