Revised Fall 2016

EGR 251
Basic Electric Circuits I

COURSE OUTLINE

Prerequisites:

MTH 176 and MTH 178

Co-requisite:

EGR 255 – Electric Circuits Laboratory

Course Description:

Teaches fundamentals of electric circuits. Includes circuit quantities of charge, current, potential, power, and energy. Teaches resistive circuit analysis; Ohm's and Kirchhoff's laws; nodal and mesh analysis; network theorems; RC, RL, and RLC transient response with constant forcing functions. Teaches ac steady-state analysis.

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Semester Credits: 3 Credits **Lecture Hours:** 3 Hours **Lab/Recitation Hours:** 0 Hours

EGR 251 - Basic Electric Circuits I

Course Outcomes

At the completion of this course, the student should be able to:

1. Know basic circuit variables and associated units.
2. Know and apply Kirchhoff's and Ohm's laws.
3. Use parallel and series equivalents to analyze resistive circuits.
4. Analyze, design, and use voltmeters, ammeters, and ohmmeters.
5. Understand and apply node-voltage and mesh-current circuit analysis.
6. Find Thevenin and Norton equivalent circuits.
7. Analyze circuits containing dependent sources.
8. Analyze and design circuits containing operational amplifiers.
9. Understand energy storage elements: inductors and capacitors.
10. Analyze and design simple first- and second-order circuits.
11. Understand the properties of sinusoidal signals and phasors.
12. Analyze steady-state ac circuits.
13. Use PSpice to simulate electric circuits.

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Required Materials:

Scientific Calculator (i.e. TI-89 Calculator)

Textbook:

Electric Circuits, 10th Edition, Revised Printing by James W. Nilsson, 2015,
Pearson Prentice Hall, Inc., Upper Saddle River, N.J.
ISBN: 9780133875904

The following supplementary materials are available:

1. PSpice Circuit Analysis Software
2. Matlab Software
3. Microsoft Word and Excel Software

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Topical Description:

Week	Topic	Text	Tests
1	Voltage, current, power and energy; SI units	Chapter 1	
2	Independent and dependent sources, Ohm's and Kirchhoff's laws	Chapter 2	
3	Series/Parallel circuits; voltage/current dividers	Chapter 3.1-3.4	
4	Instrumentation; Wheatstone Bridge; transformations	Chapter 3.5-3.7	
5	Network topology; node-voltage and mesh-current circuit analysis methods	Chapter 4.1-4.7	Test 1
6	Node-voltage vs. mesh-current; source transforms; max power; superposition	Chapter 4.8-4.13	
7	Operational amplifiers and their model	Chapter 5.1-5.2	
8	Operational amplifier circuits	Chapter 5.3-5.7	
9	Energy storage elements; capacitors and inductors	Chapter 6	
10	First-order RL and RC circuits; natural response and step response	Chapter 7.1-7.3	Test 2
11	First-order RL and RC circuits; general solution	Chapter 7.4-7.7	
12	Second-order RLC circuits; natural response and step response	Chapter 8	
13	Sinusoidal steady-state circuit analysis and phasors	Chapter 9.1-9.4	
14	Circuit analysis using phasors	Chapter 9.5-9.12	
15	Course review		Test 3

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	FINAL EXAM		

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Notes to Instructors:

1. Must cover dc circuit analysis and theorems.

2. Must introduce students to solutions of first- and second-order differential equations.

3. Must cover transient analysis (first- and second-order RL, RC and RLC circuits with constant forcing functions).

4. Must introduce students to ac circuit analysis.

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