

Electrical Engineering Program 2008-09 Assessment Report

I. Introduction

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

II. Program Mission, Objectives and Student Learning Outcomes

During the fall 2008 convocation, the program faculty reviewed and approved the following statements on mission, objectives, and student learning outcomes.

Mission

The mission of the BSEE 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 program will be a leader in providing career-ready candidates for electrical engineering fields. Faculty and students will engage in applied research in emerging technologies and provide professional services to their communities.

Program Educational Objectives

In support of this mission, BSEE graduates will:

1. Excel as engineering professionals in the various fields and disciplines in electrical engineering.
2. Continue to apply principles of mathematics, science and engineering to solving electrical engineering problems in new and emerging disciplines in the high tech industry.
3. Continue to be known for a commitment to professional development, lifelong learning and social and ethical responsibilities throughout their engineering careers.
4. Excel in areas related to critical thinking, problem solving and effective communication as applied to electrical engineering career assignments.

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.

III. Program Assessment Cycle

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 (Math/Sci)		X			X	
B (LabExp)	X		X			X
C (SysDes)		X			X	
D (Teams)	X	X	X			X
E (ProbSol)	X			X		
F (Ethics)			X			X
G (Comm.)	X			X		
H (Impacts)			X			X
I (LifeLong)				X		
J (Contemp)			X			X
K (EngTools)	X			X		
L (AdvMath)		X			X	
M (EngApps)		X			X	

Table 1. Assessment Cycle

IV. Direct and Indirect Measures for 2008-09

Currently the faculty use performance criteria rubrics on class and lab assignments as direct measures. This is a new program with graduates expected in 2009-10. A senior exit survey and alumni survey is being developed for indirect measures when the program has more graduates (2009-10).

Outcome a: an ability to apply knowledge of mathematics, science, and engineering

This outcome was assessed using tests and quizzes in a sophomore circuit class sequence and a junior class in solid state physics and electromagnetics. Two of the courses are upper division and require a high degree of proficiency in math, science, and engineering.

EE OUTCOME SUMMARY FOR: EE-A (EAC-A) An ability to apply knowledge of mathematics, science and engineering									
PERFORMANCE CRITERIA	PERCENTAGE >=2 in a COURSE ASSIGNMENT								AVE.
	EE225K	EE225K	EE343K	EE343K	EE341K	EE223K	E223P	E223P	PCT.
Use of math, science and engineering principles to predict and analyze solve problems.	100%	67%	83.3%	61%	50%	100%	100%	100%	86.8%
Apply fundamental concepts to solve technical problems	100%	67%	72.2%	72%	50%	100%	100%	94%	84.4%
Sample Size	5	5	18	18	8	8	16	16	

The established program target goal is > 80% of the students performing at a satisfactory level (2) or higher (3). The final column is an average of all the course assignments used for an assessment.

STRENGTHS:

The circuits sequence involved some basic calculus applications and complex algebra and the students were very strong here.

WEAKNESSES

The upper division course assignment involved applying some basic principles of probability and statistics to solid state problems. This is one of the first times the students had been exposed to problems of this type.

RECOMMENDATIONS:

Overall this outcome is being satisfied but there may be some specialized topic areas that need to be watched.

Outcome 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.

This outcome assessment is based on projects and was performed in three junior EE classes that have a project assignment. Some of the courses do not have a project design requirement section assigned as part of the course.

EE OUTCOME SUMMARY FOR:EE-C (EAC-C) An ability to design a system, component or process to meet desired needs								
Within realistic constraints such as economic, environmental, social, political etc. (Major Project)								
PERFORMANCE CRITERIA	PERCENTAGE > =2 in a COURSE ASSIGNMENT							AVERAGE
	(EE331K)	EE(321K)	EE323K	EE323K				PERCENT
Recognition of Need								
Define design problem	NA							
Design Strategy	100%	50%	50%	17%				54%
Gathers Information	100%	50%	50%	17%				54%
Employs models/simulations	100%	50%	50%	17%				54%
Evaluates solutions	62.5%	50%	50%	17%				45%
Selects best design solution	62.5%	50%	50%	17%				45%
Communication/Document								
Sample Size	8	8	6	6				Goal 80%

The established program target goal is > 80% of the students performing at a satisfactory level (2) or higher (3). The final column is an average of all the course assignments used for an assessment.

