3-Year Academic Assessment Plan Cover Sheet

Assessment plans are due December 20, 2018
Email to: assessment@unlv.edu

Program Information:

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<td>College</td>
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<td>02.26.2019</td>
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Contact Person for This Plan

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Please address the following items:

- What are the student learning outcomes? Please provide a numbered list.
- **Plans must include a curriculum map showing which courses will address which learning outcomes.** Examples can be found here: [http://provost.unlv.edu/Assessment/map.html](http://provost.unlv.edu/Assessment/map.html)
- Which learning outcomes will be assessed in each cycle year (i.e., assessment timeline)?
- How will the learning outcomes be assessed? (Programs must use at least one direct assessment of student learning.)
- Undergraduate programs should assess at least one University Undergraduate Learning Outcome (UULO) each year, which may or may not overlap with a program learning outcome.
- Graduate programs should assess at least one outcome related to one of the following graduate level requirements each year:
  - student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.
  - activities requiring originality, critical analysis and expertise.
  - the development of extensive knowledge in the field under study.
- What is your plan for sharing the assessment results and acting on them (i.e., closing the loop)?

Please limit the narrative portion of your report to no more than four pages. You may attach appendices with data, tables, charts, or other materials as needed. Please explain the relevant conclusions from any appendices in your narrative. Please contact the Office of Academic Assessment if you have questions or need assistance.
Three-Year ECE Graduate Program Assessment Plan

The MS and PhD programs in Electrical and Computer Engineering are custom built programs to fit each student’s individual needs and interests both on an academic level and a research level. Constrained with criterion established by the ECE faculty guided by major goals and objectives, a student under the mentorship of faculty develops an anticipated two year MS or four year PhD Graduate College approved program. Appendix A provides a curriculum road map and flow chart of our programs. These illustrate the constraints imposed in our programs. Specific learning outcomes from individual courses are not meaningful since no two students will necessarily take the same courses. That is, our program does not have a set of core courses that all students must complete that satisfies the essential assessment needs of the Office of Academic Assessment. Consequently, we have adopted an assessment approach that follows the individual student on his/her progress towards the completion of the culminating experience and that follows students as a group in a classroom or degree requirement exam (e.g., Qualifier Exam, Comprehensive Exam, Preliminary Exam, Thesis Exam) setting.

Over the next three years, the Office of Academic Assessment requires all of the following outcomes be assessed in the ECE graduate program:

- Student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice
- Activities requiring originality, critical analyses, and expertise
- The development of extensive knowledge in the field under study

Over the three year period, at least one unique outcome must be assessed in depth per year.

Referring to the ECE Graduate Document (Appendix B), the ECE graduate program is built around the following three broad major objectives:

1. Demonstrate strong technical knowledge in their field of study with the potential to lead and direct engineering and scientific teams.
2. Demonstrate the ability to learn independently and generate new knowledge in their chosen field of study.
3. Reach the highest academic level with the potential to become a leader and an authority in Electrical and Computer Engineering.

These objectives can be related to the following student learning outcomes that can be directly measured based on student performance:

- Intellectual Depth (study a field in depth with the aid of ancillary fields; custom degree program leading to the comprehensive exam, thesis and/or dissertation [takes into consideration the MS course only option, MS thesis option, and PhD option])
• Critical Thinking (develop a high level of conceptual and analytical thinking requiring some level of originality or complex thought process; the ability to attack complex and open ended questions through reasoning whether conceptually and/or analytically)
• Communication and Leadership (being able to express oneself intelligently to different audiences displaying leadership and authority in a given field)

These student learning outcomes encompass the Office of Academic Assessment requirements in the spirit of the three broad major objectives listed above set by the ECE faculty for the ECE graduate program. We are required to perform an assessment on each graduate student. Our graduate program at this time is small enough to allow us to address these requirements in a hybrid fashion.

• This past year, we will address the Critical Thinking outcome in depth and the other two outcomes in much less detail. The Critical Thinking outcome complements the UNLV required outcome, “Activities requiring originality, critical analysis, and expertise.”

• In Year 1, we will address the Communication and Leadership outcome in depth and the remaining two outcomes in less detail. The Communication and Leadership complements the UNLV required outcome, “Student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.”

