# Virginia Western Community College EGR 251 Basic Electric Circuits I

#### **Prerequisites**

MTH 264

Co-requisite

**EGR 255** 

### **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 circuit transient response with constant forcing functions. Teaches AC steady-state analysis, power, and three-phase circuits. Presents frequency domain analysis, resonance, Fourier series, inductively coupled circuits, Laplace transform applications, and circuit transfer functions. Introduces problem solving using computers.

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

#### **Required Materials**

#### Textbook:

<u>Electric Circuits Plus Mastering Engineering</u>, 10<sup>th</sup> Edition, Author: James W. Nilsson, Publisher: Pearson Prentice Hall, ISBN# 9780133875904

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#### **Other Required Materials:**

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

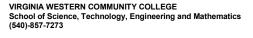
#### The following supplementary materials are available:

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

#### **Course Outcomes**

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

- 1. Know basic circuit variables and associated units.
- 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.
- 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.





Revised Fall 2017

**Topical Description** 

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

## **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
- 5. Final exam is worth 25% of the course grade.

