ELEC 54A Course Outline as of Fall 2016

CATALOG INFORMATION

Dept and Nbr: ELEC 54A Title: DC AND AC THEORY
Full Title: Direct and Alternating Current Theory
Last Reviewed: 5/8/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.00	17.5	Lecture Scheduled	35.00
Minimum	3.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	5.00		Contact Total	87.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 70.00 Total Student Learning Hours: 157.50

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:
Completion of MATH 150B or higher or assessment test score

Recommended Preparation:
Eligibility for 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: Completion of MATH 150B or higher or assessment test score
Recommended: Eligibility for ENGL 100 or ESL 100
Limits on Enrollment:

Transfer Credit: CSU;
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**			Effective:	Inactive:
CSU GE:	**Transfer Area**			Effective:	Inactive:
IGETC:	**Transfer Area**			Effective:	Inactive:
CSU Transfer:	Transferable	Effective:	Fall 2016	Inactive:	
UC Transfer:		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 (RL) 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. Basic oscilloscope and multimeter operation and measurements
VI. Resistor - Capacitor (RC) circuits, impedance measurements & calculations including RC time constant
VII. Resistor - Inductor (RL) circuits, impedance measurements & calculations
VIII. RLC circuits - impedance measurements & calculations

Assignment:

1. Textbook readings, 20 - 30 pages per week.
2. Homework assignments (10-15)
3. Lab assignments (8-14)
4. Lab reports (8-14)
5. Quizzes (4-8) midterm; final exam, lab skills test

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.

Hands-on DC lab skills test	Skill Demonstrations 10 - 20%

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: 2014.