STRENGTHS:

None but the courses are in a similar cohort of students.

WEAKNESSES:

The two electronic device classes indicate a definite need for a look at project design in a course that is more appropriate to use to assess project design.

RECOMMENDATIONS:

Assign outcome in the next assessment cycle in a senior project class and ensure adequate preparation is given for project design and planning in upper division classes. It was decided that assessing this outcome under standard lab assignments did not provide meaningful results. The project preparation provided in this class is not adequate for the performance criteria.

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

This is a new program and currently this outcome is being assessed in freshman classes before students have had any course background in team work.

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	
	EE101K	EE101K	EE101K	EE102K	EE102K				PERC
Team Development	NA		92%	100%					96%
Team Participation	100%	40%	69%	100%	92%				80%
Team Communication	100%	40%	92%	67%	92%				78%
Reaching a group consensus	100%	100%	92%		92%				96%
Sample Size	18	15	13	12	13				

The established program target goal is > 80% of the students performing at a satisfactory level (2) or higher (3). The final column is an average of all the course assignments used for an assessment.

STRENGTHS:

The student cohort has been together for over one term. They have formed definite study/learning groups and after a teamwork discussion in class (EE102) the students showed a significant improvement at the different performance criteria. The team communication on one assignment was a bit lower than the target but this is a freshman class

WEAKNESSES:

No glaring weakness but a concern on the basic team communication skills but this is expected to improve after some more reinforcing in other classes and the students taking the upper division speech course on group processes.

RECOMMENDATIONS:

Recheck after the student cohort has had a SPE 321 course. No major concern at this point. This outcome will be assessed later in another cycle in upper division courses after students have had adequate preparation and not be assessed in a freshman introduction class.

Outcome 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/statistics to appropriate applications.

This outcome was assessed in sophomore and junior classes. There were collection issues with the data, however, and some of the data is therefore not included.

EE OUTCOME SUMMARY FOR: EE-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/statistics to appropriate applications.								
PERFORMANCE CRITERIA	PERCENTAGE > 2 in a COURSE							AVERAGE
	EE225K	EE225K	EE341K	EE343K	EE223			PERCENT
Utilize Stat./Prob	n/a	n/a	n/a	61%	n/a			61%
Utilize Transform Analysis	n/a	n/a	n/a		n/a			n/a
Utilize Discrete Math					n/a			n/a
Utilize applied differential equations.					n/a			n/a
Sample Size	5	5	8	18	9			Goal 80%

The established program target goal is > 80% of the students performing at a satisfactory level (2) or higher (3). The final column is an average of all the course assignments used for an assessment.

STRENGTHS:

None

WEAKNESSES:

In the solid state course (EE343), only slightly more than half of the students met a satisfactory level on probability and statistics. This is expected due to the sequence of MATH465 Statistics after this course.

RECOMMENDATIONS:

Due to the data collection errors it was decided that this outcome needs assessment in later upper division classes after the math sequences are completed. Probability can be assessed in a senior communication course after the statistics course has been taken.

Outcome m: in addition to mathematics, knowledge of basic science, computer science, and engineering sciences necessary to analyze and design complex electronic devices, software and systems containing hardware and software components as appropriate program objectives.

This outcome was intended to be assessed in a course sequence of EE 333 and EE 335, a microcontroller course sequence. The assessment was not completed in EE 335 and the assessment done in EE 333 was flawed and the data is not useable.

V. Summary of Student Learning

The program faculty met on May 21, 2009. The faculty included Mateo Aboy, Robert Bass, Cristina Crespo, Paul Dingman, Dave Pocock, Marc Timmerman, Tom White and Jamie Zipay.

During the meeting, the current assessment collections and results were discussed. The group also discussed the continuous improvement results from this year based on previous year's recommendations. The results are summarized below.

