Electrical Engineering Program
2007-08 Assessment Report

Introduction

The Electrical Engineering program was implemented at the Klamath Falls campus in fall 2007. The initial enrollment during fall 2007 was 36 students.

Program Mission, Objectives and Student Learning Outcomes

During the fall 2007 convocation, the program faculty reviewed and approved the following statements on mission, objectives, and student learning outcomes.

Mission

The mission of the EE 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. The department will be a leader in providing career-ready candidates for the Pacific Northwest Regions electronics engineering fields. Faculty and students will engage in applied research in emerging technologies and provide professional services to their communities.

Educational Objectives

In support of this mission, the department is committed to the following objectives:

1. To provide graduates that possess the engineering design and laboratory skills needed to be immediately employable within broad-based electrical, electronics, computer, semiconductor, optoelectronic, renewable energy and biomedical fields in the Pacific NW region.

2. To ensure that curricular offerings remain current in both theoretical and applied electrical engineering concepts and practices by maintaining active liaison with members of the Industrial Advisory Board, employers of graduates, other industrial leaders, academic colleagues, program alumni and professional organizations.

3. To develop the analytical skills, written and oral communication skills, critical thinking and problem-solving abilities of students so that they may enjoy both vertical and horizontal career mobility after graduation.

4. To prepare graduates to pursue continuing education in electrical engineering, optoelectronics, biomedical engineering, and related disciplines following graduation from OIT and have an awareness of professional and ethical responsibilities of their disciplines.

Expected Student Learning Outcomes

Graduates of our Bachelor of Science in Electrical Engineering program must have:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
(l) knowledge of differential and integral calculus and advanced mathematics including differential equations, linear algebra, vector calculus, complex variables, series and sequences, LaPlace Transforms, Fourier Transforms, and probability and statistics with appropriate applications.
(m) in addition to mathematics, knowledge of basic sciences, computer science, and engineering sciences necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to program objectives.

The program faculty have approved the following three-year cycle for assessment of the student learning outcomes, as shown in Table 1.

EE PROGRAM OUTCOME ASSESSMENT TIMELINE						
SCHOOL YEAR						
PROG OUT	**2007/8**	**2008/9**	**2009/10**	**2010/11**	**2011/12**	**2012/13**
A		X			X	
B	X			X		
C		X			X	
D	X			X		
E	X			X		
F			X			X
G	X			X		
H		X			X	
I			X			X
J			X			X
K	X	X		X	X	
L			X			X
M		X			X	

Table 1. Three Year Cycle for Assessment of EE Student Learning Outcomes

2007-08 Assessment Activities

The new EE program has just started this year, so the course options for assessment were limited. Due to the fact that these courses are entry level freshman courses our expectations were not that high. The Outcomes b, d, e, g and k were assessed this year in either an Introduction to EE Course or Digital Logic design.

Additional details may be found in department assessment records. Appendix A demonstrates the mapping of the student learning outcomes to the EE curriculum map.

Outcome b: an ability to design and conduct experiments, as well as to analyze and interpret data. This outcome was assessed in a freshman level digital logic class in the new EE program in Klamath Falls. It was assessed on some introductory digital labs using CAE Tools and PLD devices. The results are summarized in the table 2 below.

EE OUTCOME SUMMARY FOR: EE-B (EAC-B) An ability to design and conduct experiments, analyze and interpret data and apply results to improve a process (Conduct Labs)									
PERFORMANCE CRITERIA	PERCENTAGE > =2 in a COURSE								AVERAGE
	CRS(207)	CRS(207)	CRS( )	CRS( )	CRS( )	CRS( )	CRS( )	CRS( )	PERCENT
Design an experiment	100%	90%							95%
Conduct an experiment	100%	100%							100%
Analyze experimental data	100%	80%							90%
Interpret experimental data	100%	80%							90%
Apply results to a process	100%	100%							100%
Sample Size	10	10							

Table 2. Assessment results for outcome b

Strengths: The EE program is very application intensive and it is felt that lab performance will be a strength of our program students. The data does support this with high performance marks on all performance criteria (PC) even the design of an experiment which would not be a high priority in a freshman lab.

Weaknesses: None noted at this time but this was just one class with a small sample size.

Recommendations**:** None except to continue checking in the assessment cycle especially on upper division course to see if this trend is consistent.

Outcome d: an ability to function on multi-disciplinary teams

The Teamwork outcome was assessed in the EE101 Introduction to Engineering on a group based project. This was a team building exercise that was intended to build team forming skills in a freshman class (Introduction to Engineering). It was based on an assignment that involved the students designing and testing an enclosure to carry a light bulb on a "drop" from 20 feet. The results are summarized below in table 3.

EE OUTCOME SUMMARY FOR: EE-D (EAC-D) An ability to function on multi-disciplinary teams (Teamwork)									
PERFORMANCE CRITERIA	PERCENTAGE > 2 in a COURSE								AVERAGE
	CRS(101)	CRS	CRS	CRS	CRS	CRS	CRS	CRS	PERCENT
Team Development	58.80%								59%
Team Participation	100.00%								100.00%
Team Communication	100%								100.00%
Reaching a group consensus	100%								100%
Sample Size	19								

Table 3. Assessment results for outcome d

Strengths: The class had good results for all groups (about 4 per team) and interacted well with each other. Most of the groups reached group decisions even though not always unanimous. The group did well on all performance criteria except Team Development. Being that there is only one set of data it is probably too early to draw any sound conclusions yet from this.

