Washington State University
School of EECS
Electrical Engineering Course Assessment Report

Course Number  EE 321
Course Title  Circuits II
Semester Offered  Fall 2005
Instructor  T. Garlick
10th Day Enrollment 5  Number Completing Successfully (C grade or better) 5

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. Circuit analysis review
2. State variable analysis of linear systems
3. Laplace Transform, Inverse Laplace Transform
4. Relationship between Laplace domain and time domain, convolution
5. System poles, zeros
6. Laplace transform in circuit analysis
7. Transfer functions
8. Frequency response, passive and active frequency selective circuits, Bode plots
9. Fourier series with circuit applications
10. Two-port networks
11. Mutual inductance
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>1-11</td>
<td>Final exam</td>
</tr>
<tr>
<td>(C) Ability to design a system, component, or process to meet desired needs.</td>
<td>8</td>
<td>Final exam, problem 1</td>
</tr>
<tr>
<td>(E) Ability to identify, formulate, and solve engineering problems.</td>
<td>2-8</td>
<td>Homework assignment 13</td>
</tr>
<tr>
<td>(G) Ability to communicate effectively in written and oral formats.</td>
<td>1-8</td>
<td>Homework assignment 13</td>
</tr>
<tr>
<td>(K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.</td>
<td>2-8</td>
<td>Homework assignment 11, problems 16.23 and 16.25</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) Ability to apply knowledge of mathematics, science and engineering.

Essentially all homework and exam problems require students to apply knowledge of mathematics, science and engineering. Due to the control the instructor has over the environment in which they are completed, exams form a more rigorous assessment tool than homeworks. I have therefore chosen the final exam as a specific measure for Outcome (A). Scores on the final ranged from 76% to 95% with a mean of 86%. Based on these scores I conclude that students achieved this outcome.

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

Problem 1 on the final exam asked students to design a high-pass filter with given specifications. Students scores on this problem ranged from 15/20 to 20/20. Based on these scores I conclude that students achieved this outcome.

(E) Ability to identify, formulate, and solve engineering problems.

I chose one homework assignment as a specific measure of this outcome. On homework assignment 13 the class average was 95% indicating an overall ability to solve engineering problems. In a lecture/theory course such as 321 students don’t really do much with the “identify” and “formulate” part of this outcome.
(G) Ability to communicate effectively in written and oral formats.

I again chose homework assignment 13 as evidence of student ability to communicate in a written format. Based on their average score of 95% they were able to effectively convey their answers in writing.

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

I chose two specific homework problems that required students to use SPICE to verify the performance of a frequency selective circuit and to compare that to the analytic results they obtained using Fourier series. The average score on this assignment was 80% indicating a reasonable achievement of the outcome.

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.

I felt that all students achieved these five outcomes at at least a minimally acceptable level of performance. The lowest course grade was C+.

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.

Students are not as fluent with Matlab/Scilab as I would like. Ideally they would be able to quickly produce code to simulate and check analytic solutions or brainstorm solutions to difficult problems and so see this tool as an aid and a time saver. Instead they tend to see programming as a challenging task. More homework problems devoted specifically to programming could help overcome this. Given the small class sizes we typically have, it should be feasible to include programming problems on at least one of the exams. This would provide a more rigorous assessment tool.

Signature Todd Garlick

Date: 2007-05-11

Please email a copy of the completed form to Patricia Arnold, patricia@eecs.wsu.edu and deliver a signed hardcopy to her mailbox.