

California State University, Fresno

Department of Electrical and Computer Engineering (ECE)

Graduate Program Assessment

Master of Science in Engineering (MSE) – EE Option and CompE Option

Academic Year 2016-2017

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General Information

The Master of Science in Engineering (MSE) has the following three options:

- Electrical Engineering (EE) option, which is offered by the Electrical and Computer Engineering (ECE) Department
- Computer Engineering (CE) option, which is offered by the Electrical and Computer Engineering (ECE) Department
- Mechanical Engineering (ME) option, which is offered by the Mechanical Engineering Department.

This assessment report has been prepared by the ECE for the EE and CE options only.

It should be noted that the CE-option is relatively new since it started in Fall '12 and its enrollment started to pick up in Fall '15 as reflected in the enrollment data section. It is also worth mentioning that the MSE program is up for a full review during the Fall '17 semester. A comprehensive self-study for the EE and CE options has been prepared and submitted to the Graduate Division. Since that self-study was prepared at the beginning of Fall '16, that self-study didn't include a good portion of the assessment data presented in this annual assessment report.

Mission Statement

The ECE Department has adopted the following mission statement:

The ECE Department offers a quality graduate program that focuses on discovery and experiential learning in Electrical and Computer Engineering to resident students as well as practicing engineers working in the high-tech industries surrounding the Fresno metropolitan area. Graduates of this program shall be better positioned to advance their career and work on complex engineering problems dictated by continuing advances in technology. Additionally, the program seeks to prepare graduates for advanced research and engineering applications to fulfill the technical needs of local industry in the region and beyond.

ECE Graduate Program Goals

The MSE-ECE program prepares students for today's technology driven careers with the following program goals:

- To enhance the students' analytical skills by developing a deeper understanding of major theoretical and practical engineering concepts.
- To improve students' written and oral technical communication skills.
- To increase the level of competence of students for solving practical yet increasingly complex discipline specific engineering problems.
- To develop students' creative thinking skills required in understanding and solving complex engineering problems.

- To allow students to acquire and demonstrate a sufficient depth of knowledge in a substantive area of Electrical and Computer Engineering.

ECE Student Learning Outcomes (SLOs)

A graduate with the EE-option is expected to be able to,

1. apply advanced mathematics and engineering science concepts to practical problems.
2. demonstrate knowledge in advanced electrical engineering subjects and utilize advanced engineering tools to solve engineering problems.
3. utilize modern engineering tools, conduct experiments and analyze collected data (hands-on).
4. communicate effectively orally and in writing.
5. conduct literature searches and formulate ideas via critical thinking practices.

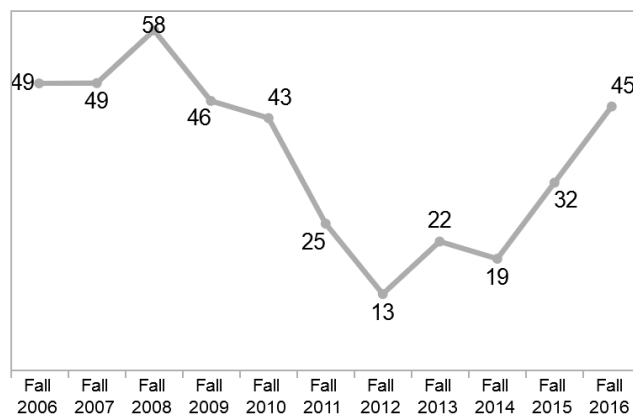
A graduate with the CE-option is expected to be able to,

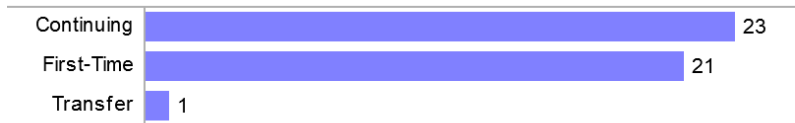
1. apply advanced engineering and software concepts to practical problems.
2. demonstrate knowledge in advanced computer engineering subjects and utilize advanced engineering tools to solve engineering problems.
3. utilize modern engineering tools, conduct experiments and analyze collected data (hands-on).
4. communicate effectively orally and in writing.
5. conduct literature searches and formulate ideas via critical thinking practices.

