

{ Electronics Engineering Technology { 2018-19 Assessment Report

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Contents

1	Introduction	3
1.1	Program Location	3
1.2	Program Goals and Design	3
1.3	Program Brief History	3
2	Program Mission, Educational Objectives, and Outcomes	5
2.1	Program Mission	5
2.2	Program Educational Objectives	5
2.3	Relationship Between Program Educational Objectives and Institutional Mission Statement	5
2.4	Program Outcomes	6
2.5	New Program Outcomes for AY2019-2020 and Later	6
3	Cycle of Assessment for Program Outcomes	7
3.1	Introduction and Methodology	7
3.2	Assessment Cycle	8
3.3	Assessment Plan for AY2019-2020 and Later	8
3.4	Summary of Assessment Activities for AY2019-2020	10

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. The campus is only about a 30 minute drive from high-tech companies in the Hillsboro and Beaverton area 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,

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

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 ("Oregon Tech"), Oregon's public polytechnic university, offers innovative, professionally-focused undergraduate and graduate degree programs in the areas of engineering, health, business, technology, and applied arts and sciences. To foster student and graduate success, the university provides a hands-on, project-based learning environment and emphasizes innovation, scholarship, and applied research. With a commitment to diversity and leadership development, Oregon Tech offers statewide educational opportunities and technical expertise to meet current and emerging needs of Oregonians as well as other 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-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

- 1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
- 2) an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
- 3) an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
- 4) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
- 5) an ability to function effectively as a member as well as a leader on technical teams.

Changes to the ABET outcomes will be sufficiently communicated among different stakeholders (faculty, IAB, students). A mapping between the old ABET ETAC *a-k* outcomes and the new (1)–(5) outcomes are presented in the table below. This mapping is partly based on the document ETAC: Side-by-side comparison posted in an Accreditation Alert from ABET.

Table 1: Mapping between old ABET ETAC *a-k* outcomes and the new (1)–(5) outcomes.

Outcome	(1)	(2)	(3)	(4)	(5)	Notes
a. Fundamentals	ρ	{	{	{	{	{
b. Application	ρ	{	{	ρ	{	And under Criterion 5
c. Experimentation	{	ρ	{	ρ	{	{
d. Design	{	ρ	{	ρ	{	{
e. Teamwork	ρ	{	{	ρ	{	{
f. Problem Solving	ρ	{	ρ	{	{	{
g. Communication	{	{	ρ	{	{	{
h. Lifelong Learning	{	ρ	{	{	{	Omitted
i. Ethics	{	ρ	{	{	{	And under Criterion 5
j. Impact	{	ρ	{	{	{	And under Criterion 5
k. Continuous Improvement	{	{	{	{	{	Moved to Criterion 5
l. Electronic Systems	{	{	{	{	{	Program criteria (curriculum)
m. Project Management	ρ	{	{	{	{	Program criteria (curriculum)
n. Advanced Mathematics	ρ	{	{	{	{	{

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 2 shows the minimum outcomes assessed each year. This assessment is performed using specific assignments, exam questions, and projects that target the particular outcome. A systematic, rubric-based process is then used to assess student attainment of the outcome based on a set of performance criteria. The results of all the assessment activities are then summarized

in an annual assessment report. At the end of each academic year, the program faculty meet to review the assessment data at the annual Closing-The-Loop meeting.

Additionally, all graduating students are asked to fill out an anonymous exit survey. As part of the survey, students are asked to rate their level of attainment of the program outcomes. This provides an indirect assessment measure. The results of this indirect assessment are also included in the assessment report, and evaluated at the Closing-The-Loop meeting.

The Closing-The-Loop meetings provide an opportunity to evaluate and compare assessment results, and discuss whether any changes are needed to the curriculum or to the assessment methodology in order to improve attainment of the outcomes or to improve effectiveness, objectivity, and consistency in the assessment methodology. By comparing assessment results over multiple years, faculty can also ascertain the effect of previous changes to curriculum or assessment methodology on outcome attainment or assessment results.

3.2 Assessment Cycle

The assessment cycle which ends this year is shown in Table 2. Next year, a new assessment cycle will be begin as discussed in the next section.

Table 2: BSEET Outcome Assessment Cycle. Check marks (ρ) indicate standard assessment cycle, daggers (γ) indicate additional assessments performed, check marks with asterisks (ρ^*) indicate assessments that were not performed due to lack of BSEET enrollment in assigned courses.

Outcome	2014/15	2015/16	2016/17	2017/18	2018/19
a. Fundamentals	ρ	{	ρ	ρ	{
b. Application	ρ	ρ	{	ρ	ρ
c. Experimentation	{	{	{	ρ	{
d. Design	ρ	{	{	ρ	γ
e. Teamwork	ρ	{	ρ	{	{
f. Problem Solving	{	{	ρ	{	{
g. Communication	{	{	ρ	γ	{
h. Lifelong Learning	{	ρ	{	{	{
i. Ethics	{	ρ	γ	{	ρ
j. Impact	ρ	ρ	{	ρ^*	ρ
k. Continuous Improvement	ρ	{	{	ρ^*	γ
l. Electronic Systems	{	ρ	ρ	{	ρ
m. Project Management	ρ	{	ρ	ρ	{
n. Advanced Mathematics	ρ	{	γ	ρ	{

3.3 Assessment Plan for AY2019-2020 and Later

Next year (AY2019-2020) the BSEET program will replace ABET *a-n* outcomes with the new ABET (1)-(5) outcomes. During the Closing-The-Loop meeting in October 2019,

the faculty developed a new assessment plan as shown in Table 3. The courses for which each outcome will be assessed are indicated. Under this plan, we will assess all new ABET (1)-(5) outcomes in 2019/20, and develop a more detailed assessment schedule at the next Closing-The-Loop meeting in 2020.