Outcome a: an ability to apply knowledge of mathematics, science, and engineering

STRENGTHS:

The circuits sequence involved some basic calculus applications and complex algebra and the students were very strong here.

WEAKNESSES

The upper division course assignment involved applying some basic principles of probability and statistics to solid state problems. This is one of the first times the students had been exposed to problems of this type.

RECOMMENDATIONS:

Overall this outcome is being satisfied but there may be some specialized topic areas that need to be watched.

Outcome 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.

STRENGTHS:

None but the courses are in a similar cohort of students.

WEAKNESSES:

The two electronic device classes indicate a definite need for a look at project design in a course that is more appropriate to use to assess project design.

RECOMMENDATIONS:

Assign outcome in the next assessment cycle in a senior project class and ensure adequate preparation is given for project design and planning in upper division classes. It was decided that assessing this outcome under standard lab assignments did not provide meaningful results. The project preparation provided in this class is not adequate for the performance criteria.

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

STRENGTHS:

The student cohort has been together for over one term. They have formed definite study/learning groups and after a teamwork discussion in class (EE102) the students showed a significant improvement at the different performance criteria. The team communication on one assignment was a bit lower than the target but this is a freshman class

WEAKNESSES:

No glaring weakness but a concern on the basic team communication skills but this is expected to improve after some more reinforcing in other classes and the students taking the upper division speech course on group processes.

RECOMMENDATIONS:

Recheck after the student cohort has had a SPE 321 course. No major concern at this point. This outcome will be assessed later in another cycle in upper division courses after students have had adequate preparation and not be assessed in a freshman introduction class.

Outcome l: knowledge of differential and integral calculus and advanced mathematics including diff. equations, linear algebra, vector calculus, complex variables, series and sequences, LaPlace Transforms, Fourier Transforms, and probability/statistics to appropriate applications.

STRENGTHS:

None

WEAKNESSES:

In the solid state course (EE343), only slightly more than half of the students met a satisfactory level on probability and statistics. This is expected due to the sequence of MATH465 Statistics after this course.

RECOMMENDATIONS:

Due to the data collection errors it was decided that this outcome needs assessment in later upper division classes after the math sequences are completed. Probability can be assessed in a senior communication course after the statistics course has been taken.

Outcome m: in addition to mathematics, knowledge of basic science, computer science, and engineering sciences necessary to analyze and design complex electronic devices, software and systems containing hardware and software components as appropriate program objectives.

STRENGTHS:

WEAKNESSES:

RECOMMENDATIONS:

This one needs more data.

**VI. Outcome Continuous Improvement
(Based on Recommendations in 2007-2008 Assessment Report)**

During the 2007-08 academic year, the EE faculty assessed the student learning outcomes and recommended improvements that are summarized below.

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

This was assessed again in the winter term after an in-class discussion was given on teamwork and communication. It involved a team performance on a circuit analysis problem set and presentation to the class.

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	
	EE101K	EE101K	EE101K	EE102K	EE102K				PERC
Team Development	NA		92%	100%					96%
Team Participation	100%	40%	69%	100%	92%				80%
Team Communication	100%	40%	92%	67%	92%				78%
Reaching a group consensus	100%	100%	92%		92%				96%
Sample Size	18	15	13	12	13				

The established program target goal is > 80% of the students performing at a satisfactory level (2) or higher (3). The final column is an average of all the course assignments used for an assessment.

STRENGTHS:

The student cohort has been together for over one term. They have formed definite study/learning groups and after a teamwork discussion in class (EE102) the students showed a significant improvement for the different performance criteria. The team communication on one assignment was a bit lower than the target, but this is a freshman class

WEAKNESSES:

No glaring weakness except a concern on the basic team communication skills, but this is expected to improve after some more reinforcing in other classes and the students taking the upper division speech course on group processes.

RECOMMENDATIONS:

Discontinue checking in a freshman level class. Assess at a more appropriate point in an upper division class.