Enrolment, FTEs and Graduation Data

EE Enrollment

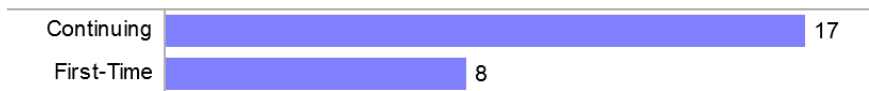
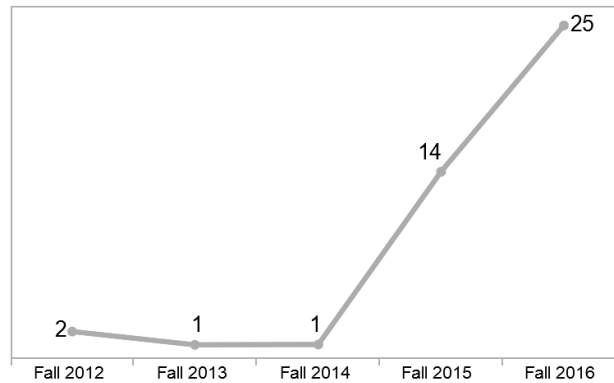
Note: the extension program was terminated in 2011 which explains the drop in enrollment between 2008 and 2011.





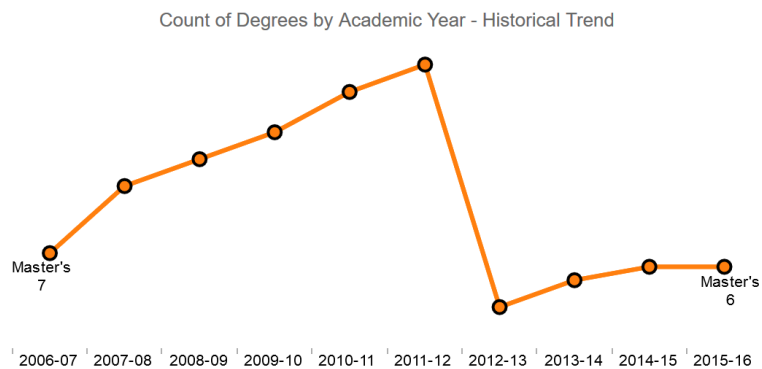
CE Enrollment

Note: The CE-option started in 2011



EE Graduates

Note: Three have graduated in Spring '17



CE Graduates

Eight have graduated in Spring '17

1. What learning outcome(s) did you assess?

All SLOs have been assessed.

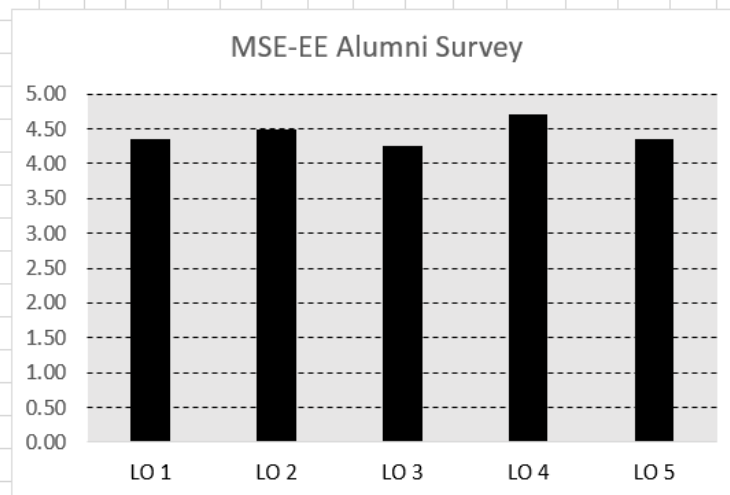
2. What instruments used to assess them?

