Electrical Engineering
2013–2014 Assessment Report

Mehmet Vurkaç
Department of Electrical Engineering and Renewable Energy

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59 students have graduated from the BSEE program since the beginning. Eleven new BSEE students graduated Spring 2014 (including one dual-major with BSREE). The status of Oregon Tech EE graduates in terms of employment and graduate studies is summarized in Table 2 for graduates of 2010, 2011, 2012, 2013, and 2014.

In 2010, three out of six graduates went on to graduate programs, two at the University of Oregon Applied Physics industrial

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1, 2013	Koam Engineering Systems, Inc., Gig Harbor, WA	Electronics/Electrical Engineer	Systems Engineering & Software Development
2, 2013	Fluent Engineering, Inc., Salem, OIR	[undisclosed]	Project Management
3, 2013	Intel, Hillsboro, OR	Analog Engineer	IC Design & Manufacturing
4, 2013	Black & Veatch, Lake Oswego, OR	Electrical Engineer I	Infrastructure
5, 2013	Intel, Hillsboro, OR	Failure-Analysis Technician	IC Design & Manufacturing
6, 2013	Elcon, Beaverton, OR	Electrical Engineer	Consulting
7, 2013	The Cadmus Group, Portland, OR	Engineering Technician	Consulting
8, 2013	Vanguard EMS, Inc., Beaverton, OR	Test Operator	Military and Aerospace
9, 2013	Vanguard EMS, Inc., Beaverton, OR	Test Supervisor	Military and Aerospace
10, 2013	POWER Testing & Energization, Vancouver, WA	Field Engineer	Power Engineering
11, 2013	POWER Testing & Energization, Vancouver, WA	Engineer I	Power Engineering
12, 2013	POWER Testing & Energization, Vancouver, WA	Engineer I	Power Engineering
13, 2013	USACE Hydroelectric Design Center, Portland, OR	Electrical Engineering-in-Training	Hydroelectric Power
14, 2013	SolenSphere Renewables, Inc., Klamath Falls, OR	CEO	Renewable Energy
[redacted]	[redacted]	[redacted]	[redacted]

The BSEE program has strong relationships with industry, particularly through its program-level Industry Advisory Council (IAC), and through its EE and EET alumni. These relationships with our constituents allow the BSEE program to meet the institutional goal of maintaining the currency of our degree programs.

The IAC has been a mainstay in the development of the EE program since its early EET roots. The IAC provides advice and counsel to the EE program with respect to curriculum content, instructional resources, career guidance and placement activities, accreditation reviews, and professional-development assistance. In addition, each advisory-committee member serves as a vehicle for public-relations information and potentially provides a point of contact for the development of specific opportunities with industry for students and faculty.

The BSEE program is located at both main campuses (Klamath Falls and Wilsonville), serving a large portion of rural Oregon and California, as well as the Portland metropolitan area. Oregon Tech is the only university offering multiple classical engineering degrees at the Bachelor's (and some at the Master's) level in a region ranging from Corvallis, Oregon, in the north, to Chico, California, in the south, and from the Pacific coast in the west to Boise, Idaho, in the east.

The Klamath Falls campus includes a leading geothermal research facility, a large solar facility, and a center for applied research in renewable energy, offering exceptional opportunities for students to gain experience in the subfields of power, energy, and renewable energy. These resources allow students access to research practical experience in geothermal, solar, and other sources of green energy.

The Wilsonville campus offers excellent access to internships and other technological collaboration with the Silicon Forest (as the semiconductor industry in the Portland metropolitan area is known).

This arrangement satisfies the needs of the state of Oregon by placing a traditional EE program in the southern, rural part of the state to serve that region as well as providing a small-school EE program to students who desire a low student-to-faculty ratio and small classes. The EE program also supports the shift at the institution from four-year technology degrees to four-year engineering degrees. The addition of EE completes the College of ETM (Engineering, Technology & Management) along with Oregon Tech's Civil Engineering, Mechanical Engineering, Manufacturing Engineering Technology, and Renewable Energy Engineering programs.

The mission of the Electrical Engineering Bachelor of Science degree 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 electrical engineering.

Program educational objectives (PEOs) are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The PEOs of Oregon Tech's Bachelor of Science in Electrical Engineering program are:

PEO 1: The graduates of the BSEE program will possess a strong technical background as well as analytical, critical-thinking, and problem-solving skills that enable them to excel as professionals contributing to a variety of engineering roles within the various fields of electrical engineering and the high-tech industry.

PEO 2: The graduates of the BSEE program are expected to be employed in electrical-engineering positions including (but not limited to) design engineers, test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, control engineers, and power engineers.

