Marquette University
Learning Assessment Plan

Electrical and Computer Engineering

Program: Electrical Engineering
Degree: B.S.
Date Submitted: April 28, 2006, Updated: 2/18/08, 09/18/12, 1/7/13

Program Learning Outcomes

<table>
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<tr>
<th>Electrical Engineering graduates will have ....</th>
<th>Performance Indicators (What would you see if the student has learned?)</th>
<th>Measures (What is the measure and where, how, and when is data collected?)</th>
<th>Use of the Information (Who collects and compiles, who reviews)</th>
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<tbody>
<tr>
<td>An ability to apply knowledge of mathematics, science and engineering (ABET outcome 3A)</td>
<td>(1) Chooses a mathematical model or scientific principle that applies to an engineering problem, but has trouble in model development (2) Shows nearly complete understanding of applications of calculus and higher mathematics in solving engineering problems (3) Most mathematical terms are interpreted correctly (4) Some gaps in understanding the application of theory to the problem (5) Minor errors in calculations by hand and applying math software</td>
<td>1. Senior Design Project Report 2. ELEN 3035 lab report 3. EBI exit survey</td>
<td>1. (Spring – even semesters) Collection – Senior Design Instructors &amp; Course Coordinator Compilation – EECE-UGC Review – EECE-UGC and college senior design team 2. (Fall Even Semesters) Collection/compilation – ELEN 3035 instructors &amp; course coordinator Review – ELEN 3035 instructional team and EECE-UGC 3. (Spring annually) Collection/Compilation – CoE Assoc Dean for Academics Program Compilation – EECE Department Chair (or designate) Review – EECE-UGC</td>
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<td>An ability to design and conduct experiments, as well as to analyze and interpret data (ABET outcome 3B)</td>
<td>(1) Observes good lab safety procedures. (2) Experimental procedure often followed, occasional oversight leads to loss of efficiency (3) Can formulate reasonable experimental plan; carefully documents data collected. (4) Can select and operate appropriate equipment and instruments with minimal guidance. (5) Analyzes and interprets data using appropriate theory; accounts for some measurement error statistically.</td>
<td>1. EECE 3015 formal lab report 2. ELEN 3025 report 3. EBI exit survey</td>
<td>1. EECE 3015 (Spring – even semesters) Collection/Compilation – EECE 3015 instructors &amp; Course Coordinator Review – EECE 3015 instruction team and EECE-UGC 2. (Fall – even semesters) Collection and Compilation – ELEN 3025 instructors &amp; Course Coordinator Review – EECE 3025 instruction team and EECE-UGC 3. (Spring annually) See 3A items 3</td>
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| An ability to design a system, component, or process to meet desired needs (ABET outcome 3C) | (1) Employs an existing design strategy with minimal changes  
(2) Develops a few alternate solutions; technique for choosing among them is presented  
(3) Applies some engineering and science principles  
(4) Some use of computer tools and other resources  
(5) Documentation of design procedure is incomplete; references are minimal  
(6) Some consideration of economic, safety, and environmental constraints  
(7) Practicality of solution is not well demonstrated  
(8) Follows an existing approach  
(9) Ideas are somewhat integrated  
(10) Sees just the forest or just the trees | 1. Senior Design Proposal Document (customer needs, implementation plan, standards/codes)  
2. Senior Design Final Report  
3. EBI exit survey | (1 and 2) – Fall Even semesters and subsequent Spring semester  
Collection – Senior Design instructors and Course Coordinator  
Compilation – EECE-UGC  
Review – College Senior Design Team and EECE-UGC  
3. (Spring annually) See 3A item 3 |
| An ability to function on multidisciplinary teams (ABET outcome 3D) | (1) Regularly participates in task definition and organization discussions with meaningful information  
(2) Recognizes the need for all defined project tasks. Accepts responsibility and leads team on individual tasks.  
(3) Performs all assigned tasks in a timely manner. Requests help when needed to accomplish their own assigned task in a timely manner. Helps other team members on specific tasks in their areas of expertise when asked.  
(4) Contributes existing skills to team to help reach project goals.  
(5) Evidences personal responsibility through participation in team meetings, makes valuable contributions to project completion.  
(6) Has good knowledge of own discipline and some knowledge of other disciplines. Interested in and can generally follow discussions with extra-disciplinary teammates or customers.  
(7) Respects all team members, is considerate and cooperative.  
(8) Always listens and speaks appropriately, never argues inappropriately with teammates.  
(9) Shares both credit for success and accountability for team results with their team members. Does not blame others when things go wrong. | 1. Senior Design Team Metrics (peer reviews, salary planning, task distribution, conflict resolution)  
2. EBI exit survey | (1) Fall Odd and subsequent Spring Even semesters  
Collection/Compilation – Senior Design instructors and Course Coordinator  
Review – College Senior Design Team and EECE-UGC  
2. (Spring annually) See 3A item 3 |
| An ability to identify, formulate, and solve engineering problems (ABET outcome 3E) | (1) Has a vision of the whole problem, and has some strategies for problem solving.  
(2) Connects theoretical concepts to practical problem-solving when prompted and is beginning to integrate previous knowledge and new information.  
(3) Demonstrates solution with integration of diverse concepts with useful relationships and connects theoretical concepts to practical problem solving. | 1. Senior Design Project Report (project definition, etc.)  
2. EBI exit survey – Q53-55 | 1. Spring Even semesters  
Collection – Senior Design instructors & Course Coordinator  
Compilation – EECE-UGC  
Review – College Senior Design Team and EECE-UGC  
2. (Spring annually) See 3A item 3 |
### An understanding of professional and ethical responsibility
(ABET outcome 3F)

| (1) | Is aware of professional standards.
| (2) | Recognizes when major ethical issues are present. Does not participate in unethical activity.
| (3) | Participates in team efforts, does what is required.
| (4) | Is able to listen to other viewpoints and tries to maintain a fair and objective perspective.