- Alumni Survey (Indirect Assessment)
- Exit Survey (Indirect Assessment)
- Culminating Experience Evaluation (Direct Assessment)
- Embedded Questions (Direct Assessment)

3. What did you discover from these data?

Alumni Survey (F '16) _ EE-Option

	#1	#2	#3	#4	#5	#6	#6	#8	#9	#10	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20	Average
LO 1	5	5	3	4	5	4	3	5	3	5	4	5	5	5	5	5	3	4	4	5	4.35
LO 2	5	5	5	4	5	4	4	5	5	5	5	5	5	5	5	5	3	3	5	2	4.50
LO 3	5	5	4	5	5	2	4	5	5	5	5	5	4	5	5	5	3	2	4	2	4.25
LO 4	4	4	5	5	5	5	4	5	4	5	5	5	4	5	5	5	5	4	5	5	4.70
LO 5	5	5	1	5	5	4	4	4	4	5	5	5	4	5	5	5	4	4	4	4	4.35
Overall	5	5	1	4	5	4	3	4	4	4	5	5	5	5	5	5	4	4	4	4	4.25



Summary of comments and detailed survey forms are included in the attached “Supporting Data” binder. The above data and the comments of the alumni are complementary of the graduate program in the most part.

Graduate Project Assessments (Fall '16) _ EE-Option
Number of students=1 (3 faculty evaluations)

Oral Communication and Quality of Slides (Average=4.0)	
Clarity of Pronunciation	3.66
Ability to answer questions	4.0
Eye contact	4.0
Quality of slides	4.7
Ability to express ideas	4.0
Organization of presentation	3.8
Technical Content (Average=4.12)	
Clarity of methodology	3.8
Soundness of Argument	4.0
Suitability of work for a graduate level	4.25
Use of engineering tools	4.33
Significance of conclusions	4.0
Use of scientific tools	4.33
Written Report (Average=4.17)	
Organization	4.33
Trans. Between Paragraphs	4.33
Sentence structure	4.0
Spelling and Grammar	4.0

Analysis: The data shows that the student performed at a level higher than the benchmark level of 3.75, in all categories on the average. However, the sub-categories of “clarity of pronunciation” needs attention.

Graduate Project Assessments (Spring '17) _ EE-Option
Number of students=3 (9 faculty evaluations)

Oral Communication and Quality of Slides (Average=4.5)	
Clarity of Pronunciation	4.44
Ability to answer questions	4.67
Eye contact	4.43
Quality of slides	4.45
Ability to express ideas	4.39
Organization of presentation	4.61
Technical Content (Average=3.88)	
Clarity of methodology	4.23
Soundness of Argument	3.71
Suitability of work for a graduate level	3.93
Use of engineering tools	4.22
Significance of conclusions	3.55
Use of scientific tools	3.67
Written Report (Average=3.77)	
Organization	3.99
Trans. Between Paragraphs	3.82
Sentence structure	3.71
Spelling and Grammar	4.0
Literature Search and Use of References	3.33

Analysis: The data shows that the student performed at a level higher than the benchmark level of 3.75, in all categories on the average. However, the sub-categories of “Soundness of Argument”, “Significance of conclusions”, “Use of scientific tools”, “Sentence structure”, and “Literature Search and Use of References” need attention.

Graduate Project Assessments (Fall '16) _ CE-Option
Number of students=2 (6 faculty evaluations)

Oral Communication and Quality of Slides (Average=4.0)	
Clarity of Pronunciation	4.0
Ability to answer questions	4.0
Eye contact	4.17
Quality of slides	4.17
Ability to express ideas	4.0
Organization of presentation	3.83
Technical Content (Average=4.25)	
Clarity of methodology	4.17
Soundness of Argument	4.0
Suitability of work for a graduate level	4.4
Use of engineering tools	4.5
Significance of conclusions	4.0
Use of scientific tools	4.4
Written Report (Average=3.83)	
Organization	3.83
Trans. Between Paragraphs	4.0
Sentence structure	3.67
Spelling and Grammar	3.8

Analysis: The data shows that the students have performed at a level higher than the benchmark level of 3.75. However, the sub-category "Sentence structure" needs attention.

Graduate Project Assessments (Spring '17) _ CE-Option
Number of students=8 (23 faculty evaluations)

Oral Communication and Quality of Slides (Average=4.1)	
Clarity of Pronunciation	4.38
Ability to answer questions	3.62
Eye contact	4.47
Quality of slides	3.52
Ability to express ideas	4.42
Organization of presentation	4.17
Technical Content (Average=3.86)	
Clarity of methodology	4.11
Soundness of Argument	3.82
Suitability of work for a graduate level	3.6
Use of engineering tools	4.36
Significance of conclusions	3.69
Use of scientific tools	3.55
Written Report (Average=4.05)	
Organization	4.53
Trans. Between Paragraphs	4.1
Sentence structure	3.85
Spelling and Grammar	3.72

Analysis: The data shows that the student performed at a level higher than the benchmark level of 3.75, in all categories on the average. However, the sub-categories of “ability to answer questions”, “quality of slides”, “Suitability of work for a graduate level “, “Significance of conclusions “, “use of scientific tools”, and “Spelling and Grammar” need attention.

