

**California State University, Fresno**

**Master of Science in Engineering,**

**Graduate Program Assessment**

**Department of Electrical and Computer Engineering**

**Academic Year 2014-2015**

**Reza Raeisi, Graduate Program Coordinators**

Master of Science in Engineering (MSE), Electrical Engineering Option  
Master of Science in Engineering (MSE), Computer Engineering Option

**September 2015**

## **General Information**

The graduate program of the Electrical and Computer Engineering Departments offers the Following Graduate Degrees:

- Master of Science in Engineering (MSE), Electrical Engineering Option
- Master of Science in Engineering (MSE), Computer Engineering Option

The objective of the MSE-EE and MSE-CompE programs is to provide advanced engineering education in Electrical Engineering 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 should be able 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.

The MSE-EE and MSE-CompE programs build upon a previously acquired foundation in basic science, mathematics, and electrical/computer engineering to advance skills in research and applied engineering science. The overarching goal of the programs is to **enhance the students' ability to be successful and advance in their chosen careers in industry, academia, and public institutions.**

### **Electrical and Computer Engineering Department Mission Statement:**

The mission of the MSE-EE and MSE-CompE programs is to provide advance engineering education in Electrical and Computer Engineering to practicing engineers in Fresno metropolitan area, California Central Valley, Edwards Air Force Base area and the surrounding high tech industries.

### **ECE Graduate Program Goals:**

The ECE graduate program builds upon a previously acquired foundation in basic science, mathematics, and electrical engineering practices, design skills, and basic technical communication skills.

The goals of ECE Engineering graduate program are to enhance the students' ability to be successful and advance in their chosen careers in industry, academia, and public institutions. The graduate 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 electrical and computer engineering concepts.
- To improve students' written and oral technical communication skills.
- To increase the level of competence of the 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 or computer engineering.

These program goals are consistent with the essential components of the mission and vision of the California State University, Fresno:

- Support and develop high quality graduate programs appropriate to the needs of the region,
- Engage in high quality research, with particular emphasis on applications that support the region, and
- Build upon existing academic programs and create new academic programs to help transform and develop the region.

### **Electrical and Computer Engineering Graduate Program Student Learning Outcomes**

There are seven areas within the MS in Electrical and Computer Engineering programs. They are embedded systems, VLSI/Digital Systems, Communications/DSP, power systems, control systems, optics/optical communications and computer networks. The minimum number of units required to complete the MS in Electrical and Computer Engineering degree is 30 units (which includes) the culminating experience. The possible options for culminating experience are Comprehensive Exam (0 units), Directed Project (3 units) and Directed Thesis (3-6 units). Students doing the thesis or directed project are required to identify one area for their emphasis of study.

### **Student Learning Outcomes**

**The graduate of the MSE-EE and MSE-CompE programs should be able to,**

1. Apply advanced mathematics and engineering science to practical problems.
2. Demonstrate knowledge in advanced electrical or computer engineering subjects and utilize advanced engineering tools to solve engineering problems.
3. Conduct experiments and analyze data
4. Formulate and solve advanced engineering problems
5. Conduct literature searches and formulate ideas via critical thinking practices.

### **Learning Outcomes Assessment**

The listed Student Learning Outcomes (SLOs) will be assessed by the following means:

1. The core courses in the curriculum are designed to provide students with grounding in advanced mathematics and common engineering tools used at the graduate level. Thus this outcome will be assessed by the performance of the students in these core courses. In addition, engineering tools specific to certain discipline areas will be covered in elective courses and the project or thesis option of the culminating experience; performance in these areas will also provide an assessment of Learning Outcome 1.
2. The elective courses and culminating experience in the graduate curriculum are designed to provide the student with depth of knowledge in electrical or computer engineering. Student performance in elective courses and culminating experience will provide assessment of Learning Outcome 2, 3, 4 and 5.

