Texas State
Technical College
Marshall

COURSE SYLLABUS

DC/AC CIRCUITS
Title

CETT 1409
Number

2-6-4
Lecture - Lab - Credit

DMTH 0100
Prerequisite

Wilson Jones
Department Chair

September 7, 2007
Date

This syllabus has been reviewed and is current on the date indicated.

Reviewed By	**Date**
Wilson A. Jones	**09-07-07**
Prepared by	
_____	_____
Department Chair/Designee	

I. COURSE DESCRIPTION:

A study of the fundamentals of direct current including Ohm's law, Kirchoff's laws and circuit analysis techniques. Emphasis on circuit analysis of resistive networks and DC/AC measurements. This course will also include an in depth study of the concepts associated with circuit resistance including capacitive reactance, inductive reactance and resistive components such as potentiometers, and semiconductors.

II. COURSE OBJECTIVES:

Upon completion of this course the student will be able to:

A. Apply safety techniques while working on and troubleshooting various circuits and components.
B. Identify appropriate soldering and de-soldering techniques.
C. Interpret color codes and other descriptors used in electronics.
D. Identify various sources of electricity in DC/AC circuits.
E. Interpret characteristics of voltage, current, resistance, and power in DC/AC circuits.
F. Measure voltage, current, and resistance in DC/AC circuits using appropriate measuring devices.
G. Analyze DC/AC circuits using appropriate mathematical formulas such as Ohm's Law, Kirchoss's Law, and the power formula; and troubleshoot various DC/AC circuits using schematics diagrams.
H. Discuss the nature of electricity, how we use it, how it is controlled and how it affects society.
I. Identify actual components, their official symbols and discuss the effect of various components in DC/AC circuits.
J. Analyze series and parallel DC/AC circuits by mathematically determining the current, voltage, resistance and power at every point in the circuit.

III. COURSE OUTLINE:

1. LECTURE:

1. Nature of electricity
   - 1.1 Analyze the nature of electricity.
   - 1.2 Explain current flow (conventional and electron).
   - 1.3 Differentiate between voltage and current.
   - 1.4 Explain what causes current to move through a conductor.
   - 1.5 Manipulate equations and make calculations involving charged bodies, current and voltage.

2. Resistance
   - 2.1 Select proper resistors for specific applications using the color and wattage rating.
   - 2.2 Determine the value and tolerance of a resistor using the color code.
   - 2.3 Recognize the characteristics of nonlinear resistors.
   - 2.4 Manipulate equations and solve problems associated with conductance.

3. Ohm's Law
   - 3.1 Transpose the terms of the Ohm's Law formula.
   - 3.2 Introduce the Ohm's Law formula wheel.
   - 3.3 Derive equations from Ohm's Law to define current, voltage, resistance.
   - 3.4 Calculate the current in a circuit given resistance and applied voltage.
   - 3.5 Explain the relationship between resistance, current flow and voltage drops in an electric circuit.
   - 3.6 Manipulate equations and solve problems using Ohms' Law.

4. Series Circuits
   - 4.1 Define a series circuit.
   - 4.2 Calculate total resistance, total current and the polarity of the IR drop in series circuits.
   - 4.3 Define the difference between a voltage rise and a voltage droop and the use of ground as a reference point.
   - 4.4 Analyze the use of voltage dividers or attenuators to provide several different voltages from one source.
   - 4.5 Analyze the effect of internal resistance on maximum power transfer from the source to load.
   - 4.6 Discover the effect of shorts and opens in series circuits.
   - 4.7 Construct series circuits to verify calculations (troubleshoot).

5. Parallel Circuits
   - 5.1 Define a parallel circuit.
   - 5.2 Develop methods of determining total resistance and current in parallel circuits.
   - 5.3 Explore the effect of opens and shorts in parallel circuits (troubleshooting).
   - 5.4 Construct parallel circuits and make measurements to verify previous calculations.

6. Apply Kirchoff's laws to series and parallel circuits
   - 6.1 Recognize series, parallel and series-parallel circuits by tracing current flow paths.
   - 6.2 Explain how voltage is distributed around series, parallel and series-parallel circuits.
   - 6.3 Explain how current divides in series, parallel and series-parallel circuits.
   - 6.4 Manipulate equations and solve problems involving the application of Kirchoff's laws to series, parallel and series-parallel circuits.

7. Analyze series-parallel circuits
    - 7.1 Identify a series-parallel arrangement of components and simplify them into a single equivalent resistance.
    - 7.2 Analyze a series-parallel circuit and make calculations to determine total resistance and voltage and current distribution.
    - 7.3 Analyze loaded voltage dividers and bridges circuits.
    - 7.4 Discover the effects of opens and shorts in series-parallel circuits (troubleshooting).
    - 7.5 Construct series-parallel circuits and make measurements to verify calculations.

8. Applying network circuit theorems
    - 8.1 Solve for two unknowns using polynomial equations.
    - 8.2 Apply delta/wye conversions for problem solving.
    - 8.3 Analyze DC/AC networks using Kirchoff's laws.
    - 8.4 Analyze DC/AC networks using superposition theorems.
    - 8.5 Analyze DC/AC networks using Thevenin's and Norton's theorems.
    - 8.6 Recognize equivalent delta and wye circuits.
    - 8.7 Calculate circuit values using the above theorems and be able to convert from one theorem to another.
    - 8.8 Construct circuits and make measurements to verify calculations.

