Continuous Improvement Report Electrical Engineering 2014-2015 Academic Year

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A. Data

A.1. Focus Group Summary

(Complete minutes available)

Students requested the following:

- Extend Senior Capstone to three quarters
- More projects, less simulation
- Better advising
- Help with tutoring

A.2. Exit survey Summary

(Raw data available upon request)

The table below shows the results of surveying 29 of the graduates in the EE program some time during their Capstone course in the Spring 2015 quarter. Note that students respond to how well they think EWU honed various skills. Each question relates to one of the (a)-(k) criteria.

Electrical Engineering Stu Exit Survey Rate how well you think EWU prepared you to apply mathematics, science, engineering concepts, techniques and modern tools in the field of Electrical Engineering	ıde	nt	Exemplary	Satisfactory	Below Average	Unsatisfactory	Not Applicable
Overall			11	17			1
Rate your ability to apply knowledge of mathematics, science and engineering			12	16	1		
Rate your ability to design and conduct experiments, as well as to analyze and interpret data			12	16	1		
Rate your ability to design a system, component, or process to meet desired needs within realistic constraints			9	17	3		
Rate your ability to identify, formulate, and solve engineering problems			11	16	2		

Rate your ability to keep up with contemporary issues in the field		11	17		1	
Rate your ability to use the techniques, skills, and modern engineering tools in Electrical Engineering		11	15	2		1
Rate how well you think EWU prepared you to develop social and leadership skills such as effective communication skills, team work skills and independent learning ability						
Overall		16	12			1
Rate your ability to function effectively in teams		15	13	1		
Rate your ability to maintain an ethically rigorous record		20	9			
Rate your ability to communicate effectively		19	7	2	1	
Rate your ability to learn independently		12	15	2		
Rate how well you think you understand the impact of professionalism, ethical responsibility, and social, economic, technical and global implications of their engineering contributions		13	11	4		1
Rate your recognition of the need to engage in lifelong learning		22	7			
Rate how well you think EWU prepared you to enter the workforce		8	21			

A.3. Performance Indicators Evaluation Data

According to our assessment plan, in AY 2014-15 we only perform course assessment of outcomes (f), (g), and (h). This data is presented below.

Outcome (f): An understanding of professional and ethical responsibility.

Performance	Unsatisfactory-	Below	Satisfactory-3	Exemplary-
Indicator	1	Average-2		4
Students must	Student scored	Student scored at	Student scored at	Student scored
demonstrate	lower than 60% on	least 60% but less	least 80% but less	greater than
practical	the NSSPE ethics	than 80% on the	than 97% on the	97% on the
knowledge of	quiz.	NSSPE ethics	NSSPE ethics	ethics quiz.
engineering ethics.		quiz.	quiz.	
Students must be	Student did not	Student knew	Student knew	Student was in
able to list the	know anything	what the FE is but	what the FE is and	the process of
requirements for	about the FE.	was uncertain	what the exact	completing or
obtaining the FE.		about the exact	requirements and	had actually
		requirements and	procedures for	completed the
		procedures for	obtaining the FE.	FE.
		obtaining the FE.		
Students must be	Student did not	Student knew	Student knew	Student had
able to list the	know anything	what the PE is but	what the PE is and	made a plan for
requirements for	about the PE.	was uncertain	what the exact	obtaining
obtaining the PE		about the exact	requirements and	his/her PE for
license.		requirements and	procedures for	after they
		procedures for	obtaining the PE.	graduate.
		obtaining the PE.		

PI #1: Students must demonstrate practical knowledge of engineering ethics.

i. Ethics test in capstone course (EENG 490).

Data #i: The following is a series of questions pertaining to the NSPE code of ethics. Please indicate whether the statements are true or false on the separate answer sheet. (questions not shown here) (EENG 490)

	PI#1								
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total			
;	No of Students	3	7	13	8	31			
-	Percentage	10%	23%	42%	26%	100%			
Ach	ievement Metric	10%	23%	42%	26%	100%			

PI #2: Students must be able to list the requirements for obtaining the FE. i. Assignment in capstone (EENG 490).

Data #i: Write an essa	y on how yo	u can obtain ai	n FE license.	(EENG 490)
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	PI#2							
		-	-	-	-	-		
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total		
;	No of Students	3	5	16	7	31		
-	Percentage	10%	16%	52%	23%	100%		
_								
Ach	ievement Metric	10%	16%	52%	23%	100%		

- PI #3: Students must be able to list the requirements for obtaining the PE license.
 - i. Assignment in capstone (EENG 490).