• In Year 2, we will address the Intellectual Depth outcome in depth and the remaining two outcomes in less detail. The Intellectual Depth outcome complements the UNLV required outcome, “The development of extensive knowledge in the field under study.”

• In Year 3, we will address the Critical Thinking outcome in depth and the other two outcomes in much less detail. The Critical Thinking outcome complements the UNLV required outcome, “Activities requiring originality, critical analysis, and expertise.”

Our significantly modified, graduate program began in fall 2013. Students that were admitted to the program prior to that time can choose which catalog they want to graduate under. The old catalog is not conducive for assessment purposes. Students under this catalog can be exempt from taking the Comprehensive Exam. Our major assessment tool for examining student knowledge is the comprehensive exam. Therefore, “extensive knowledge gained through course studies” would be pointless at this time. Therefore, this was made the last outcome to be evaluated in the sequence above.

Office of Academic Assessment Items Specifically Addressed:

• What are the student learning outcomes? Please provide a numbered list.

  1. Demonstrate strong technical knowledge in their field of study with the potential to lead and direct engineering and scientific teams.
  2. Demonstrate the ability to learn independently and generate new knowledge in their chosen field of study.
  3. Reach the highest academic level with the potential to become a leader and an authority in Electrical and Computer Engineering.
• Plans must include a curriculum map showing which courses will address which learning outcomes.

Refer to Appendix A and the discussion above regarding the uniqueness of our custom designed graduate program.

• Which learning outcomes will be assessed in each cycle year?

1. This past year, we will address the **Critical Thinking** outcome in depth and the other two outcomes in much less detail. The **Critical Thinking** outcome complements the UNLV required outcome, “Activities requiring originality, critical analysis, and expertise.”

2. In Year 1, we will address the **Communication and Leadership** outcome in depth and the remaining two outcomes in less detail. The **Communication and Leadership** complements the UNLV required outcome, “Student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.”

3. In Year 2, we will address the **Intellectual Depth** outcome in depth and the remaining two outcomes in less detail. The **Intellectual Depth** outcome complements the UNLV required outcome, “The development of extensive knowledge in the field under study.”

4. In Year 3, we will address the **Critical Thinking** outcome in depth and the other two outcomes in much less detail. The **Critical Thinking** outcome complements the UNLV required outcome, “Activities requiring originality, critical analysis, and expertise.”

• How will the learning outcomes be assessed?

Learning outcomes will be assessed in a hybrid fashion. Individual students will be assessed on an individual basis regarding his/her progress in satisfying the culminating experience by the faculty adviser. For comparison among graduate student peers in other fields of ECE at UNLV, students will be evaluated as a group in a classroom setting. This should offer a more complete comprehensive means of measuring the outcome of graduate students and the success of the department as a whole. For example, in assessing the calendar year 2014 in a classroom setting, faculty are asked to identify ONE complex critical thinking problem that the students in their course were required to address. The problem could be an examine problem or a homework problem with a complex solution. Faculty are asked to identify what makes the problem a critical thinking problem and address in detail how your class handled the problem. Specific concrete statements or direct measurements of student performance are requested. The class is divided in groups based on how the problem is approached. Group approaches to the problem are then compared and contrasted. This not only provides a ruler for measuring the students but also
provides a measure of how faculty understand the assessment request and respond to that request.

- **What is your plan for sharing the assessment results and acting on them (i.e., closing the loop)?**

The report will be shared with faculty at a faculty meeting or by email. Discussions about the direction and quality performance of our students in our program will be conducted.

To initiate the three-year plan, the ECE faculty have assessed the 2018 calendar year. There is some repetition between some parts of the three-year plan and the annual report. For clarity, some repetition has been allowed.
Appendix A

Flow Charts and Road Maps of
ECE MS Graduate Program
(Thesis and Course Only Options)
and
ECE PhD Graduate Program
Roadmap MSEE Program