3. Certain courses in the curriculum are designed to contain a significant engineering design component; student performance in these courses will be used to assess Learning Outcome 3.
4. Student performance in and on culminating experience (project or thesis option) will be used to assess Learning Outcome 4. The ENGR 200 has been introduced to provide students with the basic skills in research methods, critical thinking, technical writing as applied to technical publications, project reports, and theses, and literature review.

### **ECE Graduate Program Enrolment, FTES and Graduation Data**

Academic Year 2014 - 2015							
Program	Applied	Admitted	%Admitted	Enrolled	%Enrolled	FTES	Graduated
MSE Computer Engineering Option	38	14	37%	3	21%	1	0
MSE Electrical Engineering Option	229	66	29%	9	14%	14	6

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

Attached are some SLOs for graduate program that were evaluated in 2014-2015 academic year.

**2. What instruments used to assess them?**

The attached rubrics and students exit surveys were used

**3. What did you discover from these data?**

According to data collected most SLOs are met for the graduate program in ECE department.

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

We still need to collect more data in reference with all the listed SLOs in order to find if any changes are needed.

**5. What assessment activities will you be conducting in the 2015-2016 academic year?**

- Student exit surveys
- Embedded questions to be included in all graduate courses offered in both electrical and computer engineering courses offered during the 2015-2016 academic year
- Culminating experience to fully assess SLO 4

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

- We were able to promote program accomplishments and increase efforts to attract more domestic students to the program.
- Increased students' involvement in faculty research and scholarly activities.
- Hired more faculties in areas relevant to current trends in technology in order to enhance research and to secure external funds.
- Now accepting elective courses from other departments such as computer science, business
- More collaboration among the faculty within the LCOE as well as elsewhere in the campus such as Jordan College of Agriculture

**Graduate Student Exit Survey**  
**Department of Electrical and Computer Engineering**  
**Spring 2015**

**Thank you for filling out this survey. Your input is extremely valuable to the ECE department. This is an anonymous survey; therefore, you do not have to sign your name on the survey. For each question below, you may select multiple boxes as needed.**

1. How long did it take you to complete your MS degree program?
  - Four semesters
  - Five semesters
  - Six semesters
  - other \_\_\_\_\_
  
2. Why did you choose to come to Fresno State for your graduate education?  
Select one or more from below.
  - The EE program offers courses related to my area of interest
  - The EE program has faculty members in my area of interest
  - The fee structure at Fresno State is affordable
  - Cost of living in Fresno is cheaper than at other places
  - I heard good things about the program from other students/family/etc
  - Other reason \_\_\_\_\_
  
3. Select from below, the areas that you wanted to focus on when you first enrolled at Fresno State. By checking a box, you are stating that you would have liked to have taken courses in these areas.
  - Control and Power Systems
  - Communications, Optics, and Digital Signal Processing
  - VLSI, Embedded Systems, Computer Architecture
  - Computer Networks, Telecommunications
  - A mix of the above (broad background)
  - Other \_\_\_\_\_
  - Undecided
  
4. What area(s) did you end up focusing on?
  
5. Now that you are completing the MS degree program, please indicate to what extent the following are valid statements by selecting one or more from the list below:
  - The EE program offers courses related to my area of interest
  - The EE program has faculty members related to my area of interest
  - Cost of living in Fresno is cheaper than at other places
  - Other reason \_\_\_\_\_
  
6. Do you think that Fresno State's EE program offers sufficient courses in the areas that you are interested in?

- Yes       No

If you answered No, what courses would you have liked to see more of?

7. Do you think that your undergraduate academic preparation was sufficient for you to succeed in the graduate/undergraduate courses taken here at Fresno State?  
 Yes       No

If you answered No, what are the subject areas that you needed help in?