Data #i: Write an essay on how you can obtain a PE license. (EENG 490)

	PI#3							
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total		
;	No of Students	1	6	20	4	31		
I	Percentage	3%	19%	65%	13%	100%		
Acł	nievement Metric	3%	19%	65%	13%	100%		

Summary Graph for Outcome (f)



Performance Indicator	Unsatisfactory -1	Below Average- 2	Satisfactory-3	Exemplary-4
Student must be able to report findings through a written lab report.	Student failed to summarize findings, had an incomplete report, had an excessive number of spelling and/or grammatical mistakes, and used language that was many times incomprehensible.	Student summarized findings and had a complete report, but had several spelling and/or grammatical mistakes, and used language that was many times incomprehensible	Student summarized findings and had a complete report, but had a few spelling and/or grammatical mistakes.	Student summarized findings and had a complete report, used clear and concise language.
Student must be able to describe a circuit/code/ algorithm design through a project report.	Student was unable to describe the circuit/code / algorithm design.	Student was able to list and identify the various circuit/code/ algorithm elements, but unable to explain its workings.	Student was able to correctly identify the various circuit/code / algorithm elements, and to describe most of the circuit/code/ algorithm design techniques used.	Student was able to describe the circuit/code / algorithm design process, as well as explain why the circuit/code/ algorithm behaves the way it does.
Student must be able to prepare presentation slides and employ them to do an oral presentation.	Student presented cluttered slides, with no visual aids, and did not present the material clearly.	Student presented uncluttered slides, but with no visual aids, and did not present the material clearly.	Student presented professional, uncluttered slides, with adequate visual and written content, but did not present the material clearly.	Student presented professional, uncluttered slides, with adequate visual and written content, as well as presented the material in a clear and composed manner.

Outcome (g): An ability to communicate effectively.

PI #1: Student must be able to report findings through a written lab report.

- i. Lab report from Microelectronics 1 (EENG 330).
- ii. Lab report from Signals & Systems (EENG 321).

Data #i: Lab #2: Lab on I/V characteristics of a diode. Students must investigate the effect of temperature variations on the I/V curve. (EENG 330)

Data #ii: Lab report from Lab Experiment 7: Discrete-Time Signals. (EENG 321)

	PI#1								
1									
		atisfactory	w Average	isfactory	emplary	Total			
Data		Unsa	Belo	Sat	EX				
;	No of Students	2	4	15	1	22			
1	Percentage	9%	18%	68%	5%	100%			
	No of Students	2	3	10	1	16			
11	Percentage	13%	19%	63%	6%	100%			
Ach	nievement Metric	11%	18%	65%	5%	100%			

PI #2: Student must be able to describe a circuit/code/algorithm design through a project report.

- i. Circuit description of final project from Digital Circuits (EENG 160).
- ii. Circuit/code/algorithm description of final project from Microcontroller Systems (EENG 260).

Data #i: Final Project Report, Design a 2 Bit Calculator which is able to add/Sub, multiply and compare. (EENG 160)

Data #ii: Final Project Report, section on circuit/code description. Project varies based on student's interests, but it must use at least one of the subsystems of the HC11 microcontroller and interface with external circuitry. (EENG 260)

	PI#2							
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total		
;	No of Students	7	6	25	5	43		
-	Percentage	16%	14%	58%	12%	100%		
	No of Students	3	6	23	8	40		
11	Percentage	8%	15%	58%	20%	100%		
Ach	ievement Metric	12%	14%	58%	16%	100%		

- PI #3: Student must be able to prepare presentation slides and employ them to do an oral presentation.
 - i. Final project presentation in signals & systems (EENG 321).
 - ii. Final project presentation in capstone course (EENG 490).

Data #i: Students worked on term projects of their own choosing. Sample projects include image denoising using a progressive switching median filter, invisible digital watermarking of images, whistle controlled light dimmer, etc. (EENG 321)

Data #ii: Week 4 preliminary design presentations. (EENG 490)

	PI#3								
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total			
i	No of Students	1	4	19	2	26			
1	Percentage	4%	15%	73%	8%	100%			
;;	No of Students	2	3	24	1	30			
11	Percentage	7%	10%	80%	3%	100%			
Act	nievement Metric	5%	13%	77%	6%	100%			



Summary Graph for Outcome (g)

Outcome (h): The broad education necessary to understand the impact of engineering
solutions in a global, economic, environmental, and societal context.

