ESC 305 – Electrical Circuits
Syllabus

Credit
5 semester hours
(4 lecture hours per week, 3 laboratory hours per week)

Prerequisites
PHY 252 (Second semester physics) and MAT 122 (Second semester calculus), or instructor's consent

Course Description
Principles of DC circuits, Ohm's Law, Kirchhoff's laws, analysis theorems, AC circuit components, transient behavior, steady-state behavior, phasors, transformers, two-port networks

Rationale for Course
Physics is the study of the physical phenomena that we observe in our universe. It is broad ranging and essential to all the sciences. This course aims to introduce the fundamental concepts of electrical circuit design. Students will develop problem solving skills, learning how to logically approach and evaluate a variety of physical situations.

Learning Objectives
- The student will become proficient in the use of algebra, calculus, and linear algebra to describe and analyze DC and AC electric circuit problems.
- The student will become proficient in the use of Kirchhoff's laws of Voltage and Current to analyze electrical circuits, utilizing the techniques of mesh and nodal analysis.
- The student will be able to understand the behavior of passive transient circuit elements through the use of differential and integral equation models, and will become skilled in analyzing circuits with passive transient elements.
- The student will become proficient in the solution of the damped harmonic oscillator differential equation, and its application to RLC circuits.
- The student will learn to use phasor relationships to analyze RC, RL, and RLC circuits.
- The student will become familiar with the operation of transformers.
- The student will become proficient in the analysis of two port networks.

Academic Integrity
Students are expected to be honest and to submit their own work on exams and research papers. Strict adherence to the Mississippi College "Honesty Policy" (*2009-2010 Mississippi College Undergraduate Bulletin, pg. 60*) will be followed.

Course Outline
- Resistors, Sources, and Switches
- Ohm's law
- Kirchhoff's laws of Voltage and Current
- Current and Voltage Division
- Mesh and Node Analysis
- Source Transformations, Superposition, and Equivalent Circuits
- Capacitors and Inductors

- RL, RC, and RLC Circuits
- Phasors
- AC Steady-State Power
- Transformers
- Two-Port Networks

Method of Instruction

Class will consist primarily of presenting fundamental physics and engineering concepts, working problems, and discussing in-class demonstrations. Key points will be highlighted by the choice of examples, and these points will be discussed in the context of the example.

Required Text and Materials

Fundamentals of Electric Circuits, 4th Edition, Alexander and Sadiku

Grading

The final average will be computed as follows: 50% will be from lecture tests, 10% from homework, 20% from lab, and 20% from the final exam. The final exam is comprehensive.

Scale:	Grade	Final Average
	A	90-100
	B	80-89
	C	70-79
	D	60-69
	F	0-59

Makeup Tests

Makeup tests will be given only under the following circumstances:

- Consent of the instructor has been obtained prior to the test.
- An excused absence is obtained from a doctor or the Vice-President for Academic Affairs

Absences

Mississippi College policies on attendance and academic integrity will be enforced. Please see the *2009-2010 Mississippi College Undergraduate Bulletin, pg. 56-57* for additional details of these policies. Students are responsible for all work missed during an absence.

Special Needs

If you need special accommodations due to learning, physical, psychological, or other disabilities, please contact Dr. Buddy Wagner in the Counseling and Career Development Center. He may be reached by phone at 601-925-3354

Computer Usage: Homework and lab assignments using PSPICE, Electronics Workbench, and/or Altium Designer.