Expected Outcome 1: Broad Understanding
Graduates of the Ph.D. program in Electrical and Computer Engineering will have a broad understanding of the fundamental areas of electrical and computer engineering and other fields related to their specialty.

Assessment Method 1: Final Examination

Assessment Method Description
Each PhD candidate's knowledge of his or her chosen subdiscipline within electrical and computer engineering will be evaluated in the final oral examination by a committee of at least three members of the graduate faculty. 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 75% of the candidates score at least 3.2 on the exam. The secondary criterion is that no candidate will score lower than 2.8.

Findings
Four PhD students were assessed from Fall 2013 through Summer 2014. They averaged a 3.8 out of 4 in demonstrating mastery, and averaged a 3.8 out of 4 in their ability to apply basic principles to solve advanced problems in their chosen discipline. No student failed to meet the first or the second performance criterion.

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
The department's curriculum and assessment committee considers that since students are required to pass courses in at least three subdisciplines of electrical & computer engineering, they necessarily
have a broad understanding. Therefore, this outcome will be removed from future assessments.

**Assessment Method 2: Academic Positions**

**Assessment Method Description**
At least 90% of all ECE Ph.D. graduates who seek academic positions will receive job offers, having been found qualified by the offering institutions. This assessment method is determined by responses to a Graduate Student Exit survey, emailed from the students’ advisors after graduation. The survey asks:

Did you apply for any academic positions? (Yes/No) _____ If yes, how many? ______
If yes, for how many academic positions did you receive an offer of employment? _____

**Findings**
Both of the two PhD students responding to this survey applied for academic positions.

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

**How did you use findings for improvement?**

One student applying for an academic position failed to receive an offer, but this student only applied to 2 institutions.

The department’s Curriculum and Assessment Committee believes that our present approach of encouraging our students to develop their communications skills and publish conference and journal articles, along with conducting noteworthy research, is the best approach for an eventual career in academia.

**Additional Comments**
2 of 4 students responded to the survey. The curriculum and assessment committee is working on improving the response rate.
**Expected Outcome 2: Communication**
Graduates of the Ph.D. 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: Publications**

**Assessment Method Description**
For each student graduating from the PhD program in Electrical & Computer Engineering, an average of one refereed journal paper and one conference paper will be accepted 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 two responses for the PhD program:

<table>
<thead>
<tr>
<th>Conference papers</th>
<th>sums</th>
<th>average per student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submitted</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>first author</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Accepted</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Journal papers</th>
<th>sums</th>
<th>average per student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submitted</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>first author</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Accepted</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
How did you use findings for improvement?
Both performance criteria were met. The department’s Curriculum and Assessment Committee is very pleased with the publication rate of our PhD students. No action is required.

Additional Comments
2 of 4 students responded to the survey. The curriculum and assessment committee is working on improving the response rate. Also, the committee has decided that this assessment method is a better measure of the student's expertise, and so it will no longer be included as an assessment method of the communications outcome.

Assessment Method 2: Oral Examination

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
Four PhD students were assessed with the results as follows:

<table>
<thead>
<tr>
<th>Oral Communications</th>
<th>average</th>
<th>≥3</th>
<th>&lt;2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI1: appropriate content</td>
<td>3.8</td>
<td>4(100%)</td>
<td>0</td>
</tr>
<tr>
<td>PI2: visual aids</td>
<td>3.8</td>
<td>4(100%)</td>
<td>0</td>
</tr>
<tr>
<td>PI3: well prep. presenter</td>
<td>3.8</td>
<td>4(100%)</td>
<td>0</td>
</tr>
<tr>
<td>PI4: presentation mechanics</td>
<td>3.7</td>
<td>4(100%)</td>
<td>0</td>
</tr>
<tr>
<td>PI5: response to questions</td>
<td>3.7</td>
<td>4(100%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Four PhD students were assessed with the results as follows:

<table>
<thead>
<tr>
<th>Written Communications</th>
<th>average</th>
<th>≥3</th>
<th>&lt;2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI1: quality of English</td>
<td>3.9</td>
<td>4(100%)</td>
<td>0</td>
</tr>
<tr>
<td>PI2: technical writing content</td>
<td>3.6</td>
<td>4(100%)</td>
<td>0</td>
</tr>
</tbody>
</table>
The primary and secondary criteria were met on 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. Faculty members are urged to inform their students of the gravity of the presentation and the importance of doing the best job they can.

**Additional Comments**
An additional assessment method will be added to measure the quality of student communication in their dissertation.

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**Expected Outcome 3: Expertise**
Graduates of the PhD program in Electrical and Computer Engineering will understand the principles and standard methods in one of the major subdisciplines within electrical and computer engineering at such a level as to have the expertise to teach in the discipline of specialty and to conduct and direct research to solve new problems in the discipline.

**Assessment Method 1: Final Examination**

**Assessment Method Description**
Each PhD candidate's knowledge of his or her chosen subdiscipline within electrical and computer engineering will be evaluated in the final oral examination by a committee of at least three members of the graduate faculty. 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 75% of the candidates score at least 3.2 on the exam. The secondary criterion is that no candidate will score lower than 2.8.

**Findings**
Four PhD students were assessed from Fall 2013 through Summer 2014. They averaged a 3.8 out of 4 in demonstrating mastery, and averaged a 3.8 out of 4 in their ability to apply basic principles to solve advanced problems in their chosen discipline. Only one student failed to meet the first performance criterion (a 3.0/4 in demonstrating mastery) and none
failed the second criterion.

**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: Publications**

**Assessment Method Description**

For each student graduating from the PhD program in Electrical & Computer Engineering, an average of one refereed journal paper and one conference paper will be accepted 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:

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On how many of these papers were you the first author? ______________
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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 two responses for the PhD program:

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Accepted 2 1

**How did you use findings for improvement?**
Both performance criteria were met. The department’s Curriculum and Assessment Committee is very pleased with the publication rate of our PhD students. No action is required.

**Additional Comments**
2 of 4 students responded to the survey. The curriculum and assessment committee is working on improving the response rate.