9. Practice using measurement devices
    - 9.1 Accurately read and interpret the scales of digital and analog multimeters.
    - 9.2 Measure resistance and both DC/AC and Ac voltages and currents with the appropriate meters.
    - 9.3 Convert a milliammeter into an ammeter and voltmeter with different ranges utilizing a combination of shunt and multiplier resistors.
    - 9.4 Calculate values for shunt and multiplier resistors and construct circuits to verify calculations.

2. LABORATORY

1. Introduce laboratory procedures including safety, use of equipment, stockroom procedures, and computer usage.
2. Use the oscilloscope to make measurements of frequency, time and amplitude.
3. Construct a RC circuit to study capacitive reactance.
4. Construct a RL circuit to study inductive reactance.
5. Observe the uses of a transformer through circuit analysis.
6. Analyze series, parallel, and series/parallel RC, RL, and RLC circuits.
7. Observe characteristics of series and parallel resonant circuits.
8. Construct circuits to analyze passive filters, and integrating and differentiating circuits.
9. Use computer aided learning software packages to enhance and reinforce learning objectives.

IV. REFERENCE MATERIALS:

A. Textbook: Electricity & Electronics, Howard H. Gerrish_,William E. Dugger, Jr. and Richard M. Roberts, Goodheart-Willcox Company, Inc. Publisher.

B. Lab Manual: Electricity & Electronics, Howard H. Gerrish_,William E. Dugger, Jr. and Richard M. Roberts, Goodheart-Willcox Company, Inc. Publisher.

V. SUPPLIES:

A. Paper and pencils.
B. Scientific calculator w/batteries (TI-36X) or equivalent.
C. Screw driver ¼" blade x 4" length
D. Clip leads 14" long with mini alligator clips, 12 each
E. Protoboard (PB-101 or equivalent), 1 each
F. Wire strippers, size 22-30, 1 each
G. 5" diagonal cutting pliers, 1 each
H. 3" needle nose pliers, 1 each
I. Tool box with resistors, capacitors and other components identified in the bookstore as appropriate for this class.
J. Digital multimeter – AC Amps/Volts, DC/AC Amps/Volts, DC/AC MA (Down to 1MA); Ohmmeter (Beckman DM 25x1 or Wavetek DM25xt or equivalent)

VI. GRADING POLICY:

A. Final Average

90 – 100 = A
80 – 89 = B
70 – 79 = C
60 – 69 = D*
0 – 59 = F*

B. *A letter grade of D or F will not allow the student to continue on to courses requiring this course as a prerequisite. The student will be required to repeat the entire CETT 1409 course before continuing.

C. The course grade will be comprised of the following:

1. 50% Lecture; including major tests, NIDA computer tests, daily quizzes, and the final exam.
2. 50% Lab; including practical lab reports, experiments, class participating, and NIDA computer grades.

VII. RETENTION POLICY

Texas State Technical College challenges students to be learners who assume responsibility for being a part of a community of scholars. Student presence and participation in the classroom is an important component of this challenge. Furthermore, as part of its mission, TSTC offers an education that prepares students for professional employment. Each student is encouraged to develop a professional work ethic that reflects responsibility, initiative and teamwork. Students are expected to participate in all classes. Students who are absent from class miss opportunities to contribute to the learning environment of the classroom and are developing patterns that will not be tolerated in the professional workplace.

In light of the above, the student is responsible for all assigned course work and cannot be absolved of this responsibility. When enrolled in a particular course, the student is obligated to do all the work assigned. Punctual and regular participation is vital to the discharge of this obligation and absences, excused or not, do not alter this responsibility.

Students whose absences exceed 15 percent of the scheduled classes, including laboratories, may receive a "F" for the course.

If a student is not in the assigned classroom on time, or if the student leaves class prior to the scheduled release time without the approval of the instructor, the student will be counted as absent for the entire class period. The student is responsible for any material covered when absent. It is the student's responsibility to obtain all information missed as a result of an absence.

VIII. SAFETY:

Students must obey all safety rules and guidelines as outlined by the instructor.

IX. SPECIAL NEEDS:

If you have a condition, such as a physical or mental disability, which will make it difficult for you to carry out the work as outlined, or will require extra time on examinations, please notify the Instructor or the Counseling Office in the first two weeks of the course so that appropriate arrangements may be made.

X. OTHER:

A. An atmosphere of mutual respect will be expected of all students in the classroom and laboratories.

B. Any display of prejudice, harassment, etc. will not be tolerated. Any student who disrupts the classroom will be asked to leave and will not receive any credit for the work done that day. Note: Class disruption includes disturbances caused by cell phones or pagers.

XI. INSTRUCTOR INFORMATION:

A.	Instructor Name:	Wilson A. Jones
B.	Office Number:	420 South Campus
C.	Phone Numbers:	
	1. School:	903-935-1010
	2. Extension:	3364
D.	Instructors e-mail address:	wilsonjones@marshall.tstc.edu
E.	Office Hours:	As Posted on Office Door

XII. SCANS Analysis for the Course: DC/AC CIRCUITS

SCANS Matrix

Program: ELECTRICAL/COMPUTERIZED CONTROL SYSTEMS AND ROBOTICS

Degree: X Associate Certificate

List of All Identified Competencies

Competencies

1	2	3	4	5	6	7	8	Course Number	Course Title
X	X	X	X	X	X	X	X	CETT 1409	DC/AC CIRCUITS
								Competency References	
							8	**Basic Use of Computers**	
						7		**Workplace Competencies**	
					6			**Personal Qualities**	
				5				**Thinking Skills**	
			4					**Speaking and Listening**	
		3						**Arithmetic or Mathematics**	
	2							**Writing**	
1								**Reading**	