– Electronics Engineering Technology –
2015-16 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, TriQuint, 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, TriQuint, Tektronix, 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 a perfect preparation to start our upper-division coursework. Alternatively, coursework on DC Circuit Analysis, AC Circuit Analysis, Combinational Logic (Digital Circuits), Sequential Logic (Digital Circuits), Semiconductor Devices, and other technical and general education courses provides adequate preparation. Our BSEET program has articulation agreements with the Electronics and Microelectronics programs at Portland Community College, Clackamas Community College, Chemeketa Community College, and Columbia Gorge Community College. It is recommended that students start the advising process with OIT 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.

The BSEET program also has strong relationships with industry, particularly through its program-level Industry Advisory Board 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 Oregon Tech'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 Mission Statement

These program objectives support Oregon Tech's institutional mission statement, which states:

> Oregon Institute of Technology, a member of the Oregon University System, offers innovative and rigorous applied degree programs in the areas of engineering, engineering technologies, health technologies, management, and the arts and sciences. To foster student and graduate success, the university provides an intimate, hands-on learning environment, focusing on application of theory to practice. Oregon Tech offers statewide educational opportunities for the emerging needs of Oregon's citizens and provides information and technical expertise to state, national and international constituents.

2.4 Program Outcomes

The BSEET Program Outcomes include ABET's ETAC $a - k$ outcomes as well as the electronics specific $l - m$ 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 minimum outcomes assessed each year. The assessment cycle was changed during the 2014/15 assessment year from previous years (see Table 2 for the old assessment cycle). 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 2014/15, the assessment cycle begins in the spring. In previous years, the assessment cycle started in the fall. This change reflected a shift on an institutional level to begin data collection in the spring term. In 2012-13 the Assessment Commission Executive Committee began recommending that programs begin data collection for the upcoming year during spring term. This recommendation was based on the fact that many programs found the best courses to embed assessment often fell in spring term. Yet this made it difficult to gather the data for a spring term faculty meeting to review the results and make recommendations for actions.

3.2 Assessment Cycle

Table 1: BSEET 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	√	–	–

Table 2: Old BSEET Outcome Assessment Cycle

Outcome	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14
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 Program Outcomes during the 2015-2016 assessment year using direct measures such as comprehensive ABET Projects and ABET Assignments[1] and targeted ABET Program Outcome Exam Questions. Additionally, the Program Educational Objectives were assessed using indirect measures, namely, surveys of employers and alumni.

3.3.2 Methodology for Assessment of Program Outcomes

The BSEET mapping process links specific tasks within engineering assignments to ABET program outcomes and on to program educational objectives in a systematic way based on ABET rubrics[2]. The program outcomes are evaluated as part of the course curriculum primarily by means of comprehensive ABET assignments specifically designed to measure program-level outcomes in addition to course-level outcomes. These assignments typically involve a short project or lab requiring the student to apply math, science, and engineering principles learned in the course to solve a particular problem requiring the use of modern CAD tools and engineering equipment, working in teams, writing a project report, and giving an oral presentation. ABET assignments are designed to assess several fundamental program outcomes at once. An ABET multi-outcome rubric is used to perform direct assessment of these assignments. A systematic, rubric-based process is then used to quickly assess tasks within assignments and link them directly to a group of program outcomes. Evaluations of these outcomes are then gathered and accounted in outcome-specific tables, analyzed and then individually summarized. Summaries for all outcomes are then compiled

[1] ABET Projects and ABET Assignments refer to projects and assignments especially designed by Oregon Tech BSEET faculty to go beyond the assessment of course outcomes in order to assess more general program-level outcomes including the ABET $a - n$ outcomes.

[2] ABET rubrics refer to rubrics especially designed by Oregon Tech BSEET faculty to assess ABET Projects based on program-level outcomes.

into a comprehensive program outcome summary for each course. The outcome summary is then evaluated for relevance with respect to the program objectives. The summary of outcomes is formatted and organized such that it is suitable for inclusion in an ABET review document.

The mapping process aims to systemize the assessment of engineering coursework, and to provide a mechanism that facilitates the design of engineering assignments that meet the ABET-relevant ("a" through "n") outcomes, particularly those that are more distant from traditional engineering coursework. Rather than considering how the outcomes match the assignment, the assignment is designed to map to the program outcomes.

By assessing multiple outcomes per assignment, the number of assessed assignments may be reduced and assignments become more relevant to the program outcomes, since the assignments are designed with the general program outcomes in mind. Additionally, incorporating multiple outcomes in a single assignment provides for a richer assignment, one that takes into account a wider range of engineering issues.