8. What is your career goal?  
 Work in industry as an Electrical Engineer  
 Do you have a job offer in hand? \_\_\_\_ Yes \_\_\_\_ No  
 If you checked yes, where will you be working? \_\_\_\_\_  
 Pursue a PhD Degree  
 Admitted to a PhD program? \_\_\_\_ Yes \_\_\_\_ No  
 If you checked yes, state the name of the University \_\_\_\_\_  
 and your PhD start date: \_\_\_\_\_  
 Work as a consultant or engineer in a field other than Electrical Engineering  
 Other \_\_\_\_\_

9. Do you feel that you are prepared to begin the next phase of your academic or professional life?  
 Yes       No

10. What were the main challenges (academic/social/financial/) that you faced since you enrolled in the MS-EE program here at Fresno State?

11. How many pre-requisite courses were you assigned when you first started here?  
 Zero       One       Two       Three       Four

12. Do you feel that you received adequate advising in the ECE department?  
 Yes       No

If you answered No, state your reasons.

13. Would you recommend the MS program in EE to other students?  
 Yes       No

If you answered No, state your reasons.

14. Are you satisfied with the MS degree program here at Fresno State? If yes, state why. If no, how can the program be improved?

15. **Rate the following**

	Strongly Agree	Agree	Ambivalent	Disagree	Strongly Disagree
I am able to apply advanced mathematics and engineering science to practical problems	<input type="radio"/>				
I am able to utilize advanced engineering tools to solve engineering problems.	<input type="radio"/>				

I am able to conduct experiments and analyze collected data (hands-on).	<input type="radio"/>				
I am able to communicate effectively orally and in writing.	<input type="radio"/>				
I am able to conduct literature searches and formulate ideas via critical thinking practices.	<input type="radio"/>				

	Excellent	Very Good	Good	Fair	Poor
Academic standards in the program	<input type="radio"/>				
Integration of current developments in my field	<input type="radio"/>				
Program space and facilities	<input type="radio"/>				
Overall program quality	<input type="radio"/>				
Intellectual quality of faculty	<input type="radio"/>				
Intellectual quality of fellow graduate students	<input type="radio"/>				
Interaction between faculty and graduate students	<input type="radio"/>				

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 1**

**Course: ECE 201**

**Date: Fall 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Identification of Applicable Advanced Physics and Mathematics Principles	Lack of Knowledge				Complete Knowledge	
Utilization of Physics and Mathematics Principles toward Modeling of an engineering system	Improper utilization or application				Proper and correct utilization	
Application of the Mathematics Methodology toward analyzing an engineering system	Incorrect Application				Correct and Complete Application	
Use of mathematical steps toward solving an engineering problem	Incorrect or invalid mathematical steps				Except for minor errors, completion of appropriate mathematical steps	
Interpretation and appropriate presentation of results	Lack of Valid results				Complete results that include proper units	

**Total of Student: 10**

Evaluator : Dr. Bengiamin

**Overall average score: 4.14**

Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 2**

**Course: ECE 201**

**Date: Fall Semester 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Uses the Appropriate Engineering Model						
Uses the Appropriate Engineering Principles Associated with the Model						
Correct Solution Methodology						
Presented Correct Results						
Understands Implications of Results						

**Total of Student: 10**

Evaluator: Dr. Bengiamin

**Overall average score: 3.99**

Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 3**

**Course: ECE 201**

**Date: Fall Semester 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Designing Experiments: Develop a methodology to test concepts and produce data to evaluate a specific process	Improper design or technique				Appropriate design or technique to evaluate a specific process	
Conducting Experiments: Operate appropriate laboratory equipment or hardware/software tools to collect data	Unable to operate equipment				Appropriate use of equipment	
Interpreting Data: Data manipulation and judgment	Improper data				Reasonable results	

**Total of Student: 10**

Evaluator: Dr. Bengiamin

**Overall average score: 5.1**

Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 4**

**Course: ECE 201**

**Date: Fall Semester 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Recognize class of problems	no recognition				Correct recognition	
Formulate the problem using equations	No formulas or equations				Right formulas or equations	
Solving equations and finding an answer	unsolved				Well solved	
Analysis of the results	No analysis				Right analysis	