Exit Survey (Fall '16) _ EE-Option
Number of students=1

SLO	Rating of Achieving SLOs Strongly Agree (SA), Agree (A), Ambivalent (AM), Disagree (D), Strongly Disagree (SD)
SLO 1	A
SLO 2	A
SLO 3	A
SLO 4	A
SLO 5	A

Exit Survey (Spring '17) _ EE-Option
Number of students=4

SLO	Rating of Achieving SLOs Strongly Agree (SA), Agree (A), Ambivalent (AM), Disagree (D), Strongly Disagree (SD)
SLO 1	SA, SA,A,SA
SLO 2	SA, A,SA,SA
SLO 3	SA, SA,SA,SA
SLO 4	SA, AM,SA,SA
SLO 5	SA, A,SA,SA

Exit Survey (Fall '16) _ CE-Option
Number of students=2

SLO	Rating of Achieving SLOs Strongly Agree (SA), Agree (A), Ambivalent (AM), Disagree (D), Strongly Disagree (SD)
SLO 1	A, A
SLO 2	SA, A
SLO 3	A, A
SLO 4	A, A
SLO 5	SA, A

Exit Survey (Spring '17) _ CE-Option
Number of students=7

SLO	Rating of Achieving SLOs Strongly Agree (SA), Agree (A), Ambivalent (AM), Disagree (D), Strongly Disagree (SD)
SLO 1	A, A, A,SA,A,SA,A
SLO 2	A, A, A,SA,SA,SA,SA
SLO 3	AM, A, A,SA,A,SA,A
SLO 4	A, SA, SA,SA,A,SA,SA
SLO 5	A, A, SA.A,A,SA,AM

Learning Outcomes Assessment Data (Embedded Questions)

Course	LO 1	LO 2	LO 3	LO 4	LO 5
ECE 278	4.5	4.2			
ECE 251	3.81	4.1	4.08		

ECE 278 Embedded Systems (F' 16)

Course#: ECE 278

SLO #: 1

Number of students: 14

Item	Proficiency					
	5	4	3	2	1	
Proper selection of engr and software principles	<i>Selection of engr and software principles was well justified and explained IIII IIIII</i>	<i>I</i>	<i>Selection of engr and software principles was partially justified II</i>		<i>Selection of engr and software principles was not justified</i>	4.6
Application of engr and software principles to problems	<i>Advanced engr and software principles were applied with depth to solve key problems in depth IIII IIIII II</i>	<i>I</i>		<i>I</i>	<i>Engr and software principles were referred but not applied to solve key problem.</i>	4.7
The effectiveness of applying engr and software principles to problems	<i>Application of engr and software principles was essential to solve key problems IIII IIIII</i>	<i>III</i>	<i>I</i>	<i>I</i>	<i>Application of engr and software principles was not related to solve key problems</i>	4.4

Average Score: 4.5

Evaluator: Reza Raeisi

Date: 11/9/2016

ECE 278 Embedded Systems (F' 16)

Course#: ECE 278

SLO #: 2

Number of students: 14

Item		Proficiency					
		5	4	3	2	1	
In-depth Knowledge on EE Subjects	<i>Problem formulation</i>	<i>Conduct research to Identify and formulate a problem using mathematical tools and engineering models</i> IIII	II II II II	II			4.1
	<i>Problem solving</i>	<i>Solve problem mathematically or using engineering tools</i> IIIIII	II II	II	I		4.2
	<i>Analyzing results</i>	<i>Analyzing results quantitatively</i> IIII II	II II I	II			4.3
Engineering Tool Skill	<i>Modeling Tools</i>	<i>Fluent</i> IIII II	II II	II		<i>Learning</i> I	4.2
	<i>Design Tools</i>	<i>Fluent</i> IIII III	II II	I	I	<i>Learning</i>	4.3
	<i>Analysis Tools</i>	<i>Fluent</i> IIII III	II I	I	I	<i>Learning</i>	4.3
	<i>Manufacturing Tools</i>	<i>Fluent</i>				<i>Learning</i>	

Average Score: 4.2

Evaluator: Reza Raeisi

Date: 11/9/2016

Rubric
Application of MATH, SCIENCE, and ENGR Principles
EE Student Learning Outcome1

Date: Feb 9, 2012
Course#: EE6251

MSE-EE Student Learning Outcome1 - The graduate from the program should be able to apply advanced mathematics, science, and engineering principles to practical problems.