**MSEE Admission Requirements**

**Continuing Education Option**

**Thesis Option**
- 30 Credits Minimum

12 Credits in ECE and/or Other Approved Disciplines

18 ECE Credits Courses Minimum (Excludes ECG 695/795 & 791)

15 Credits 700 Level

6 Credits – Course 600/700 Level

**Culminating Experience**
- 6 Credits Thesis ECG 797

**Course Only Option**
- 30 Credits Minimum

9 Credits in ECE and/or Other Approved Disciplines

21 ECE Credits Minimum (Excludes ECG 695/795 & 791)

21 Credits ECE 700 Level

**Course Only Option**

600/700 Level

**Final Advanced Professional Degree Option**

**Continuing Education Option**

**Course Only Option**

**Culminating Experience**
- 6 Credits Thesis ECG 797

Minimum of 3 ECE credits per area in a minimum of three areas:
1. Computer Engineering
2. Communications
3. Control Systems
4. Electromagnetics & Optics
5. Electronics
6. Power Systems
7. Signal Processing
8. Solid State Electronics & Devices

Pass Comprehensive Exam (Final Year)

Major ECE field of interest

Six year time limit for MS degree
Notes:
1. Dual degree programs may apply shared credits in Open Option 1 slots.
2. Informal courses (e.g., ECG 791, seminar, and ECG 695/795) may not be applied towards the required 18 (thesis option) or 21 (course only option) ECE credits of coursework.
3. FC – Formal Courses (refer to Section 3.6)

Transfer Credits (Overall allowed 15 credits):
1. Max. 6 non-UNLV credits in MS program from another regionally accredited university
2. 15 credits maximum of UNLV course credits
Roadmap Ph.D. Program

Admission Requirements

Ph.D. Degree Req.
Full Graduate Standing Status

Qualifying Exam
Examines Undergrad. Background
Must pass within first 2 semesters.
Two sittings allowed

Select Advisor & Advisory Committee
First Semester
Five members on committee

Beyond BS
33 credits
15 cr. in Major
9 cr. ea. in 2 Minors

Beyond MS
27 credits
Overall 3.2 GPA min
Each Class 2.7 min

Conventional Ph.D.

Beyond MS
27 credits
Overall 3.2 GPA min
Each Class 2.7 min

Direct Ph.D.
51 cr. (24 +27)
33 in 700 level min.
Same 3.2/2.7 GPA

Comprehensive Exam
Examines Graduate Background
Upon completion. of major area
Two sittings allowed

Preliminary Exam
Initial Eval. of Dissertation Topic
May be taken repeatedly

Final Exam - Dissertation
18 cr. ECG 799 Dissertation

Six year time limit for Ph.D. degree
Typical PhD Program Course Credits with Limits on Informal Courses
(Special Topics, Seminar, and Indep. Study: Overall Total 6 credits max/degree)
Total Credits: 51 credits (MS and PhD Course Credits: Joint Program)
(Max. 18 Course Credits 600 Level) [Min. 33 Course Credits 700 Level]
NOTE: ECE Minor 1 – Primary Minor; Open Minor 2 – Secondary Minor
Conventional PhD Program Option: 6 credits in the major field and 3 credits in each minor field must be from credits applied to the PhD program
Dissertation and Thesis Credits are not considered as Course Credits!

Open Option 1 – Informal courses (such as ECG 791 Independent Study, ECG 695/795 Special Topics, Seminar [Refer to Section 3.6]) and Dual Degree Credits

NOTES
1. FC – Formal courses (Refer to Section 3.6)
2. If appropriate, shared credits in Dual Degree Option may be applied towards partial completion of Open Minor 2.
3. Informal courses (max. 6 cr./deg. prog.) cannot be applied towards the major or two minor fields. (Refer to Section 3.6)

Ph.D. Flowchart

Ph.D. Program
27 Course Credits

15 Credits 700 Level
9 Credits 600/700 Level
9 Credits 600/700 Level
18 Credits 700 Level

9 Credits 600/700 Level
15 Credits 700 Level (FC only)

6 Credits 600/700 Level
3 Credits 600/700 Level
6 Credits Max 600/700 Level

Open Option 1
Open Option 1
Open Option 1

3 Credits ECE Major 700 Level
3 Credits ECE Minor 1 700 Level
3 Credits Open Minor 2 700 Level

6 Credits ECE Major 600/700
3 Credits ECE Minor 1 600/700
3 Credits Open Minor 2 600/700

6 Credits ECE Major 700 Level
3 Credits ECE Minor 1 700 Level
3 Credits Open Minor 2 700 Level

Transfer Credits (Overall allowed 15 cr.):
1. Max. 6 credits in MS prog. and Max. 9 credits in PhD prog. from another regionally accredited university;
2. 15 cr. Max of UNLV course credits
Appendix B