3.3.3 2015-2016 Targeted Assessment Activities

The sections below describe the 2015-2016 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 c: an ability to conduct standard tests and measruements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.

This outcome was assessed in EE 320 - Advanced Circuits and Systems in Fall 2015 and EE 335 -Advanced Microcontroller Engineering in Winter 2016.

Outcome (c) : EE 320, Fall 2015, Dr. Aaron Scher

This outcome was assessed in EE 320 - Advanced Circuits and Systems in Fall 2015 by means of a design lab. The lab consisted of designing, simulating, building, debugging, and characterizing an active bandpass filter using op amps and finding. Students were asked to find their bandpass filters' impulse response, step response, ramp response, and frequency response from the transfer function. Theoretical results were compared with simulation and experiment. Designing, building, debugging, experimentally characterizing and comparing circuit performance requires the abilities to conduct standard tests and measurements, conduct, analyze, and interpret experiments, and apply experimental results to improve processes.

Four BSEET students were assessed in Fall 2015 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 3 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 (c) : EE 335, Winter 2016, Prof. Allan Douglas

This outcome was assessed in EE 335 - Advanced Microcontroller Engineering in Winter 2016 by means of a hands-on engineering design project, which involved several student teams designing robots to compete in an end-of-term obstacle course challenge. The work was divided into five lab projects; each project focused on a different robot sub-system (wireless communications, motor drive, speed feedback, servo control, and position feedback). Students learned by building microcontroller hardware, interfacing to external devices, writing software to control peripherals, and integrating the sub-systems into one complete system. When integrating and testing, students were asked to record their testing and tuning activies and include waveforms, timing data, verifcation of speed, etc. A total of eight BSEET students were assessed in Winter 2015 in the course EE335 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 two of the three performance criteria (criteria 1 and criteria 3). Criteria 2 had a preformance level of 75%.

Table 3: Targeted Assessment for Outcome c: 1) Criterion 1 - an ability to conduct experiments, 2) Criterion 2- an ability to analyze and interpret experimental results, and 3) Criterion 3 - an ability to apply experimental results to improve processes.

Outcome (b) : EE 320, Fall 2015, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Conduct experiments	0	2	2	100%
2 - Analyze/Interpret	0	2	2	100%
2 - Apply	0	2	2	100%

Outcome (b) : EE 335, Winter 2015, Prof. Allan Douglas

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Conduct experiments	0	4	4	100%
2 - Analyze/Interpret	2	2	4	75%
2 - Apply	0	5	3	100%

3.3.5 Targeted Assessment for Outcome i: an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.

This outcome was assessed in is EE430 - Linear Systems and Digital Signal Processing in Winter 2016

Outcome (i) : EE430, Winter 2016, Dr. Aaron Scher

This outcome was assessed by means of an essay assignment using the IEEE code of ethics. For the first part of the assignment, the students were asked to list three provisions in the professional ethics code that they thought were important, explain why they though the provision was important, and give an example of how their chosen provisions might be applied in a professional situation. For the second part of the assignment, the students were presented with an ethics scenario they might encounter in the workplace. The students were asked to describe the ethical issue(s) involved, describe the parties who are or should be involved in the issue(s), discuss their point(s) of view, describe and analyze possible/alternative approaches to the issue(s), and choose one of the approaches they think is best and explain the benefits and risks. Students were evaluated based on an ABET rubric, which targets different aspects of professional and ethical responsibilities, such as the ability to use the code of ethics for describing ethical issues, describe parties involved and their points of view, analyze possible alternative approaches to an ethical problem, and choose an approach and explain the benefits and risks.

A total of four BSEET students were assessed in Winter 2016 in the course EE430 Linear Systems and Digital Signal Processing 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. The results indicate that the acceptable performance level was reached in two of the three performance criteria (i.e. Criteria 1 and 3). The performance level for Criteria 2 is 75%, which is very close to the minimum acceptable performance level of 80%. These results suggest that most students in the program have an effective understanding and commitment to professional and ethical responsibilities including a respect for diversity.

Table 4: Targeted Assessment for Outcome i: 1) Criterion 1-an ability to use a code of ethics to identify and describe ethical issues, 2) Criterion 2-an ability to identify the different parties involved and understand their points of view, and 3) Criterion 3-an ability to analyze possible alternative approaches and explain their benefits and risks.

Outcome (i) : EE 430 Winter 2016, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Code of Ethics	0	3	1	100%
2 - Parties	1	2	1	75%
3 - Risks & Benefits	0	4	0	100%

3.3.6 Targeted Assessment for Outcome j: a knowledge of the impact of engineering technology solutions in a societal and global context

This outcome was assessed in EE 323 - Electronics II in Winter 2016.

