Course Outcomes Guide (COG)

Course Title: EGR 208 Systems and Circuits **Date:** May 10, 2019

Course Team: Ed Sigler

Expected Learning Outcomes

1. Apply knowledge of mathematics, science, and engineering.
2. Apply calculus and differential equation techniques to circuit analysis
3. Identify, formulate and solve basic resistive and RLC circuit problems.
4. Use the techniques, skills, and modern engineering tools necessary for successful practice.
5. Design and conduct experiments and interpret analysis results

Assessment

The assessment for the course common mid-term and final exams administered to all sections of EGR 208. The problem types and complexity are maintained as constant as possible across semesters to track per class variations. Students are assessed on the following capabilities:

1. Analysis of resistive networks
2. Computation of Thevenin and Norton equivalent circuits
3. Analysis of circuits with operational amplifiers
4. Analysis of circuits with one or two energy storage devices and compute complete response
5. Analysis of resistive and active component networks and determine frequency response
6. Computation of AC circuits and determine frequency response
7. Determination of 1st and 2nd order filter responses
8. Analysis of Transformers
9. Analysis of low-pass, high-pass and band-pass filters and determining frequency response.
10. Laboratory experiments in resistive, LC, RLC, operation amplifiers transformers and filter networks.

Validation

Learning outcomes are assessed through homework problems, midterm exams, and the final exam. Common questions for each exam are given to each section of the course. Data collected from these exams will be used to identify areas of weakness and to adjust instruction accordingly.

Results

EGR 208 began as a seminar course. The first lecture course was conducted Fall 2015. Courses are conducted in the Spring Semester. Significant time and energy were devoted to development of lab activities that would complement and emphasize material covered in lectures. The labs are structured for materials to be covered in lecture prior to coverage as part of lab experiments.

Major Findings

Spring 2017:

- Equipment failures for frequency counters and Labvolt trainer kits were problematic. New frequency counters and digital oscilloscopes were purchased that should improve the quality of the labs.
- Improve coverage of RLC circuit solutions with forcing functions
- Improve determining Thevinin and Norton equivalent circuits in the frequency domain
- Students performed well with operational amplifier circuits and steady-state phasor analysis
- Significant time and energy were devoted to development of lab activities that would complement and emphasize material covered in lectures. The labs are structured for materials to be covered in lecture prior to coverage as part of lab experiments. Students were very positive on reinforcement of lecture concepts with lab experiments.

Spring 2018:

- Class was held as a tutorial due to low enrollment: Met with students for 1.5 hours per week and also held lab concurrent with physics lab. Made class difficult for students and instructor.
- Course should NOT be held as a tutorial due to a) complexity and b) lab requirement
- New oscilloscopes and frequency generators made labs less problematic.
- Material coverage similar to lecture courses. Similar exam complexity. Score averages comparable to lecture exam scores.

Spring 2019:

- Class was held with 4 students. Three were academically strong.
- New oscilloscopes and frequency generators made labs less problematic.
- All course material was covered in lecture with reinforcement in lab.
- EGR 208 is a difficult course due to complexity and volume of material. Students must put in a significant amount of time outside of lecture to understand and master concepts.
- RLC circuits solutions (natural+forced = total solution) were most difficult as in previous semesters. Most other concepts were well-grasped by the students.

Follow-up

The course (Lecture) will be adjusted to reflect the degree of difficulty for material. Resistive network coverage was be shortened to allow for deeper coverage of RCL circuit response, phasors, transformers and filter responses. However, resistive network analysis concepts are very important for sinusoidal analysis (Phasor/impedance) – node voltage/mesh circuit/Thevenin equivalence/etc.

I plan to add more worked examples and in-class group work on important concepts.

Budget Justification

No additional budget is required for this class.

Course: EGR 208 **SLOA Data** **Faculty Team: E. Sigler**

	FA 2015	SP 2016	FA 2016	SP 2017	FA 2017	SP 2018	FA 2019	SP 2019
# Active students	6	N/A	N/A	10	N/A	3	N/A	4
%W	0			0		0		0
*# walk-away Fs No final exam/grade = F	2			2		0		0
% Success (A,B,C)	66.7%			80%		75%		4
Common Comprehensive Final Exam Score Average	79.3%**			76.3%**		73.8**		73.1%
Mean course grade***	2.33			2.3		2.00		3.0
Item Analysis **Weakest Content Areas**				See SP 2017 Findings		Frequency Domain analysis of circuits.		RLC Total solution; Complex power

*% Walk-away Fs = Did not take the final exam and received a grade of F.

** - Final exam scoring is curved

*** - Mean Course Grade includes walk-away Fs