PEO 3: The graduates of the BSEE program will be committed to professional development and lifelong learning by engaging in professional or graduate education in order to stay current in their field and achieve continued professional growth.

PEO 4: The graduates of the BSEE program will be working as effective team members possessing excellent oral and written communication skills, and assuming technical and managerial leadership roles throughout their career.

2.3 Relationship between Program Objectives and the Institutional Mission

The Oregon Tech mission statement is as follows. "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."

The “strong technical background” of PEO 1 corresponds to the rigor required by the institutional mission of Oregon Tech’s degree programs.

The innovative aspect of our degree programs are reflected in the commitment to critical-thinking and problem-solving skills evident in the variety of courses offered and innovative teaching techniques employed throughout the institution as well as within the EE program. Critical thinking is built into the lectures, student work, assignments, and exams of many EE courses like the introductory circuit-analysis sequence, the junior electronics sequence, and senior courses like Communication Systems, as well as general-education courses like SPE 314: Argumentation, HUM 207: Informed Decision Making, and PSY 201/2: Psychology. Likewise, problem-solving is a pervasive aspect of the BSEE from the interdisciplinary course on the introduction to engineering to the often-interdisciplinary senior project.

PEO 2 is aligned with the institution’s mission to fulfill the emerging technology needs of Oregon as the BSEE prepares students to take their place in the work force as design engineers, test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, control engineers, and power engineers.

The institution’s mission emphasizes graduate success along with student success, and this is where the commitment to lifelong learning (PEO 3) aligns with the mission. Furthermore, the mission statement’s specification that “to foster student and graduate success, the university provides and intimate, hands-on learning environment, focusing on application of theory to practice” is also in strong alignment with the BSEE program due to the prominence of small classes, the hands-on focus of the program, and faculty-taught laboratories.

The BSEE student outcomes include ABET’s EAC (a)–(k) student outcomes. The program-specific outcomes (l) and (m) are de-emphasized this year by recommendation of ABET evaluators. What this means is that ABET evaluators have recommended that we focus on the outcomes (a)–

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	2007 –08	2008 –09	2009 –10	2010 –11	2011 –12	2012–13	2013–14	2014–15

(a) Fundamentals

) Fundamentals	•		
) Experimentation		•	
) Design	•		
d) Teamwork	•		
e) Problem-solving			•
f) Ethics		•	
(g) Communication			•
(h) Impact		•	
(i) Independent learning			•
(j) Contemporary issues	•		
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This outcome was assessed via group presentations. Individual students were assessed to the extent possible.

Using the performance criteria listed below, ten students were assessed Fall 2013 (five individually, three in a group, and the remaining two in a group). The minimum acceptable performance level was the usual 80 % of the students performing at the accomplished or exemplary level in each of the performance criteria for this assessment run.

The table below summarizes the results of this targeted assessment. The target performance level was met (and exceeded) in two of the three criteria: 'orally communicating information' and 'acquiring information from many sources'. Performance was below 80% in written communication. The graphical aspect of the students' presentations were mostly excellent, 8 out of 10 students performed at the exemplary level in the graphical aspect.

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Performance Criteria	1-Developing	2-Accomplished	3-Exemplary	% students at level 2 or 3
Orally communicating information	1	3	6	90%

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Outcome met. No further recommendations.

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This outcome was assessed visual observations of students working in the labs (with hardware, software, and firmware—usually at least two of the three) continually throughout the winter term of their senior projects.

Ten students were assessed using the performance criteria listed below. The minimum acceptable performance level was set to have above 80 % of the students performing at the accomplished or exemplary level in each of the performance criteria.

The table below summarizes the results of this targeted assessment. The results indicate that the

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This outcome was assessed via the final exam during the fall term of 2013.

Nine students were assessed using the performance criteria listed below. The minimum acceptable performance level was set to have above 80 % of the students performing at the accomplished or exemplary level in each of the performance criteria.

The table below summarizes the results of this targeted assessment. The results indicate that the minimum acceptable performance level of 80 % was met on criteria 1 and 2, but not on criterion 3.

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All program faculty participated in direct-assessment activities during this pass through the assessment cycle for BSEE. Please note that it was decided at the institution level to adjust the starting and ending terms of upcoming assessment years, starting with this year. As a result, the spring term of 2014 was not part of this assessment cycle. Hence, this report only concerns the fall term of 2013 and the winter term of 2014.

The findings and recommendations from this year's direct assessment activities are summarized in two categories below.

The recommendations are divided into three groups.