Outcome (j) : EE323, Winter 2016, Bryant Baker

This outcome was assessed in EE 323 - Electronics III in Winter 2015. Students were asked to research and study a past or current engineering or technology solution of their choice, and write a report describing the particular solution and its societal impact. Students were encouraged to use sources such as technology journals (e.g., IEEE Spectrum magazine or IEEE Technology and Society magazine, published by the IEEE Society on Social Implications of Technology, ISSIT), patents related to new products and technologies (available through the US Patent & Trademark Office), or others (newspaper science section, the internet, etc.). The report included a description of the engineering or technology solution, an explanation of the technical problem the particular technology was intended to solve, and a discussion of the societal impact or potential impact brought about by any intended or unintended consequences associated with this technology. A total of four BSEET students were assessed in Winter 2016 in the ourse EE323 - Electronics III using the performance criteria listed in the table below. 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 j: 1) Criterion 1- knowledge of contemporary issues, 2) Criterion 2- an ability to analyze contemporary issues, and 3) Criterion 3- an ability to recognize the historical pretext of contemporary issues.

Outcome (j) : EE 323, Winter 2016, Bryant Baker

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Knowledge	0	3	1	100%
2 - Analysis	0	1	3	100%
3 - Historical	0	1	3	100%

3.3.7 Targeted Assessment for Outcome l: the ability to analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems.

This outcome was assessed in is ENGR465 - Capstone Project in Spring 2015

Outcome (l) : ENGR465, Spring 2015, 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. A total of five students were assessed in Spring 2015 using the performance criteria listed in table listed below. 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. This level was not reached for performance criteria 2.

Table 6: Targeted Assessment for Outcome l: 1) Criterion 1 - an ability to analyze electronic systems, 2) Criterion 2 - an ability to design electronic systems, and 3) - an ability to implement electronic systems.

Outcome (l) : ENGR465, Spring 2015, Dr. Aaron Scher

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students ≥ 2
1 - Analyze	1	3	1	80%
2 - Design	2	3	0	60%
3 - Implement	1	4	0	80%

3.3.8 2015-2016 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 BSEET 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. Note that this data was was also presented in last year's BSEET Assessment report (for 2013-2014). This reflects a slight change in the organization of this report. Since the majority of students graduate in Spring, the BSEET faculty decided it was appropriate to present survey data that includes data collected in the same Spring as that covered by the BSEET Assessment Report. Therefore, next year's BSEET Assessment Report for 2016-17 will present indirect assessment data that is being collected in Spring 2016.

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.)

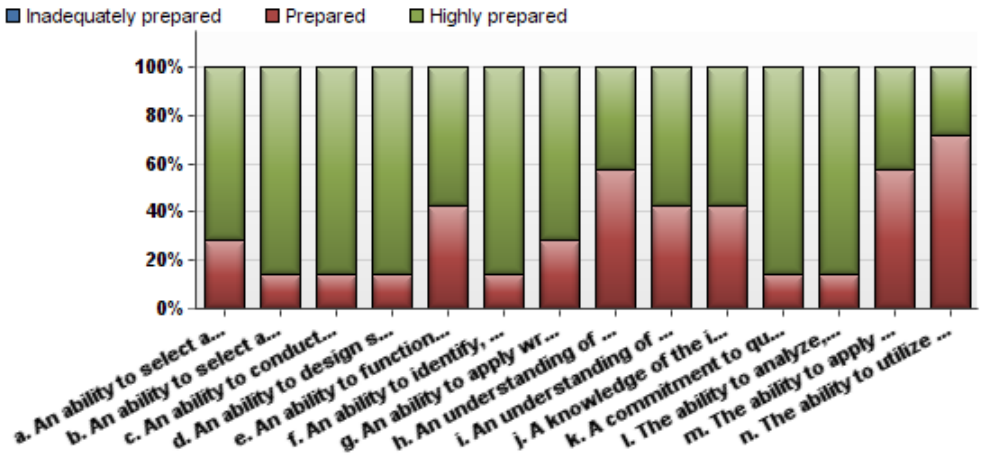

Figure 1: Graph of results of the indirect assessment for the BSEET Student Outcomes as reported in the Senior Exit Survey (AY 2015-16)

4 Changes Resulting From Assessment

This section describes the changes resulting from the assessment activities carried out during the year 2015-2016. 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 June 9, 2016 to review the assessment results and determine whether any changes are needed to the BSEET curriculum or assessment methodology

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)

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 2015-16 assessment results for the outcomes which were directly assessed. This data is seperated into outcomes and courses assessed. Table 8 presents the combined data seperated into outcomes only. This data shows the combined total for each outcome.