Performance	erformance Unsatisfactor Below S		Satisfactory-3	Exemplary-4	
Indicator	v-1	Average-2	•		
	·	0			
	<u>a</u>				
Student must	Student has no	Student 1s aware	Student can list the	Student can explain	
be able to	awareness of how	that the given	positive and	the different effects	
analyze the	the given	technology has	negative effects of	the technology has in	
effects a given	technology affects	effects in	the technology in	society, as well its	
technology has	society.	society.	society.	evaluate the pros and	
in society.				cons.	
Students must	Student is unable	Student is able to	Student is able to	Student is able to	
outline the	to outline the	identify some of	outline the	outline the	
environmental	environmental	the	environmental	environmental effects	
effects	effects of his/her	environmental	effects of his/her	of his/her capstone	
associated with	capstone project.	effects of his/her	capstone project, but	project, as well as	
their capstone		capstone project.	cannot provide	providing alternatives	
project.			alternatives for	for improvement.	
			improvement.		
Students must	Student is unable	Student is able to	Student is able to	Student is able to	
outline the	to outline the	identify some of	outline the	outline the economic	
economic	economic effects	the economic	economic effects of	effects of his/her	
effects	of his/her	effects of his/her	his/her capstone	capstone project, as	
associated with	capstone project.	capstone project.	project, but cannot	well as providing	
their capstone			provide alternatives	alternatives for	
project.			for improvement.	improvement.	
Students must	Student is unable	Student is able to	Student is able to	Student is able to	
outline the	to outline the	identify some of	outline the global	outline the global	
global effects	global effects of	the global effects	effects of his/her	effects of his/her	
associated with	his/her capstone	of his/her	capstone project, but	capstone project, as	
their capstone	project.	capstone project.	cannot provide	well as providing	
project.			alternatives for	alternatives for	
			improvement.	improvement.	

PI #1: Student must be able to analyze the effects a given technology has in society.

i. Essay from Technology in World Civilizations (TECH 393).

Data #i: Students are asked to select any technology that interests them and write an essay analyzing the effects on society of that technology. (TECH 393)

PI#1						
·		Г	r	-	-	1
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total
	No of Students	3	4	24	6	37
	Percentage	8%	11%	65%	16%	100%
_						
Acł	Achievement Metric 8% 11% 65% 16% 100%					

- PI #2: Students must outline the environmental effects associated with their capstone project.
 - i. "Environmental Effects" section in week 8 deliverable in capstone course (EENG 490).

Data #i: Write a paper describing the global, economical, environmental and societal effects of your project. (EENG 490)

PI#2						
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total
;	No of Students	3	5	23	0	31
	Percentage	10%	16%	74%	0%	100%
Achievement Metric		10%	16%	74%		100%

- PI #3: Students must outline the economic effects associated with their capstone project.
 - i. "Economic impact" section in week 8 deliverable in capstone course (EENG 490).

Data #i: Write a paper describing the global, economical, environmental and societal effects of your project. (EENG 490)

PI#3							
Data		Unsatisfactory	Below Average	Satisfactory	Exemplary	Total	
;	No of Students	1	3	20	7	31	
-	Percentage	3%	10%	65%	23%	100%	
Acł	Achievement Metric 3% 10% 65% 23% 100%						

PI #4: Students must outline the global effects associated with their capstone project.

i. "Global Effects" section in week 8 deliverable in capstone course (EENG 490).

Data #i: Write a paper describing the global, economical, environmental and societal effects of your project. (EENG 490)

PI#4						
		Jnsatisfactory	elow Average	Satisfactory	Exemplary	Total
Data						
	No of Students	4	6	21	0	31
	Percentage	13%	19%	68%	0%	100%
Ach	Achievement Metric 13% 19% 68% 100%					



Summary Graph for Outcome (h)

B. Analysis of Data

The exit survey resulted in no red flags. Students seem to be overwhelmingly happy about the instruction they receive at EWU.

The focus group yielded a few interesting observations. Students like hands-on experience and seem to downplay simulation. There is a fair amount of 'hardware' in the laboratory, but there also is a healthy complement of software simulation. Students would like to see more of the former and less on the latter. Students would also like more flexibility in course offerings, as sometimes they have to wait a year to retake a class. Students would like Senior Capstone to become a three-quarter sequence. It is worth noting that in 2013 we changed this class from a one-quarter class into two quarters.

The PI data analysis will be split up by outcome:

Outcome (f). Outcome was met.Outcome (g). Outcome was met.Outcome (h). Outcome was met.Outcome (i).

C. Summary of Faculty Discussion

At the quarterly/annual faculty meeting, the following issues were discussed.

Issue #1: Students prefer indulging in a few more hands-on experience. (focus group & exit survey)

- Faculty noted that this was discussed in previous years, and the faculty feel comfortable with the current setup.
- Recommendation: Continue monitoring issue.

Issue #2: Some students are not well prepared in circuits/math to complete senior capstone projects (faculty observation)

- We have observed that there is a variety of skills lacking in senior project (and other classes): circuit design skills, mathematical skills, analytical skills, coding skills. There are a variety of reasons for this, but by and large we need to standardize some portions of circuit design (i.e. among all faculty), software (same), etc.
- Recommendation #1: Put a minimum passing grade of 2.0 to the following classes: EENG 209, EENG 260, EENG 330
- Recommendation #2: Make sure that all sections of all core, basic classes have similar grading (this will be done between faculty when teaching classes).

Issue #6: Capstone should be three quarters (focus group & exit survey)

• Faculty believe this is not an issue yet.

• Recommendation: Continue monitoring issue.

D. Recommended Changes

The faculty has agreed to implement the following programmatic changes in the upcoming academic year, 2013-2014.

• Change #1: Submit CPAC forms to make 2.0 minimum requirement for EENG 209, EENG 260, EENG 330