

## COURSE OUTLINE

Revision: Mike Steffancin, February 2008

DEPARTMENT:	Academic Programs
CURRICULUM:	Engineering
COURSE TITLE:	Electrical Circuits
COURSE NUMBER:	ENGR& 204
TYPE OF COURSE:	Academic Transfer
COURSE LENGTH:	1 quarter
CREDIT HOURS:	5
LECTURE HOURS:	55
LAB HOURS:	0
CLASS SIZE:	24
PREREQUISITES:	PHYS& 222 and MATH& 152

## COURSE DESCRIPTION:

Basic circuits and systems concepts. Resistors, sources, capacitors, inductors and operational amplifiers. Solutions of first and second order linear differential equations associated with basic circuit forms.

## STUDENT LEARNING OUTCOMES ADDRESSED:

1. Computation – Students will use mathematics appropriate for their field of study during in-class activities and homework. This includes solving simultaneous linear equations, calculus and differential equations.
2. Communication – Students will get practice in both written and verbal communication through readings of technical lab documents and group activities.
3. Critical Thinking and Problem Solving – Students will learn to think critically to help them solve problems assigned as homework, group work and other in-class worksheets.

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STUDENT LEARNING OUTCOMES ADDRESSED: (cont.)

4. Technology – Students will use calculators, computers and the Internet to investigate topics. Students will also build electric circuits and use ORCAD PSpice software and MATLAB to model circuits.
5. Information Literacy – Students will learn to access and evaluate information from a variety of sources including their book, the Internet and other class handouts.

GENERAL COURSE OBJECTIVES:

At the end of the course the student will be able to:

1. Identify linear systems and represent those systems in schematic form.
2. Apply Kirchhoff's current and voltage laws and Ohm's law to circuit problems.
3. Simplify circuits using series and parallel equivalents and using Thevenin and Norton equivalents.
4. Perform node and loop analyses and set these up in standard matrix format.
5. Analyze operational amplifier circuits.
6. Identify and model first and second order electric systems involving capacitors and inductors.
7. Predict the transient behavior of first and second order circuits.

TOPICAL OUTLINE:	APPROX. HOURS
I. Circuit variable. Voltage, current, power and energy.	2
II. Circuit elements. Voltage and current sources, resistance and Ohm's Law, Kirchhoff's Laws, analysis of circuits with dependent sources.	7
III. Simple resistive circuits. Series and parallel resistors, voltage and current dividers, measuring voltage, current and resistance, Wheatstone bridge, Delta-to-Wye equivalent circuits.	6
IV. Techniques of circuit analysis. Node voltage method, mesh current method, source transformations, Thevenin and Norton equivalents, maximum power transfer, superposition.	12
V. The operational amplifier. Terminals, terminal voltages and currents, inverting amplifiers, summing amplifiers, non-inverting amplifiers, difference amplifiers, non-ideal op amps.	6
VI. Inductance, capacitance and mutual inductance. The inductor, the capacitor, series and parallel combinations, mutual inductance.	3

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TOPICAL OUTLINE: (cont.)	APPROX. HOURS
VII. Response of 1 <sup>st</sup> order RL and RC circuits. Natural response of RL and RC circuits, step response of RL and RC circuits, general solution, sequential switching, unbounded response, the integrating amplifier.	10
VIII. Natural and step response of RLC circuits. Natural response of parallel RLC circuit, step response of parallel RLC, natural and step response of series RLC circuit, two integrating amplifier circuits.	9
Total hours	55

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Course Prefix and Number: ENGR& 204

Course Title: Electric Circuits

SLO #	Included in Course Objective Number	SSCC Student Learning Outcomes
SLO 1.1	1-7	Communication - Read and listen actively
SLO 1.2		Communication - Speak and write effectively
SLO 2.1	1-7	Computation - Use mathematical operations
SLO 2.2	1-7	Computation - Apply quantitative skills
SLO 2.3	1-7	Computation - Identify, interpret, and utilize higher level mathematical and cognitive skills
SLO 3.1		Human Relations - Use social interactive skills to work in groups effectively
SLO 3.2		Human Relations - Recognize the diversity of cultural influences and values
SLO 4.1	1-7	Critical Thinking and Problem Solving -
SLO 5.1		Technology - Select and use appropriate technological tools
SLO 6.1		Personal Responsibility - Be motivated and able to continue learning and adapt to change
SLO 6.2		Personal Responsibility - Value one's own skills, abilities, ideas and art
SLO 6.3		Personal Responsibility - Take pride in one's work
SLO 6.4		Personal Responsibility - Manage personal health and safety
SLO 6.5		Personal Responsibility - Be aware of civic and environmental issues
SLO 7.1	1-7	Information Literacy - Access and evaluate information
SLO 7.2	1-7	Information Literacy - Use information to achieve personal, academic, and career goals, as well as to participate in a democratic society

PREPARED BY: Mike Steffancin  
DATE: May 2008