**Total of Student: 10**

Evaluator: Dr. Bengiamin

**Overall average score: 3.89**

Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 5**

**Course: ECE 201**

**Date: Fall Semester 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Introducing Technical Concept: Problem Statement	Problem statement stated poorly				Problem statement stated concisely as to the direction of article	
Body: Flow of the review from general ideas to specific conclusions	Flow from one section to the next follow in a logical order				Transition of sections tie sections together	
Coverage of Content	Contents are covered as explicit as expected				The content covered in depth and sources are cited when specific statements are made.	
Clarity of writing of technical article	Article not clear or contains misspelled words, incorrect grammar, and improper punctuation are evident.				Article is crisp, and clear. No spelling, grammar, or punctuation errors are made.	
Citation/References	Followed standard format such as APA style				Citation for the article did follow a standard format and was accurate and complete	

**Total of Student: 10**

Evaluator: Dr. Bengiamin

**Overall average score: 3.75**

Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 1**

**Course: ECE 257**

**Date: Fall Fall 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Identification of Applicable Advanced Physics and Mathematics Principles	Lack of Knowledge				Complete Knowledge	
Utilization of Physics and Mathematics Principles toward Modeling of an engineering system	Improper utilization or application				Proper and correct utilization	
Application of the Mathematics Methodology toward analyzing an engineering system	Incorrect Application				Correct and Complete Application	
Use of mathematical steps toward solving an engineering problem	Incorrect or invalid mathematical steps				Except for minor errors, completion of appropriate mathematical steps	
Interpretation and appropriate presentation of results	Lack of Valid results				Complete results that include proper units	

**Total of Student: 3**

Evaluator : Dr. Krihgn

**Overall average score: 4.33**

Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 2**

**Course: ECE 257**

**Date: Fall Semester 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Uses the Appropriate Engineering Model						
Uses the Appropriate Engineering Principles Associated with the Model						
Correct Solution Methodology						
Presented Correct Results						
Understands Implications of Results						

**Total of Student: 3**  
Evaluator: Dr. Krighn

**Overall average score: 4.13**  
Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 4**

**Course: ECE 257**

**Date: Fall Semester 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Recognize class of problems	no recognition				Correct recognition	
Formulate the problem using equations	No formulas or equations				Right formulas or equations	
Solving equations and finding an answer	unsolved				Well solved	
Analysis of the results	No analysis				Right analysis	

**Total of Student: 3**  
 Evaluator: Dr. Krighen

**Overall average score: 4.0**  
 Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 5**

**Course: ECE 257**

**Date: Fall Semester 2014**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Introducing Technical Concept: Problem Statement	Problem statement stated poorly				Problem statement stated concisely as to the direction of article	
Body: Flow of the review from general ideas to specific conclusions	Flow from one section to the next follow in a logical order				Transition of sections tie sections together	
Coverage of Content	Contents are covered as explicit as expected				The content covered in depth and sources are cited when specific statements are made.	
Clarity of writing of technical article	Article not clear or contains misspelled words, incorrect grammar, and improper punctuation are evident.				Article is crisp, and clear. No spelling, grammar, or punctuation errors are made.	
Citation/References	Followed standard format such as APA style				Citation for the article did follow a standard format and was accurate and complete	

**Total of Students: 3**  
 Evaluator: Dr. Krighn

**Overall average score: 3.87**  
 Date: December 2014

**Assessment for MSE-EE and MSE-CompE Student Learning Outcome 5**

**Course: ENGR 200**

**Date: Spring Semester 2015**

Evaluate on a scale of 1-5 (5 is for excellent); check the proper box

	1	2	3	4	5	N/A
Introducing Technical Concept: Problem Statement	Problem statement stated poorly				Problem statement stated concisely as to the direction of article	
Body: Flow of the review from general ideas to specific conclusions	Flow from one section to the next follow in a logical order				Transition of sections tie sections together	
Coverage of Content	Contents are covered as explicit as expected				The content covered in depth and sources are cited when specific statements are made.	
Clarity of writing of technical article	Article not clear or contains misspelled words, incorrect grammar, and improper punctuation are evident.				Article is crisp, and clear. No spelling, grammar, or punctuation errors are made.	
Citation/References	Followed standard format such as APA style				Citation for the article did follow a standard format and was accurate and complete	

