

CATALOG INFORMATION

Dept and Nbr: ELEC 60A      Title: DC AND AC THEORY  
Full Title: Direct & Alternating Current Theory  
Last Reviewed: 2/23/2015

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	6.00	Lecture Scheduled	5.00	17.5	Lecture Scheduled	87.50
Minimum	6.00	Lab Scheduled	3.00	10	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	8.00		Contact Total	140.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 175.00

Total Student Learning Hours: 315.00

Title 5 Category: AA Degree Applicable  
Grading: Grade Only  
Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP  
Also Listed As:  
Formerly:

**Catalog Description:**  
Introduction to electronic components and underlying physics concepts, electrical units, direct current (DC), DC circuit analysis, batteries, magnetism, meters, alternating current (AC), capacitance, inductance, transformers, and AC circuit analysis.

**Prerequisites/Corequisites:**

**Recommended Preparation:**  
Course Eligibility for MATH 150A and ENGL 100 OR ESL 100

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: Introduction to electronic components and underlying physics concepts, electrical units, direct current (DC), DC circuit analysis, batteries, magnetism, meters, alternating current (AC), capacitance, inductance, transformers, and AC circuit analysis. (Grade Only)  
Prerequisites/Corequisites:  
Recommended: Course Eligibility for MATH 150A and ENGL 100 OR ESL 100  
Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>		Effective:	Inactive:
<b>UC Transfer:</b>		Effective:	Inactive:

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

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

1. Use algebraic functions, signed numbers and metric notations, make circuit calculations using Ohm's Law, Watt's Law and Kirchoff's Laws.
2. Use algebraic expressions and numerical representations to analyze and evaluate series, parallel, and series-parallel circuits.
3. Summarize the basic characteristics of magnetism.
4. Identify alternating current (AC) units.
5. Use signed numbers to calculate values in an AC resistive circuit.
6. Identify and describe the characteristics of capacitors, inductors and transformers using trigonometric functions.
7. Analyze and evaluate resistor-capacitor (RC), resistor-inductor (RL) and resistor-inductor-capacitor (RLC) circuits through the application of right angle trigonometry and geometry.

### **Topics and Scope:**

- I. Atoms
  - A. Bohr model structure
  - B. quantum mechanical model structure
- II. Review of elementary algebra
- III. Basic laws of physics
  - A. Ohm's law
  - B. Watt's law
  - C. Kirchoff's laws
- IV. Direct current (DC) circuits
  - A. digital volt meters
  - B. series circuits
  - C. parallel circuits
  - D. series-parallel circuits
- V. Unloaded voltage dividers

- VI. Conductors and insulators
- VII. Control components
  - A. switches
  - B. fuses
  - C. circuit breakers
- VIII. Resistors, fixed and variable
- IX. Batteries
- X. Magnetism
- XI. Right angle trigonometry
- XII. Alternating current (AC)
  - A. oscilloscope operation
  - B. frequency
  - C. sine wave values
- XIII. Capacitors and capacitance
  - A. resistor-capacitor (RC) time constant
  - B. capacitive reactance
  - C. RC circuit impedance
    - 1. series
    - 2. parallel
    - 3. series-parallel
- XIV. Inductors and inductance
  - A. resistor-inductor (L/R) time constant
  - B. inductive reactance
  - C. RL circuit impedance
    - 1. series
    - 2. parallel
    - 3. series-parallel
- XV. Resistor, inductor, capacitor (RLC) circuits
  - A. series
  - B. parallel
  - C. admittance, conductance and susceptance
  - D. transformers

## LABORATORY MATERIAL

- I. Ohm's Law simple circuits
- II. Series Circuits - Kirchoff's Laws, Watt's Law, & Ohm's Law. Voltage dividers
- III. Parallel Circuits - Kirchoff's Laws, Watt's Law, & Ohm's Law. Current dividers
- IV. Complex Circuits - Kirchoff's Laws, Watt's Law, & Ohm's Law. Maximum Power Transfer.
- V. Construction and basic soldering techniques including safety
- VI. Basic oscilloscope and multimeter operation and measurements
- VII. Resistor - Capacitor (RC) circuits, impedance measurements & calculations including RC time constant
- VIII. Resistor - Inductor (RL) circuits, impedance measurements & calculations
- IX. RLC circuits - impedance measurements & calculations

## Assignment:

- 1. Textbook readings, 20 - 30 pages per week.
- 2. 1-2 weekly homework/lab assignments.
- 3. 8-10 lab reports
- 4. 4-8 quizzes; midterm; final exam.

## Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports

Writing  
20 - 30%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems, lab assignments

Problem solving  
30 - 40%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes; midterm and final exam: objective examinations include multiple choice, true/false, matching items, completion

Exams  
30 - 40%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

## Representative Textbooks and Materials:

Electric Circuit Fundamentals, 8th edition. Thomas L. Floyd. Prentice Hall: 2010.

Basic Electronics, 9th edition. Grob/Schultz. Glencoe McGraw Hill: 2003.