### ELEC 54A Course Outline as of Fall 2024

# 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:**
In this course, students will learn about 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:**
Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:**


**Schedule of Classes Information:**
Description: In this course, students will learn about 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: 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

**Student Learning Outcomes:**
At the conclusion of this course, the student should be able to:
1. Identify and describe the characteristics of common electronic components.
2. Analyze and measure the characteristics of typical DC and AC circuits.
3. Use algebra and right angle trigonometry to solve electronic circuit calculations.

**Objectives:**
At the conclusion of this course, the student should be able to:
1. Use algebraic functions, signed numbers and metric notations to 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.

**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. Fixed and Variable Resistors
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

All subjects are covered in both lecture and lab portions of the course.

LABORATORY MATERIAL
I. Ohm's law simple circuits
II. Series Circuits - Kirchoff's laws, Watt's law, and Ohm's law. Voltage dividers
III. Parallel Circuits - Kirchoff's laws, Watt's law, and Ohm's law. Current dividers
IV. Complex Circuits - Kirchoff's laws, Watt's law, and Ohm's law. Maximum power transfer
V. Basic oscilloscope and multimeter operation and measurements
VI. Resistor - Capacitor (RC) circuits, impedance measurements, and calculations including RC time constant
VII. Resistor - Inductor (RL) circuits, impedance measurements, and calculations
VIII. RLC circuits - impedance measurements and calculations

**Assignment:**

Lecture-Related Assignments:
1. Textbook readings (20-30 pages per week)
2. Homework assignments (8-14)
3. Quizzes (2-6)
4. Final exam

Lab-Related Assignments:
1. Lab reports (8-14)
2. 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 - 40% |
|---|---|

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

| Homework assignments | Problem solving 10 - 30% |
|---|---|

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

| Lab skills test | Skill Demonstrations 10 - 20% |
|---|---|

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

| Quizzes; final exam | 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:**
Electronics Fundamentals. 9th ed. Floyd, Buchla & Snyder. Pearson Education, Inc. 2022.