Expected Outcome 1: Academic Preparation
Graduates of the MS program in Electrical and Computer Engineering will have sufficient academic preparation for, and the opportunity to evaluate the viability and desirability of further study at the doctoral level.

Assessment Method 1: PhD Program Acceptance
Assessment Method Description
Of the graduates of the MS program in ECE who choose to pursue further study at the doctoral level upon completion of their MS degree, at least 90% will be accepted into a doctoral program. This assessment method is determined by responses to a Graduate Student Exit survey, emailed from the students’ advisors after graduation. For MEE and MS Graduates the survey asks:
Did you apply to any PhD programs? (Yes/No) _____ If yes, how many? ______
If yes, how many programs accepted you? ______

Findings
Of the six students graduating from the MS program in ECE, two applied for PhD programs.

<table>
<thead>
<tr>
<th></th>
<th># applied for</th>
<th>#acceptances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Student 2</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

How did you use findings for improvement?
The department’s Curriculum and Assessment Committee considers that there are a number of factors that determine acceptance into a doctoral program, such as the student’s particular area of expertise within electrical and computer engineering, the number of doctoral programs applied for, the prestige of the institutions where the student applies, and of course the quality of the applying student. The committee believes that it is premature to take action on this finding with such limited data.
Additional Comments
The department’s Curriculum and Assessment Committee would like to get a greater response rate on this exit survey from its MEE, MS and PhD graduates. Therefore, starting Fall 2013 semester, the survey will be given to the student at the end of their project, thesis, or dissertation defense.

Assessment Method 2: Qualifying Exam
Assessment Method Description
Students admitted to the doctoral program must pass a written qualifying examination. This exam ensures that a candidate for the doctoral degree has a basic fundamental knowledge of electrical and computer engineering. The exam must be taken by the end of the second semester of study. If a student fails the exam, the student will immediately be required to design a remediation plan with his or her advisory committee, submit a signed copy of that plan to the ECE Graduate Program Officer, and then retake the exam at its next offering. Only one repeat is allowed for the exam. A second failure will result in dismissal from the doctoral program.

The Qualifying Examination is a three-hour closed-book written exam covering undergraduate material in four fundamental areas of electrical and computer engineering:
1. Circuits, Signals, and Systems
2. Electronics
3. Electromagnetics
4. Digital systems
The exam is comprised of twelve questions, three from each area. Eight questions are submitted for grading.

Our success metric is that at least 90% of the graduates of the MS program in Electrical & Computer Engineering at Auburn University who enter the department’s doctoral program will successfully pass the PhD qualifying exam.

Findings
In the 2012-2013 academic year, there were seven MS students taking the qualifying exam. There scores were as follows:
Student 1 74% pass
Student 2 88% pass
Student 3 94% pass
Student 4 75% pass
Student 5 98% pass
Student 6 42% fail
Student 7 39% fail

**How did you use findings for improvement?**
The 71% pass rate is well below our established success metric. However, it is noted that the passing percentage varies significantly from semester to semester. For example, for the last 10 years, the aggregate MEE and PhD test averages were as low as 25% and as high as 100%, and the 10-year average is 70%. The department’s Curriculum and Assessment Committee is discussing whether or not this assessment is a useful tool for determining the academic preparation of our students, and what, if anything, we can do to improve our program and meet our success metric.

**Additional Comments**

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**Expected outcome 2: Communication**
Graduates of the MS program in Electrical and Computer Engineering will be able to communicate their ideas effectively with their technical peers and with others outside their discipline.

**Assessment Method 1: Thesis Defense**
**Assessment Method Description**
Each candidate's advisory committee will rate the student's thesis defense on several attributes of effective oral communication. These performance indicators (PI) are: PI1 - appropriate content, PI2 - visual aids, PI3 - well prepared presenter, PI4 - presentation mechanics, and PI5 - responses to questions.

The committee will also rate the student's thesis on several attributes of effective written communication. These performance indicators are: PI1 - Quality of English, and PI2 - Technical Writing Content.

Each performance indicator for both oral and written assessments is rated on a 4 point scale. The primary criterion for success is that at least 80% of the students will achieve at least 3 on each performance indicator. The secondary criterion is that no more than 10% of the students will have a score for any specific attribute of less than 2.
Findings
Seventeen students were assessed with the results as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Average</th>
<th>≥3</th>
<th>&lt;2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Communications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI1: appropriate content</td>
<td>3.61</td>
<td>17(100%)</td>
<td>0</td>
</tr>
<tr>
<td>PI2: visual aids</td>
<td>3.53</td>
<td>15(88%)</td>
<td>0</td>
</tr>
<tr>
<td>PI3: well prep. presenter</td>
<td>3.66</td>
<td>16(94%)</td>
<td>0</td>
</tr>
<tr>
<td>PI4: presentation mechanics</td>
<td>3.65</td>
<td>16(94%)</td>
<td>0</td>
</tr>
<tr>
<td>PI5: response to questions</td>
<td>3.59</td>
<td>16(94%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Sixteen students were assessed with the results as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Average</th>
<th>≥3</th>
<th>&lt;2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Communications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI1: quality of english</td>
<td>3.38</td>
<td>16(100%)</td>
<td>0</td>
</tr>
<tr>
<td>PI2: technical writing content</td>
<td>3.44</td>
<td>14(88%)</td>
<td>0</td>
</tr>
</tbody>
</table>

The primary and secondary criteria were met for all performance indicators.