Weaknesses: Team development was noted as a weakness but in a freshman class not a concern at this time. In a later course, SPE 321, they will be presented a great deal of instruction on Small Group Communications in this very area.

Recommendations**:** The outcome needs to be assessed again after the students have taken the Small Group Communication class possibly on a senior project team.

Outcome e: an ability to identify, formulate, and solve engineering problems

This outcome was assessed in EE 131, but the assessment was flawed and the data is not useable.

Recommendations: This outcome needs to be evaluated in other courses on various assignments to obtained more data to make a sound evaluation. It would be good to evaluate this outcome over a course sequence such as the three term digital sequence.

Outcome g: an ability to communicate effectively

This outcome was assessed in Winter 2008 in EE102. It should be noted that this is an Introduction to Engineering class and happens before students have a good foundation in speech (SPE 111 Course is later). This included a collection from one oral presentation as shown below in table 5 below.

EE OUTCOME SUMMARY FOR: EE-G (EAC-G) An ability to communicate effectively									
PERFORMANCE CRITERIA	PERCENTAGE > 2 in a COURSE								AVERAGE
	CRS(102)	CRS()	CRS()	CRS()	CRS()	CRS()	CRS()	CRS	PERCENT
Organizing an Oral Presentation	65%								65.00%
Answering Questions(oral)	70%								70.00%
Performance of presentation(oral)	70%								70.00%

Gathering Information	82%								82.00%
Content and Org.(written)	NA								
Techniques (Written)	NA								
Conclusions (Written)	NA								
Sample Size	17								

Table 5. Assessment results for outcome g

Strengths: None.

Weaknesses: The overall performance here was weak on this outcome but this should be expected. The students have not had a good foundation in speech in the program at this point and the results reflect that.

Recommendations: It is recommended that this outcome be assessed again after the students have taken the SPE111 on sophomore or junior classes. It is also suggested that the students be given some guidelines on the assignment to point out some of the expectations.

Outcome k: an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

This outcome was assessed in EE 131, but the assessment was flawed and the data is not useable.

Recommendations: This outcome needs to be evaluated in other courses on various assignments to obtained more data to make a sound evaluation. It was recommended that this outcome be evaluated over a course sequence such as the three term digital sequence.

Summary of Student Learning Outcomes

During the 2007-08 academic year, the EE faculty assessed the student learning outcomes summarized below.

SLO b: an ability to design and conduct experiments, as well as to analyze and interpret data

Strengths: At the freshman level, students demonstrated proficiency for all performance criteria, including designing an experiment, conducting the experiment, analyzing experimental data, interpreting experimental data, and applying the results to a process.

Weaknesses: None at this time.

SLO d: an ability to function on multi-disciplinary teams

Strengths: At the freshman level, students demonstrated proficiency in team participation, team communication, and reaching a group consensus.

Weaknesses: Team development was noted as a weakness.

Action plan: Students at this level have not yet taken SPE 321, Small Group and Team Communication, where they will receive a great deal of instruction. This outcome will be assessed after students have taken SPE 321 in their curriculum.

SLO e: an ability to identify, formulate, and solve engineering problems

Strengths and weaknesses: With only one class assignment to evaluate this outcome it is difficult to declare any strengths of weaknesses. The outcome will be evaluated in other courses on various assignments to be obtain more data to make a sound evaluation.

SLO g: an ability to communicate effectively

Strengths: None.

Weaknesses: At the freshman level, the overall performance was weak on this outcome since students do not yet have a good foundation in speech. This outcome will be assessed again after students have taken SPE 111, Fundamentals of Speech.

SLO k: an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Strengths and weaknesses: With only one class assignment to evaluate this outcome it is difficult to declare any strengths of weaknesses. The outcome will be evaluated in other courses on various assignments to be obtain more data to make a sound evaluation.

Note: This report has been edited (10/19/11) to remove data determined to have been collected using an incorrect process.

Appendix A

PROGRAM OUTCOME CURRICULUM COURSE MAPPING

EE PROGRAM COURSE MATRIX													
COURSE NUMBER	PROGRAM OUTCOMES												
	a	b	c	D	e	f	g	h	I	j	k	l	m
EE 101 (F, FR)				X			X						
EE 102 (W, FR)		X		X		Z	X	Y	Y				
EE 103 (S, FR)		X		X			X	Y	Y		X		
EE 131 (W, FR)											X		
EE 133 (S, FR)		X											
CST 116 (F, SO)													
EE 221 (F, SO)		X										Z	Y
EE 223 (W, SO)											X		
EE 225 (S, SO)	Y	X									X		
EE 321 (F, JR)													Y
EE 323 (W, JR)													
EE 325 (S, JR)													
EE 343 (W, JR)												Z	
EE 311 (F, JR)	Y											Z	
EE 341 (F, JR)	Y												
EE 331 (F, JR)					Z								Y
EE 333 (W, JR)													
EE 335 (S, JR)					Z								
EE ELC (W, JR)													
EE ELC (S, JR)													
EE ELC (F, SR)													
EE 431 (F, SR)												Z	
EE 421 (W, SR)					Z								
EE 401 (S, SR)					Z								
EE 411 (F, SR)			Z										
EE 412 (W, SR)			Z			Z							
EE 413 (S, SR)			Z			Z							
IMGT 345 (S,JR)						Z		Y		Y			

X = 2007/08, Y = 2008/09, Z = 2009/10