SLO g: an ability to communicate effectively

This outcome was assessed previously 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).

EE OUTCOME SUMMARY FOR: EE-G (EAC-G) An ability to communicate effectively									
PERFORMANCE CRITERIA	PERCENTAGE > 2 in a COURSE								AVERAGE
	EE102K	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								Goal 80%

The established program target goal is > 80% of the students performing at a satisfactory level (2) or higher (3). The final column is an average of all the course assignments used for an assessment.

STRENGTHS:

None at this point in the program but these are freshman classes that occur before students have had normal course work in a communication course.

WEAKNESSES:

Slightly below the target of 80% but it is expected to improve if assessed in upper division courses.

RECOMMENDATIONS:

Assess during the next scheduled point in the cycle in an upper division course, discontinue assessment in the introduction courses except as a possible point of reference.

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

APPENDIX

OUTCOME CURRICULUM MAP for OUTCOMES A, C, D, L & M

Outcome a: an ability to apply knowledge of mathematics, science, and engineering

TERM	FRESHMAN			SOPHMORE		
Fall	EE101	Intro Engineering		EE221	DC Circuits	R
	MATH251	Diff. Calculus	I	CST116	C++ Programming	I
	CHEM201	Chem I	I	PHY 223	Physics III	I
	CHEM204	Chem I Lab	I	SS Elective	Soc Science Elec	
	WRI121	Comp I				
Winter	EE102	Intro Engineering		EE223	AC Circuits	R
	MATH252	Int. Calculus	I	MATH 321	Diff. Eqns.	I
	EE131	Digital I	I	MATH 341	Linear Alg.	I
	WRI122	Comp II		SS Elective	Soc Science Elec	
	PHY 221	Physics I	I	HUM Elec.	Hum. Elec	
Spring	EE103	Intro Engineering		EE225	LaPlace Trans.	S
	MATH254 N	Vector Calculus	I R	MATH253 N	Sequences/Series	I
	EE133	Digital II		WRI227	Tech Writing	
	PHY 222	Physics II	I	SS Elective	Soc Science Elec	
	SPE 111	Speech		HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

TERM	JUNIOR			SENIOR		
Fall	EE321	Electronics I	S	EE411	Sen. Proj I	S
	EE331	Digital Sys	S	WRI321	Sen. Proj I	
	EE341	Electro/Mag	S	EE431	DSP	S
	IMGT34 5	Eng. Econ.		SPE321	Team Comm.	
				EE Elec	Engineering Elec.	S
Winter	EE323	Electronics II	S	EE412	Sen. Proj II	S
	EE333	Microcont. I	S	WRI322	Sen. Proj II	
	EE343	Solid-State Elec.	S	EE421	Analog Cir Design	S
	EE Elec	Engineering Elec.	S	MATH465	Statistics	I
				MATH/SC I	Math/sci Elec.	I
Spring	EE311	Signals/Systems	S	EE413	Sen. Proj. III	S
	EE325	Electronics III	S	WRI323	Sen. Proj. III	
	EE335	Microcont. II	S	EE401	Communication Sys.	S
	EE Elec	Engineering Elec.	S	SS Elective	Soc Science Elec	
				HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

Outcome 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

TERM	FRESHMAN			SOPHMORE		
Fall	EE101	Intro Engineering	I	EE221	DC Circuits	I
	MATH251	Diff. Calculus		CST116	C++ Programming	I
	CHEM201	Chem I		PHY 223	Physics III	
	CHEM204	Chem I Lab		SS Elective	Soc Science Elec	
	WRI121	Comp I				
Winter	EE102	Intro Engineering	I	EE223	AC Circuits	I
	MATH252	Int. Calculus		MATH 321	Diff. Eqns.	
	EE131	Digital I	I	MATH 341	Linear Alg.	
	WRI122	Comp II		SS Elective	Soc Science Elec	
	PHY 221	Physics I		HUM Elec.	Hum. Elec	
Spring	EE103	Intro Engineering	I	EE225	LaPlace Trans.	I
	MATH254 N	Vector Calculus		MATH253 N	Sequences/Series	
	EE133	Digital II	I	WRI227	Tech Writing	
	PHY 222	Physics II		SS Elective	Soc Science Elec	
	SPE 111	Speech		HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