1. Senior Design Project Report (standards, constraints, etc.)
2. Ethical: Academic Honesty Stats
3. EBI exit survey
4. Spring Odd Semesters
   Collection/compilation - Senior Design instructors & Course Coordinator
   Review – College Senior Design Team and EECE-UGC

### An ability to communicate effectively
(ABET outcome 3G)

1. Oral: Senior Design Presentations
2. Senior design reports (team communication)
3. Written: ECE 3015 formal lab report
4. Written: ELEN 3035 formal lab report
5. Oral: ELEN 3035 project presentation
6. EBI exit survey

1. Oral: Senior Design Presentations
2. Senior design reports (team communication)
3. Written: ECE 3015 formal lab report
4. Written: ELEN 3035 formal lab report
5. Oral: ELEN 3035 project presentation
6. EBI exit survey
7. Spring Odd Semesters
   Collection/compilation - Senior Design instructors & Course Coordinator
   Review – College Senior Design Team and EECE-UGC

### The broad education necessary to understand the impact of engineering solutions in a global and societal context
(ABET outcome 3H)

| (1) | Global impact: is aware of current and future impact on user; some consideration of potential for broader impact on others.
| (2) | Economic impact: is aware of immediate economic impact; some consideration of long term economic impact.
| (3) | Environmental impact: is aware of current environmental impact; some consideration of broader environmental impact.
| (4) | Societal impact: is aware of the basic risks and benefits to society; some consideration of broader societal impact.

1. Senior Design Project Report
2. UCCS curriculum completion
3. Alumni survey
4. EBI exit survey
5. Spring, even semesters
   Collection – Senior Design instructors & Course Coordinator
   Compilation and Review – EECE UGC
6. Triennially
   Collection and Compilation – Department Chair (or designated representative)
   Review – EECE Goals Committee, EECE-UGC, EECE Program Advisory Committee
7. See 3A – item 3
The recognition of the need for, and an ability to engage in lifelong learning (ABET outcome 3I) (level 3 performance)

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<td>(1) Needs some guidance to start a task or project.</td>
<td>(2) Completes all required work, occasionally seeks information from outside sources to enhance both classroom learning and quality of submitted assignments.</td>
<td>(3) May exhibit difficulty transferring materials and/or concepts from one format to another – (different nomenclature.)</td>
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<td>(4) Occasionally participates in the activities of professional and technical societies available to students</td>
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<td>1. Alumni survey</td>
<td>1. Triennially Collection and Compilation – Department Chair (or designated representative) Review – EECE Goals Committee, EECE-UGC, EECE Program Advisory Committee</td>
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<td>2. EECE 2030 self-paced instruction course statistics</td>
<td>2. Fall, even semesters Collection/Compilation – EECE 2030 instructors &amp; Course Coordinator Review – EECE-UGC</td>
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<td>3. EBI exit survey</td>
<td>3. See 3A – item 3</td>
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A Knowledge of contemporary issues (ABET outcome 3J)

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<td>(1) Effect of Politics on Engineering: aware of government regulations or impact of political decisions on engineering solutions</td>
<td>(2) Effects of Technology Trends: aware of future impact of present work</td>
<td>(3) Societal/Cultural Norms wrt Engineering solutions: Consideration given to impact of engineering solution on existing s/c norms.</td>
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<td>(4) Diversity in Engineering: aware of diversity issues within work performed</td>
<td>(5) Job Market: aware economic forces and their impact on the profession.</td>
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<td>1. Senior Design Project – Final Reports (1, 2, 3, standards, constraints, etc.)</td>
<td>1. Spring, even semesters Collection –Senior Design instructors &amp; Course Coordinator</td>
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<td>2. Specific UCCS components with contemporary issue content</td>
<td>Compilation – EECE-UGC</td>
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<td>3. EBI exit survey</td>
<td>Review – College Senior Design Team and EECE-UGC</td>
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<td>Collection and Compilation – Department Chair (or designated representative) Review – EECE-UGC</td>
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<td>4. Pilot Spring 2013 – essay in EECE 2035</td>
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<td>Collection, compilation – EECE 2035 instructor Review – EECE-UGC</td>
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<td>3. See 3A – item 3</td>
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An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (ABET outcome 3K)

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<td>(1) Knows what tools are generally available and is competent to use them at a basic level.</td>
<td>(2) Can usually identify tools that might fit a particular problem or project.</td>
<td>(3) Has average computer skills.</td>
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<td>(4) Is able to find some relevant information for application to a problem.</td>
<td>(5) Is able to eventually learn new tools and skills, but is sometimes inefficient and uncomfortable doing so.</td>
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<td>1. EECE 2015/2035 (Multisim, test and measurement equipment)</td>
<td>1. Fall Odd semesters and subsequent Spring even semester Collection/Compilation – EECE 2015/2035 instructors &amp; Course Coordinator Review – EECE 2015/2035 Instructional Team and EECE-UGC (competency exam, practical exam, lab reports).</td>
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<td>2. ELEN 3025 (Labview)</td>
<td>2. Fall Even semesters Collection/Compilation – ELEN 3025 Course Instructors Review – ELEN 3025 Instructional Team and EECE-UGC</td>
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<td>3. EBI Exit survey</td>
<td>3. See 3A – item 3</td>
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