Washington State University
School of EECS
Electrical Engineering Course Assessment Report

Course Number  EE 321
Course Title  Circuit Analysis II (EE 321)
Semester Offered: Fall 2006
Instructor  S.Roy
10th Day Enrollment 31  Number Completing Successfully (C grade or better) 26

I. Assessment Outcomes from the Course Syllabus

☑ (A) ABET Outcome: Ability to apply knowledge of mathematics, science and engineering.

Ability to perform complex-frequency domain analysis of linear, lumped parameter circuits using Laplace transform techniques. Ability to perform steady-state sinusoidal analysis of linear, lumped-parameter circuits. Understanding of the relationship between time-domain, complex frequency domain, and frequency domain techniques. Ability to analyze passive and active frequency-selective circuits. Understanding of the effect of system poles and zeros on the transient response and frequency response of systems. Understanding of Fourier series and their application in circuit analysis. Ability to analyze two-port circuits. Complete a class project designed to introduce the student to more advanced topics in the field of system analysis and document the results of the project.

☑ (G) ABET Outcome: Ability to communicate effectively in written and oral formats.

Complete a class project designed to introduce the student to more advanced topics in the field of system analysis and document the results of the project.

☐ (B) ABET Outcome: Ability to design and conduct experiments as well as analyze and interpret data.
(C) ABET Outcome: Ability to design a system, component, or process to meet desired needs:

Ability to design and analyze passive and active frequency-selective circuits.

(D) ABET Outcome: Ability to function on multidisciplinary teams.

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

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Ability to perform computer-aided time domain analysis of linear, lumped parameter circuits using state variable methods. Ability to use computer tools (Matlab) to perform circuit analyses in the time and frequency domain, and enhance understanding of the underlying concepts. Complete a class project designed to introduce the student to more advanced topics in the field of system analysis and document the results of the project.

(F) ABET Outcome: An understanding of professional and ethical responsibility.

II. List of Course Topics from the Course Syllabus

1. Circuit analysis review (1)
2. State variable analysis of linear systems (3)
3. Laplace Transform, Inverse Laplace Transform (5)
4. Relationship between Laplace domain and time domain, convolution (5)
5. System poles, zeros (1)
6. Laplace transform in circuit analysis (5)
7. Transfer functions (2)
8. Frequency response, passive and active frequency selective circuits, Bode plots (8)
9. Fourier series with circuit applications (6)
10. Two-port networks (1)
11. Mutual inductance (2)

Textbooks/References:

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 (Samples should be available in the course materials file for inspection.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) ABET Outcome: Ability to apply knowledge of mathematics, science and engineering.</td>
<td>1-11</td>
<td>Homework exercises, computer exercises, both parts of the project, exam</td>
</tr>
<tr>
<td>(C) ABET Outcome: Ability to design a system, component, or process to meet desired needs.</td>
<td>8</td>
<td>HW 6-9, exam 3, final, projects</td>
</tr>
<tr>
<td>(E) ABET Outcome: Ability to identify, formulate, and solve engineering problems.</td>
<td>6,8,9</td>
<td>Both the analysis and the design parts of the project</td>
</tr>
<tr>
<td>(G) ABET Outcome: Ability to communicate effectively in written and oral formats.</td>
<td>1-11</td>
<td>Project reports, selected test questions</td>
</tr>
<tr>
<td>(K) ABET Outcome: Ability to use techniques, skills and modern engineering tools necessary for engineering practices.</td>
<td>2-5, 7-9</td>
<td>Both the analysis and the design parts of the project</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.
All passing students achieved this outcome, as evidenced by their responses and performance on homework and exams, as well as their work on both the modeling and design project.

(C) Ability to design a system, component, or process to meet desired needs.
The students passing the course successfully completed design-focused tasks (specifically, filter design tasks) in homework, exams, and the project.

(E) Ability to identify, formulate, and solve engineering problems.
The students’ work on both the analysis and the design aspects of the project, as well as on some broader final-exam problems, demonstrate their ability to solve engineering problems. Of
particular note, in approaching the broad filter design task in the project, the students needed to
identify performance metrics and build circuits to match these metrics.

(G) Ability to communicate effectively in written and oral formats.
The students’ written reports for both projects, as well as their answers to various discursive
homework problems (see for example HW 10) highlight their ability to communicate effectively
in written and oral formats.

(K) Ability to use techniques, skills and modern engineering tools necessary for engineering
practices.
All students used the Matlab simulation program for the project, and also were tested on use of
Matlab on the final.
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.

We strongly believe that students who completed this course with a grade of C or better have
achieved the intended ABET outcomes for this course. Our discussion of each outcome above
supports that all students have been given multiple opportunities to demonstrate their competence
in each area above, and have had to demonstrate competence in order to pass the class. The
students’ achievement of the outcomes is reflected, especially, by their work on the final exam in
the class. In particular, the students have demonstrated through the final that they are able to
assimilate notions from various parts of the course, indicating that they have gained the
perspective on the subject required by ABET, and not simply a procedural understanding of
topics in the field.

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 have one main concern regarding the course:

1. Several students were inadequately prepared for the course in terms of their mathematical
background and maturity. Unfortunately, in my opinion, it appears that these students were able
to complete earlier mathematics and engineering courses with only a formulaic understanding of
fundamental topics (including calculus), and did not have a good conceptual understanding (e.g.,
they may be unable to interpret a time-derivative).

Signature ______________________________________ Date: _______________________

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