Evaluate each item on a scale of 1 to 5 (5 is the highest).

Item	Proficiency					
	5	4	3	2	1	N/A
Proper selection of math/science/engr principles	Selection of math/science/engr principles was well justified and explained. / / / /	/ / / /	Selection of math/science/engr was partially justified. /		Selection of math/science/engr was not justified.	3.9
Applicaion of math/science/engr to problems	Advanced math/science/engr principles were applied with depth to solve key problems in depth. / / /	/ / /	/ / / /		Math/science/engr principles were referred but not applied to solve key problems.	3.81
Applicaion of math/science/engr to problems	Advanced math/science/engr principles were applied with depth to solve key problems in depth. / / /	/ / /	/ / / /		Math/science/engr principles were referred but not applied to solve key problems.	3.81
The effectiveness of math/science/engr principles to problems	Application of Math/science/engr principle was essential to solve key problems / / /	/ / /	/ / / /		Application of Math/science/engr principle was not related to solve key problems	3.72

Average Score: 3.81
Evaluator: Kim Date: Feb 9, 2012

Rubric
Knowledge in EE Subjects and Engineering Tool Skills
EE Student Learning Outcome2

Date: Feb 9, 2012
Course#: EE 251

MSE-EE Student Learning Outcome2 - The graduate from the program should be able to demonstrate knowledge in advanced electrical engineering subjects and utilize advanced engineering tools to solve engineering problems.

Evaluate each item on a scale of 1 to 5 (5 is the highest).

Item		Proficiency						N/A
		5	4	3	2	1		
In-depth Knowledge on EE Subjects	Problem formulation	Conduct research to Identify and formulate a problem using mathematical tools and engineering models	/	/	/			
	Problem solving	Solve problem mathematically or using engineering tools	/	/	/			
	Analyzing results	Analyzing results quantitatively	/	/	/			
Engineering Tool Skill	Modeling Tools	Fluent				Learning		
	Design Tools	Fluent	/	/	/	Learning		
	Analysis Tools	Fluent	/	/	/	Learning		
	Manufacturing Tools	Fluent				Learning		

Average Score: 4.10
Evaluator: KM Date: Feb 9, 2012

Rubric
Conduct Experiments and Data Analysis
EE Student Learning Outcome3

Date: Feb 9, 2012
Course#: ELE201

MSE-EE Student Learning Outcome3 - The graduate from the program should be able to conduct experiments and analyze collected data.

Evaluate each item on a scale of 1 to 5 (5 is the highest).

Item		Proficiency					N/A
		5	4	3	2	1	
Experiments and analysis of data	Predefined Objectives and Goals	Understand the objectives and goals of conducting experiments	/	/		Conduct experiments without goals	4.28
	Proper Methodology	Prepare the experiments with equipments and well-thought procedures	/	/	/	No preparation	4.12
	Data analysis	Data analysis using mathematical tools and engineering modeling	/	/	/	No verification of the data from experiments	3.85

Average Score: 4.08
Evaluator: Kim Date: Feb 9, 2012

4. What changes did you make as a result of the findings?

Since the data doesn't indicate the need for immediate action and the formal programs review will take place in Fall '17. It was determined to await the feedback of the review team report and respond accordingly.

5. What assessment activities will you be conducting in the 2017-2018 academic year?

The plan is to follow the SOAP and assess all SLOs. Feedback from the program review team will also determine whether specific assessment activities must be highlighted.

6. What progress have you made on items from your last program review action plan?

- More flexibility has been given to students in taking courses in Computer Science and Business. They are also encouraged to take relevant courses in Mathematics and Physics to strengthen their basic science background.
- The curriculum has become broader with the hiring of a good number of new faculty members over the past few years.
- The core curriculum has been sharpened with a separate core for each option in the program.
- The college's assigned-time program has been growing, which facilitates good opportunities for faculty for scholarly activities that benefit the graduate program.