Table 7: Summary of BSEET direct assessment for AY2015-16. Data seperated into outcomes and courses assessed

	Total Students	Students ≥ 2	% Students ≥ 2
c - Experimentation (Scher)			
1 - Conduct	4	4	100%
2 - Analyze	4	4	100%
3 - Apply	4	4	100%
c - Experimentation (Douglas)			
1 - Conduct	8	8	100%
2 - Analyze	8	6	75%
2 - Apply	8	8	100%
i - Ethics (Scher)			
1 - Code	4	4	100%
2 - Parties	4	3	75%
3 - Risks	4	4	100%
j - Impact (Baker)			
1 - Knowledge	4	4	100%
2 - Analysis	4	4	100%
3 - Historical	4	4	100%
l - Electronic Systems (Scher)			
1 - Analyze	5	4	80%
2 - Design	5	3	60%
3 - Implement	5	4	80%

Table 8: Summary of BSEET direct assessment for AY2015-16. Data seperated into outcomes only, showing the combined total for each outcome.

	Total Students	Students ≥ 2	% Students ≥ 2
c - Experimentation			
1 - Conduct	12	12	100%
2 - Analyze	12	10	83.33%
3 - Apply	12	12	100%
i - Ethics			
1 - Code	4	4	100%
2 - Parties	4	3	75%
3 - Risks	4	4	100%
j - Impact			
1 - Knowledge	4	4	100%
2 - Analysis	4	4	100%
3 - Historical	4	4	100%
l - Electronic Systems			
1 - Analyze	5	4	80%
2 - Design	5	3	60%
3 - Implement	5	4	80%

4.1 Changes Resulting from the 2015-2016 Assessment

Because of the small sample size, the combined results shown in Table 8 was used for assessment. The results of the 2015-16 Assessment indicate that the minimum acceptable performance level of 80% was not met on all performance criteria for all assessed outcomes. Areas of improvement to the curriculum were discussed during the Closing the Loop Meeting in June 2016 with respect to these results. These areas include:

- **Outcome c (Experimentation):**
  - **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 2013-14 assessment cycle.
  - **Recommendation:** The faculty identified no problem with this outcome, and therefore recommended no changes at this time.
- **Outcome i (Ethics):**
  - **Results:** The results indicate that the acceptable performance level was reached in two of the three performance criteria (i.e. Criteria 1 and 3). The performance level for Criteria 2 is 75%, which is very close to the minimum acceptable performance level of 80%. These results suggest that most students in the program have an effective understanding and commitment to professional and ethical responsibilities including a respect for diversity. These results are consistent with those obtained the last time this outcome was assessed in the 2012-13 assessment cycle.
  - **Recommendation:** The faculty noted that the results were close to the threshold, and that the resolution of these measurements is a effected by the low sample size (i.e., a single measurement moving from the 1 to the 2 category would have yielded a result above the threshold). Therefore, the faculty decided to reassess this outcome next year to increase the sample size. Since Criteria 2 is "an ability to identify different parties involved and understand their points of view", it was decided that the EET Program Director will discuss this issue with Oregon Tech's Department of Communication.
- **Outcome j (Impact):**
  - **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 2012-13 assessment cycle.
  - **Recommendation:** The faculty identified no problem with this outcome, and therefore recommended no changes at this time.
- **Outcome l (Electronic Systems):**
  - **Results:** The results show that the threshold of attainment of this outcome was not met on the design performance criteria. These results show a slight decline in the design performance criteria compared with those obtained the last time this outcome was assessed in the 2012-13 assessment cycle.

– **Recommendation:** The 60% score for the design performance criteria reflects a need for more design skills and experience that has been already noticed by the EET faculty. In response, the EET faculty have started to incorporate more design projects and assignments in existing classes. For example, in Winter 2015 in EE335 - Advanced Microcontroller Engineering, a new hands-on engineering design project was assigned, which involved several student teams designing robots to compete in an end-of-term obstacle course challenge. Students learned by building microcontroller hardware, interfacing to external devices, writing software to control peripherals, and integrating the sub-systems into one complete system. Note that this design project was assigned after the Outcome l assessment data was collected. The faculty are activiely developing more design based assignments and projects - especially in digital and analog electronics courses - and will be assigning these next year.

4.2 Changes to Assessment Methodology

Based on the discussion at the 2016 BSEET Closing the Loop meeting, the EET faculty have no major recommendations with regards to improving the assessment methodology.