**Total of Students: 11**  
Evaluator: Dr. Krighn

**Overall average score: 3.87**  
Date: December 2014

## Graduate Student Exit Survey in 2014-2015

Total number of student participated: 6					
Subject Questions	Excellent	Very Good	Good	Fair	Poor
Academic standard in the program	111	111			
Integration of current developments in my field	111	111			
Program space and facilities	11111	1			
Overall program quality	11	1111			
Intellectual quality of faculty	11111	1			
Intellectual quality of fellow graduate students	111	11	1		
Interaction between faculty and graduate students	11111	1			

Total number of students participated: 6					
Subject questions	Strongly agree	Agree	Ambivalent	Disagree	Strongly Disagree
Able to apply advanced math and engr science to practical problems	111111				
Able to utilize advanced engr tools to solve engr problems	111111				
Able to conduct experiments and analyze collected data (hands-on)	11111	1			
Able to communicate effectively orally and in writing	111111				
Able to conduct literature searches and formulate ideas via critical thinking practices	11111	1			

Do you think that Fresno State's EE program offers sufficient courses in the areas that you are interested in?	Yes	NO
	11111	1

Do you think that your undergraduate academic preparation was sufficient for you to succeed in	Yes	NO
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the graduate/undergraduate courses taken here at Fresno State?	111111	
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Do you feel that you are prepared to begin the next phase of your academic or professional life?	Yes	NO
	111111	

How many pre-requisite courses were you assigned when you first started here?	Zero	One	Two	Three	Four
	1111	1	1		

What is your career goal?	Work in industry	Pursue PhD
	11	1111

Would you recommend the MS program in ECE to other students?	Yes	No
	111111	

Do you feel that you received adequate advising in the ECE department?	Yes	No
	111111	

## Graduate Project Assessments in 204-2015

Questions:Comm. And quality of slides	Chen	Olga	Ankit	Gawtham	Peddi	Kaur	Subodh
Clarity of Pronunciation	3.3	4.3	4.6	5	3.5	4.6	3.6
Ability to answer questions	4	4.3	3.6	5	3	4.6	3.6
Eye contact	3.6	4.6	4.6	5	3.8	4.3	4.6
Clarity of slides	5	4.2	3.3	4.6	3.5	4.5	3.3
Ability to express ideas	4.6	4.3	4.3	4	3.4	4	3.6
Organization of presentation	5	4.5	4.2	4.6	3.6	4.1	4
Questions:Tech. Content	Chen	Olga	Ankit	Gawtham	Peddi	Kaur	Subodh
Clarity of methodology	4.6	4.7	3.5	4.3	3.6	4.6	3.6
Soundness of Argument	4.3	4	4	4.6	3.7	4.3	3.6
Suitability of work for a graduate level	5	4.3	4.3	5	4.3	5	3.5
Use of engineering tools	4.6	5	4.3	4.6	4.3	4.6	4.6
Significance of conclusions	4.3	3.5	4	4	3.5	4.3	3.6
Use of scientific tools	5	4.6	4.3	4.5	4	4.5	5
Questions: Report	Chen	Olga	Ankit	Gawtham	Peddi	Kaur	Subodh
Organization	5	4	4	4.3	3.5	3.6	4
Trans. Between Paragraphs	4.6	3.5	3.6	4	4	4.1	3.5
Sentence Structure	3.6	4.5	3.6	3.6	4	4	2.3
Spelling/Grammar	3	4	4	3.3	4	4	2.3
Literature search and use of references	4.5	4	4.3	3.5	2.5	4	2.5
Transition Between Paragraph	4.6	3.5	3.6	4	4	4.1	3.5