TERM	JUNIOR			SENIOR		
Fall	EE321	Electronics I	R	EE411	Sen. Proj I	S
	EE331	Digital Sys	R	WRI321	Sen. Proj I	
	EE341	Electro/Mag	I	EE431	DSP	S
	IMGT34 5	Eng. Econ.	I	SPE321	Team Comm.	
				EE Elec	Engineering Elec.	
Winter	EE323	Electronics II	R	EE412	Sen. Proj II	S
	EE333	Microcont. I	R	WRI322	Sen. Proj II	
	EE343	Solid-State Elec.	I	EE421	Analog Cir Design	S
	EE Elec	Engineering Elec.	R	MATH465	Statistics	
				MATH/SC I	Math/sci Elec.	
Spring	EE311	Signals/Systems	I	EE413	Sen. Proj. III	S
	EE325	Electronics III	R	WRI323	Sen. Proj. III	
	EE335	Microcont. II	R	EE401	Communication Sys.	S
	EE Elec	Engineering Elec.	S	SS Elective	Soc Science Elec	
				HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

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

TERM	FRESHMAN			SOPHMORE		
Fall	EE101	Intro Engineering	I	EE221	DC Circuits	R
	MATH251	Diff. Calculus		CST116	C++ Programming	
	CHEM201	Chem I		PHY 223	Physics III	
	CHEM204	Chem I Lab		SS Elective	Soc Science Elec	
	WRI121	Comp I				
Winter	EE102	Intro Engineering	I	EE223	AC Circuits	R
	MATH252	Int. Calculus		MATH 321	Diff. Eqns.	
	EE131	Digital I		MATH 341	Linear Alg.	
	WRI122	Comp II		SS Elective	Soc Science Elec	
	PHY 221	Physics I		HUM Elec.	Hum. Elec	
Spring	EE103	Intro Engineering	I	EE225	LaPlace Trans.	R
	MATH254 N	Vector Calculus		MATH253 N	Sequences/Series	
	EE133	Digital II		WRI227	Tech Writing	
	PHY 222	Physics II		SS Elective	Soc Science Elec	
	SPE 111	Speech		HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

TERM	JUNIOR			SENIOR		
Fall	EE321	Electronics I	R	EE411	Sen. Proj I	S
			R			
	EE331	Digital Sys		WRI321	Sen. Proj I	
	EE341	Electro/Mag		EE431	DSP	
	IMGT34 5	Eng. Econ.	I	SPE321	Team Comm.	I
				EE Elec	Engineering Elec.	R
Winter	EE323	Electronics II	R	EE412	Sen. Proj II	S
			R			
	EE333	Microcont. I		WRI322	Sen. Proj II	
	EE343	Solid-State Elec.		EE421	Analog Cir Design	R
	EE Elec	Engineering Elec.	R	MATH465	Statistics	
				MATH/SC I	Math/sci Elec.	
Spring	EE311	Signals/Systems	R	EE413	Sen. Proj. III	S
			R			
	EE325	Electronics III		WRI323	Sen. Proj. III	
	EE335	Microcont. II	R	EE401	Communication Sys.	R
	EE Elec	Engineering Elec.	R	SS Elective	Soc Science Elec	
				HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

Outcome 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.