1. In terms of assessment practices, the departmental faculty in charge of assessment, under the leadership of chair Dr. Crespo, has determined that for greater reliability, a given outcome should be consistently assessed in the same course (or set of courses), and that this should be the case for both campuses. The following table maps the BSEE outcomes assessed each year to the corresponding courses where assessment for the specific outcome is performed.

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(a) Fundamentals			

students in written communication may be in placing consistent program-wide emphasis on careful use of the by both faculty and students. It was emphasized that this resource conforms to the highest level of American English editorial standards, as well as presenting all examples in a technical, specifically EE and ECE, context. We recommend that the use of the guide

Thirteen BSEE senior-level students

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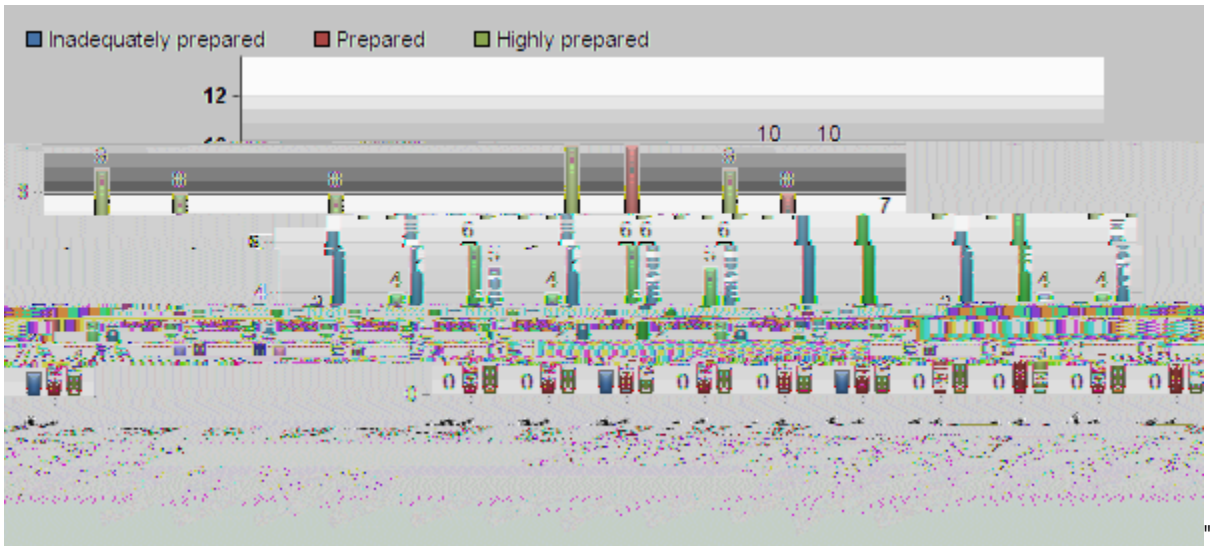

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EE 411: Senior Project I	X	X	X	X	X	X	X	X	X	X	X	X	X
EE 431: Digital Signal Processing	X		X	X	X		X				X		
SPE 321: Small Group and Team Communication				X									

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At Oregon Tech,

arguments and points of view	
Acquiring an interest in learning more by asking questions and seeking answer	(i)

Mapping the IDEA Center Relevant Objectives to program outcomes is justified as follows:

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: Assuming the course material is math-, science- or engineering-based, students who identify with having made progress on learning to apply course material should have the ability to apply that material.

( ), , maps to one IDEA Center objective.

: Analyzing and interpreting data from experiments having to do with engineering design, development, or testing is one of the skills needed in the engineering professions.

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, maps to two IDEA Center objectives.

: The design of systems, components, or processes to meet certain realistic constraints is an excellent example of the application of course material to engineering practices.

: The design of systems, components, or processes to meet certain realistic constraints is one of the fundamental and critical skills engineers must possess.

( ), , maps to one IDEA Center objective.

: Though not specific to teams, this objective does ask students whether they have made progress in acquiring the skills need to function on teams. Students who report having made progress are developing the ability to function on teams. ABET takes this outcome further by requiring evidence of competence in multidisciplinary teamwork, which is captured in much of the department's assessment of senior-projects.

( ), , maps to two IDEA Center objectives.

: The formulation and solution of engineering problems is an application of course material to engineering problems.

: The formulation and solution of engineering problems is another of the fundamental and critical skills engineers must possess.

( ), , maps to two IDEA Center objectives.

the need to conduct assessment in various courses, not just one course for all outcomes,
the need to involve all program faculty in the assessment process, and
the need to obtain a mixture of student class levels (freshman, sophomore, etc.) for outcome assessment.