How did you use findings for improvement?
The department’s Curriculum and Assessment Committee is generally pleased with the results of this assessment. No action is planned at this time.

Additional Comments

Assessment Method 2: Publication
Assessment Method Description
For each student graduating from the MS program in ECE, an average of one refereed journal paper and one conference paper will be submitted for publication, on which the student was an author or co-author. This assessment method is determined by responses to a Graduate Student Exit survey, emailed from the students’ advisors after graduation. The survey asks:

While you were in the graduate program:
On how many submitted conference papers were you an author or co-author?_____________
On how many of these papers were you the first author?
________________________
How many of these conference papers were accepted?
________________________

On how many submitted refereed journal papers were you an author or co-author?____________
On how many of these papers were you the first author?
How many of these refereed journal papers were accepted?

Findings
There were six responses for the MS program:
Conference papers

<table>
<thead>
<tr>
<th></th>
<th>Submit</th>
<th>Average per student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submitted</td>
<td>9</td>
<td>1.5</td>
</tr>
<tr>
<td>first author</td>
<td>5</td>
<td>0.83</td>
</tr>
<tr>
<td>Accepted</td>
<td>6</td>
<td>1.00</td>
</tr>
</tbody>
</table>

There were no journal papers submitted by MS students.

How did you use findings for improvement?
The department’s Curriculum and Assessment Committee is pleased with the conference paper submissions. However, the fact that no journal paper articles were submitted by our MS students is of concern.

Additional Comments
The department’s Curriculum and Assessment Committee would like to get a greater response rate on this exit survey from its MEE, MS and PhD graduates. Therefore, starting Fall 2013 semester, the survey will be given to the student at the end of their project, thesis, or dissertation defense.

Expected Outcome 3: Mastery
Graduates of the MS program in Electrical and Computer Engineering will master the basic principles of at least one of the subdisciplines within electrical and computer engineering and understand how these basic principles are applied to solve advanced problems, enabling them to practice electrical and computer engineering at a high level.

Assessment Method 1: Thesis Defense
Assessment Method Description
In each MS candidate’s thesis and oral defense, the student must demonstrate mastery of the basic principles of at least one of the subdisciplines of ECE. The student will also be able to apply the basic principles of at least one of the subdisciplines of ECE to solve advanced problems in their chosen discipline. These are assessed by each member of the student's project committee on a 4 point scale. The primary
criterion for success is that 50% of the students rate at least a 3.5 on both categories. The secondary criterion for success is that less than 10% of students rate less than a 3 on either category.

**Findings**
Seventeen MS students were assessed from Fall 2012 through Summer 2013. They averaged a 3.62 out of 4 in demonstrating mastery, and averaged a 3.62 out of 4 in their ability to apply basic principles to solve advanced problems in their chosen discipline. Two students (12%) scored less than 3 on both categories (2.5 and 2.3/4.0 on demonstrating mastery, 2.5 and 2.3/4 in ability to apply basic principles).

**How did you use findings for improvement?**
The department’s Curriculum and Assessment Committee is generally pleased with the results of this assessment. It is thought that the occasional poor performance, in this case the two students who failed to meet the performance criteria, could be less frequent if we tighten our program acceptance requirements. We also fed back this information to the department faculty with the recommendation that they better prepare their students for the thesis defense.

**Additional Comments**

**Assessment Method 2: Employment Statistics**

**Assessment Method Description**
Graduates of the MS program will be successful in seeking employment that will utilize their knowledge and skills in industry, government, academia, or start-up companies. This assessment method is determined by responses to a Graduate Student Exit survey, emailed from the students’ advisors after graduation. The survey requests the following:

Upon completion of your degree, please indicate where you found employment:
- Industry (optional: name of company: ________________________)
- Academia (optional: name of academic institution: ________________)
- Graduate School (optional: name of academic institution: ____________)
- Other, (specify: _____________________________________________ ____________ )
Findings

There were six responses for the MS program. The graduates found employment at:
AMD
Applied Research Labs at University of Texas, Austin
Advantest
Notre Dame
DOD Lab
Freescale Semiconductor
These institutions are considered highly technical in the Electrical & Computer Engineering disciplines.

How did you use findings for improvement?
As all of the students who responded successfully found employment that utilizes their knowledge and skills, the outcome has been successfully met.

Additional Comments
The department’s Curriculum and Assessment Committee would like to get a greater response rate on this exit survey from its MEE, MS and PhD graduates. Therefore, starting Fall 2013 semester, the survey will be given to the student at the end of their project, thesis, or dissertation defense.