ECE Graduate Document (excerpt) -

ECE Graduate Program Objectives, Outcomes, and Assessments
Section 2.0 - Overall and Specific Degree Program Objectives, Outcomes, and Assessments

The Department of Electrical and Computer Engineering offers graduate programs which culminate in M.S. and Ph.D. degrees in Electrical Engineering. Throughout this document, the Master of Science in Electrical Engineering and Doctor of Philosophy in Electrical Engineering are abbreviated as MSEE (M.S.E.E.) and PhD (Ph.D.) respectively. These programs strive to provide a learning centered environment where accomplished faculty share their experience and knowledge with students so that graduates of the program can

1. Demonstrate strong technical knowledge in their field of study with the potential to lead and direct engineering and scientific teams.
2. Demonstrate the ability to learn independently and generate new knowledge in their chosen field of study.
3. Reach the highest academic level with the potential to become a leader and an authority in Electrical and Computer Engineering.

MSEE Program – Course Only Option (All Corresponding Tracks)

Objective:
The M.S. in Electrical Engineering non-thesis program strives to provide a learning centered environment where accomplished faculty share their experience and knowledge with students so that graduates of the program can

1. Demonstrate strong technical knowledge in their field of study with the potential to lead and direct engineering and scientific teams.

Outcome:
Graduates of the program will

1. Demonstrate a strong technical knowledge in chosen electrical engineering field by passing a comprehensive exam in the student's major area of study near the completion of the degree program.

Assessment:
1. Comprehensive exam
2. Exit interview

MSEE Program – Thesis Option (All Corresponding Tracks)

Objective:
The M.S. in Electrical Engineering thesis program strives to provide a learning centered environment where accomplished faculty share their experience and knowledge with students so that graduates of the program can

1. Demonstrate strong technical knowledge in their field of study with the potential to lead and direct engineering and scientific teams.
2. Demonstrate the ability to learn independently.

Outcome:
Graduates of the program will

1. Demonstrate strong technical knowledge in electrical engineering field by successfully completing course work and integrating knowledge learned in their course work into a thesis.
2. Demonstrate the ability to learn independently by completing a creative or research project and reporting on this activity in a thesis which should include
   2.1. A hypothesis (or hypotheses)
2.2. A motivation
2.3. A set of objectives and goals
2.4. A critical literature review
2.5. A theoretical, experimental and/or modeling study
2.6. A conclusion

3. Demonstrate the ability to communicate technical information orally and in writing at an acceptable level of proficiency.

Assessment:
1. Thesis defense (oral exam)
2. MS thesis
3. Exit interview

Ph.D. Program (All Track Options)

Objective:
The Ph.D. in Electrical Engineering program strives to provide a learning centered environment where accomplished faculty share their experience and knowledge with students so that graduates of the program can

1. Demonstrate strong scientific and technical knowledge in their field of study capable to lead and direct engineering and scientific teams.
2. Demonstrate the ability to learn independently and generate new knowledge in their chosen field of study.
3. Reach the highest academic level with the potential to become a leader and an authority in Electrical Engineering.

Outcome:
Graduates of the program will

1. Demonstrate strong technical knowledge in electrical engineering field by successfully completing course work, by passing a qualifying exam and a comprehensive exam, and by integrating knowledge learned in this course work into a dissertation.
2. Demonstrate the ability to learn independently and generate new knowledge by completing creative novel work and reporting on this work in a dissertation which should include
   2.1 A hypothesis (or hypotheses)
   2.2 A motivation
   2.3 A set of objectives and goals
   2.4 A critical literature review
   2.5 A theoretical, experimental and/or modeling study
   2.6 A conclusion
3. Demonstrate the ability to communicate technical information both orally and in writing at an acceptable level of proficiency by completing a well written dissertation and presenting the work in their dissertations during an oral dissertation exam.

Assessment:
1. Qualifying Exam
2. Comprehensive Exam
3. Preliminary Exam
4. Final Exam (Oral Defense)
5. Ph.D. Dissertation
6. Exit interview