TERM	FRESHMAN			SOPHMORE		
Fall	EE101	Intro Engineering		EE221	DC Circuits	I
	MATH251	Diff. Calculus	I	CST116	C++ Programming	
	CHEM201	Chem I		PHY 223	Physics III	
	CHEM204	Chem I Lab		SS Elective	Soc Science Elec	
	WRI121	Comp I				
Winter	EE102	Intro Engineering		EE223	AC Circuits	I
	MATH252	Int. Calculus	I	MATH 321	Diff. Eqns.	I
	EE131	Digital I		MATH 341	Linear Alg.	
	WRI122	Comp II		SS Elective	Soc Science Elec	
	PHY 221	Physics I		HUM Elec.	Hum. Elec	
Spring	EE103	Intro Engineering		EE225	LaPlace Trans.	R
	MATH254 N	Vector Calculus	I	MATH253 N	Sequences/Series	I
	EE133	Digital II		WRI227	Tech Writing	
	PHY 222	Physics II		SS Elective	Soc Science Elec	
	SPE 111	Speech		HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

TERM	JUNIOR			SENIOR		
Fall	EE321	Electronics I	I	EE411	Sen. Proj I	R
	EE331	Digital Sys		WRI321	Sen. Proj I	
	EE341	Electro/Mag	S	EE431	DSP	S
	IMGT34 5	Eng. Econ.		SPE321	Team Comm.	
				EE Elec	Engineering Elec.	
Winter	EE323	Electronics II	I	EE412	Sen. Proj II	R
	EE333	Microcont. I		WRI322	Sen. Proj II	
	EE343	Solid-State Elec.	R	EE421	Analog Cir Design	R
	EE Elec	Engineering Elec.	R	MATH465	Statistics	I
				MATH/SC I	Math/sci Elec.	I
Spring	EE311	Signals/Systems	S	EE413	Sen. Proj. III	R
	EE325	Electronics III	I	WRI323	Sen. Proj. III	
	EE335	Microcont. II		EE401	Communication Sys.	S
	EE Elec	Engineering Elec.	R	SS Elective	Soc Science Elec	
				HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

Outcome M: in addition to mathematics, knowledge of basic science, computer science, and engineering sciences necessary to analyze and design complex electronic devices, software and systems containing hardware and software components as appropriate program objectives.

TERM	FRESHMAN			SOPHMORE		
Fall	EE101	Intro Engineering		EE221	DC Circuits	I
	MATH251	Diff. Calculus	I	CST116	C++ Programming	
	CHEM201	Chem I		PHY 223	Physics III	
	CHEM204	Chem I Lab		SS Elective	Soc Science Elec	
	WRI121	Comp I				
Winter	EE102	Intro Engineering		EE223	AC Circuits	I
	MATH252	Int. Calculus	I	MATH 321	Diff. Eqns.	I
	EE131	Digital I		MATH 341	Linear Alg.	
	WRI122	Comp II		SS Elective	Soc Science Elec	
	PHY 221	Physics I		HUM Elec.	Hum. Elec	
Spring	EE103	Intro Engineering		EE225	LaPlace Trans.	R
	MATH254 N	Vector Calculus	I	MATH253 N	Sequences/Series	I
	EE133	Digital II		WRI227	Tech Writing	
	PHY 222	Physics II		SS Elective	Soc Science Elec	
	SPE 111	Speech		HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage

TERM	JUNIOR			SENIOR		
Fall	EE321	Electronics I	I	EE411	Sen. Proj I	R
	EE331	Digital Sys		WRI321	Sen. Proj I	
	EE341	Electro/Mag	S	EE431	DSP	S
	IMGT34 5	Eng. Econ.		SPE321	Team Comm.	
				EE Elec	Engineering Elec.	
Winter	EE323	Electronics II	I	EE412	Sen. Proj II	R
	EE333	Microcont. I		WRI322	Sen. Proj II	
	EE343	Solid-State Elec.	R	EE421	Analog Cir Design	R
	EE Elec	Engineering Elec.	R	MATH465	Statistics	I
				MATH/SC I	Math/sci Elec.	I
Spring	EE311	Signals/Systems	S	EE413	Sen. Proj. III	R
	EE325	Electronics III	I	WRI323	Sen. Proj. III	
	EE335	Microcont. II		EE401	Communication Sys.	S
	EE Elec	Engineering Elec.	R	SS Elective	Soc Science Elec	
				HUM Elec.	Hum. Elec	

S = Strengthened (Covered strongly)

R = Reinforced (Covered moderately)

I = Introduced (Covered lightly)

Blank = No Coverage