Table 3: New BSEET Outcome Assessment Plan for 2019/2020

Outcome	Course	Assignment type
1. Problem solving	ENGR 465	Capstone project
2. Design	ENGR 465	Capstone project
3. Communication	ENGR 465	Capstone project
4. Experimentation	ENGR 465	Capstone project
5. Teamwork	EE 335	Team project

Table 5: 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	2	0	66.67%	
2 - Definition					

3.4.4 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 2019.

Outcome (k) : EE 325, Spring 2019, Dr. Cristina Crespo

This outcome was assessed in the final project for the course, which involved the design of an electronic system. Students were asked to research a variety of applications in electronics, and select a particular project in an area of interest. Students were asked to generate a project proposal, including some background establishing the need/relevance of the project, a project definition (specification), and all the necessary information to implement the project (resources needed, list of components, useful references, etc.). They proposal also needed to include a timeline for the project, as well as projected cost. Students were required to design and implement their project on a PCB board, and deliver a poster and oral presentation with live demo of their design. The overall quality of the design and presentation, the adherence to the timeline, and the ability of students to make incremental improvements using instructor feedback and an iterative design process were used to assess the students' commitment to quality, timeliness, and continuous improvement.

Table 7 summarizes the results of this targeted assessment. The minimum acceptable performance level was to have above 80% of the students performing at the accomplished or exemplary level in all performance criteria. Three BSEET students were assessed. Two of them showed an outstanding level of attainment in this outcome. Despite meeting the project timeline, the other student did not show a satisfactory level of quality or continuous improvement in this project.

Table 7: Targeted Assessment for Outcome k: 1) Criterion 1 - commitment to quality, 2) Criterion 2 - timeliness, and 3) - continuous improvement.

Outcome (k) : EE 325, Spring 2019, Dr. Cristina Crespo

Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% Students	2
1 - Quality	1	0	2	66.67%	
2 - Timeliness	0	1	2	100%	
3 - Cont. Improvement	1	0	2	66.67%	

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

This outcome was assessed in EE 325 - Electronics III in Spring 2019

Outcome (I) : EE 325, Spring 2019, Dr. Cristina Crespo

This outcome was assessed in the final project for the course, which involved the design of an electronic system. Students were asked to research a variety of applications in electronics, and select a particular project in an area of interest, which could involve a control system, instrumentation system, communications system, computer system, or power system. Students were asked to generate a project proposal, including some background establishing the need/relevance of the project, a project definition (specification), and all the necessary information to implement the project (resources needed, list of components, useful references, etc.). Then, students were required to produce an original design for their electronic system. Students were required to: (1) analyze the system using appropriate mathematical methods, (2) simulate their systems using CAD tools and models, (2) construct a physical prototype, and (3) demonstrate the system's operation.

3.4.6 2018-2019 Indirect Assessment

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

The number of BSEET graduates was very low and no exit survey responses were received. The BSEET Program Director has brought this issue to the attention of the Office of Academic Excellence and Assessment.

4 Evaluation and Continuous Improvement

The BSEET faculty met in October 2019 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. Table 9 provides a summary of the 2018-

Table 9: Summary of BSEET direct assessment for AY2018-19.

	1-Developing	2-Accomplished	3-Exemplary	% Students	2
c - Test and measurement					

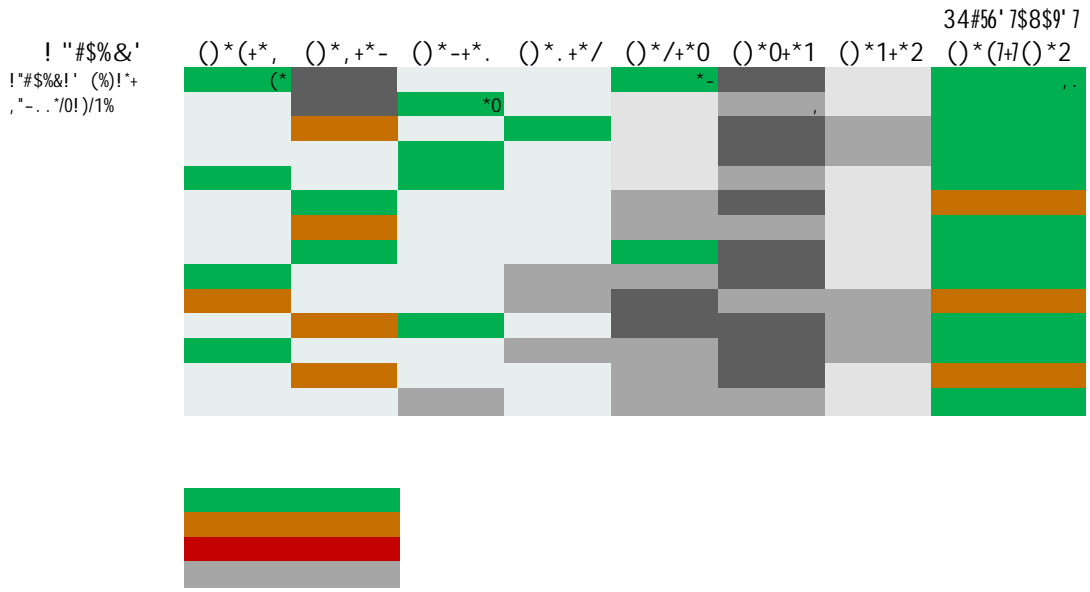


Figure 1: Summary of assessment results from AY 2012-13 to present.