WASHINGTON STATE UNIVERSITY  
School of EECS  
Electrical Engineering Course Assessment Report  

Course Number EE 352  
Course Title Electrical Engineering Laboratory  
Semester Offered Fall 2006  
Instructor Hudson  

10th Day Enrollment 10  Number Completing Successfully (C grade or better) 9  

I. Assessment Outcomes from the Course Syllabus  

☑ (A) Ability to apply knowledge of mathematics, science and engineering.  
☑ (B) Ability to design and conduct experiments as well as analyze and interpret data.  
☑ (C) Ability to design a system, component, or process to meet desired needs.  
☑ (D) Ability to function on multidisciplinary teams.  
☐ (E) Ability to identify, formulate, and solve engineering problems.  
☐ (F) An understanding of professional and ethical responsibility.  
☐ (G) Ability to communicate effectively in written and oral formats.  
☐ (H) A broad education necessary to understand the impact of engineering solutions in global, economic, and societal context.  
☐ (I) Recognize the need for, and have the ability to engage in lifelong learning.  
☐ (J) Have a broad education and knowledge of contemporary issues.  
☑ (K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.  

II. List of Course Topics from the Course Syllabus  
1. Laboratory and equipment familiarization  
2. Operational Amplifiers – characteristics and filters  
3. Diode characteristics, PSPICE, and circuits  
4. BJT characteristics, model and circuits  
5. MOSFET characteristics and circuits  
6. Circuit analysis: steady state and transient behavior of RLC networks, frequency response  
7. Design project
### III. Course Assessment Summary Table: one row of the table should be devoted to each of the checked outcomes in part I.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Topics</th>
<th>Specific Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Ability to apply knowledge of mathematics, science and engineering.</td>
<td>1-7</td>
<td>Lab assignments.</td>
</tr>
<tr>
<td>(B) Ability to design and conduct experiments as well as analyze and interpret data.</td>
<td>2-7</td>
<td>Lab assignments required students to make measurements and analyze and interpret data.</td>
</tr>
<tr>
<td>(C) Ability to design a system, component, or process to meet desired needs.</td>
<td>7</td>
<td>Last few lab assignments involved design of a 10-W class-AB audio amplifier.</td>
</tr>
<tr>
<td>(D) Ability to function on multidisciplinary teams.</td>
<td>7</td>
<td>Audio amplifier labs required thermal calculations for heat sink sizing</td>
</tr>
<tr>
<td>(G) Ability to communicate effectively in written and oral formats.</td>
<td>2-7</td>
<td>All lab assignments required submission of a lab writeup.</td>
</tr>
<tr>
<td>(J) Have a broad education and knowledge of contemporary issues.</td>
<td>2-7</td>
<td>Students were exposed to a wide range of electronics-related topics</td>
</tr>
<tr>
<td>(K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.</td>
<td>2-7</td>
<td>Most lab assignments involved simulation with SPICE before building circuits and taking measurements.</td>
</tr>
</tbody>
</table>
IV. Using the table as a guide, for each outcome summarize your evaluation of the students’ achievement of that outcome; cite student performance on the identified measures as evidence to support your conclusions.

(A) An ability to apply knowledge of mathematics, science and engineering:

All students displayed an adequate ability to apply required concepts. Some students needed guidance and prompting to make the connection to the theory they had learned in 311 and/or 321.

(B) Ability to design and conduct experiments as well as analyze and interpret data:

All lab assignments required students to make measurements and analyze and interpret data. Most of the labs had step-by-step prompts to guide the students. Students were uniformly able to complete these assignments. Some of the labs had more open-ended requests requiring the students to figure out what measurements to make and how to make them. The stronger students were able to do these tasks on their own while a few of the weaker students needed some additional guidance from the instructor.

(C) Ability to design a system, component, or process to meet desired needs.

The last few lab assignments involved the design of a 10-W class-AB audio amplifier. All students were able to complete these labs although the effectiveness of the designs varied from student to student.

(D) Ability to function on multidisciplinary teams

Students in the class are all electrical engineering students, so this outcome would not seem to really apply to this course. The last few labs involved the design of a 10-W audio amplifier. One component of this was understanding thermal resistance and heat flow for the purpose of sizing a heat sink. One might argue that this is "multidisciplinary" in a rather tangential sense.

(G) Ability to communicate effectively in written and oral formats

Each lab assignment required submission of a formal lab report in electronic form. Writing skills varied. In particular, a few students whose first language was not English struggled with grammar. Overall student writing was adequate to convey the information asked for.

All labs required students to demonstrate their results to the instructor. In doing so I was able to access their oral communication skills somewhat. I felt that at this informal level at least the students were able to adequately express themselves.
(J) Have a broad education and knowledge of contemporary issues

Students were exposed to a wide range of electronics-related topics in the labs. I'm not sure this qualifies as coverage of "contemporary issues," and this outcome is probably not well measured in this course.

(K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices

Most lab assignments involved simulation with SPICE before building circuits and taking measurements. All students were able to successfully perform the simulations. Some students required input from the instructor or other students while the strongest students were able to work independently.

V. Qualitative Assessment of Student Performance: using the arguments above and other data support the claim that students who completed this course with a grade of C or better have achieved each of the intended outcomes of this course.

Overall the students performed well in this course and really enjoyed the hands-on aspect. Since there are no time limitations (students have around-the-clock access to the lab) students can make mistakes, ask for help and try again. Therefore, it is not surprising that eventually they were all able to complete all tasks. I was pleased with their uniformly high motivation level. To a large extent circuits work or they don't, and, since students worked independently on all labs, successful completion of each lab served as a fairly reliable measure of outcomes.

VI. Concerns: state any concerns you may hold about this class – were the students adequately prepared coming into it? Are there topics or outcomes where (some) students were weak after completing the course? Other concerns? Were there any comments on students’ course evaluations that should be addressed in future instances of the course? This section is very important for improving our program: it provides critical input to the curriculum committee for identifying areas requiring attention.

I do not feel that the students in this class are ready for open-ended design problems. I believe the focus of this course should be learning to work in a laboratory environment and making the connection between the theory students have learned in their lecture courses and the real-world behavior of electronic systems.

I believe that Outcome D (ability to function on multidisciplinary teams) and Outcome J (have a broad education and knowledge of contemporary issues) are not fully relevant to this course and should be dropped from the list of measured outcomes.

Signature: Scott Hudson Date: 2007-05-11