COURSE SYLLABUS

LAST REVIEW	Spring 2021
COURSE TITLE	Circuit Analysis I
COURSE NUMBER	AUDI 0115
DIVISION	Arts, Communications, and Humanities
DEPARTMENT	AUDI
CIP CODE	10.0203
CREDIT HOURS	3.00
CONTACT HOURS/WEEK	Class: 3.00 Lab: X Clinical: X
PREREQUISITES	Prerequisites

COURSE PLACEMENT Students must meet the correct placement measure for this course. Information may be found at: https://www.kckcc.edu/admissions/information/mandatory-evaluation-placement.html

COURSE DESCRIPTION
A detailed study of D.C. Circuits, which includes Kirchhoff's Law, Superposition Theorem, Thevenin's Theorem and Norton's Theorem. Explanation of RC time constants, capacitive circuits, inductive circuits, transformers and tuned circuits. Study of basic amplifiers and construction of power supplies circuits. To understand circuit analysis, it is necessary to understand various affecting factors such as voltages, current resistive, capacitive and inductive components. This course is designed to give maximum understanding in circuit analysis and circuit buildup.

KANSAS SYSTEMWIDE TRANSFER: AUDI0115
The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

PROGRAM ALIGNMENT
This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit: https://kansasregents.org/workforce_development/program-alignment

General Education Learning Outcome

- [ ] Basic Skills for Communication
- [ ] Mathematics
- [ ] Humanities
- [ ] Natural and Physical Sciences
- [ ] Social and Behavioral Sciences

Institutional Learning Outcomes

- [ ] Communication
- [ ] Computation and Financial Literacy
- [ ] Critical Reasoning
- [ ] Technology and Information Literacy
- [ ] Community and Civic Responsibility
- [ ] Personal and Interpersonal Skills

TEXTBOOKS

http://kckccbookstore.com/

METHODS OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

I. D.C. Circuits
   A. Simple Circuits
   B. Voltage Dividers
   C. Bridge circuits
   D. Kirchhoff's Law
   E. Superposition Theorem
   F. Thevenin's Theorem
   G. Norton's Theorem
   H. Millman's Theorem
   I. Maximum Power Transfer Theorem
II. Inductance & Capacitance in D.C. Circuits
   A. LR Circuit Operation
   B. Instantaneous Current and Voltage in LR Circuits
   C. Open-Circuiting an Inductive Circuit
   D. LR circuit Waveforms
   E. CR Circuit Operation
   F. Instantaneous Current and Voltage in CR Circuits
   G. Discharging A Capacitor

    - H. CR Circuit Waveforms
- III. Inductance and Capacitance in A.C. Circuits
    - A. Alternating Current & Voltage in an Inductive Circuit
    - B. Inductive Reactance
    - C. Alternating Current & Voltage in a Capacitive Circuit
    - D. Capacitive Reactance
    - E. Series R, L, and C
    - F. Parallel R, L, and C
    - G. Low-Pass Filter
    - H. High-Pass Filter
- IV. A.C. Network Analysis
    - A. AC Sources and Kirchhoff's Laws for AC Circuits
    - B. AC Circuit Loop Equations
    - C. Superposition Theorem Applied to AC Networks
    - D. Nodal Analysis for AC Circuits
    - E. Thevenin's Theorem Applied to AC Circuits
    - F. Norton's Theorem Applied to AC Circuits
    - G. Maximum Power Transfer Theorem Applied to AC Circuits
    - H. Delta-Wye Transformations for AC Networks
- V. Transformers
    - A. Principle of Transformer Operation
    - B. EMF Equation
    - C. Transformer on No-Load
    - D. Transformer on Load
    - F. Referred Resistance and Reactance
    - G. Transformer Voltage Regulation
    - H. Transformer Efficiency
    - I. Open-Circuit and Short-Circuit Tests
    - J. Autotransformer
    - K. Current Transformer
    - L. Audio Transformer
- VI. Tuned Circuits (Resonance)
    - A. Series Resonance
    - B. Tuning for Resonance
    - C. Q Factor of a Series Resonant Circuit
    - D. Bandwidth of a Series Resonant circuit
    - E. Parallel Resonance
    - F. Q Factor for Parallel LC Circuit
    - G. Resonance Frequency for Parallel Circuit
    - H. Resistance Damping of Parallel LC Circuit
    - I. Tuned Coupled Coils
    - J. Resonance Filters
- VII. Basic Amplifiers
    - A. Amplifier Configurations

B. Amplifier Biasing
C. Feedback Biasing
D. Voltage Divider Biasing
E. Classification
F. Amplifier Couplings

VIII. Power Supplies
A. Rectifier Circuits
B. Power Supply Filters
C. Voltage Multipliers
D. Voltage Regulators
E. Power Supply Circuits

IX. Laboratory Experiments
A. Alternating Voltage and Current
B. Inductive Reactance
C. Capacitive Reactance
D. RC Time Constant
E. Alternating-Current Circuits: RLC Series
F. Superposing Alternating Current on Direct Current
G. Series Resonance
H. Parallel Resonance
I. Filters
J. PN Junction
K. Diode Characteristics Rectification
L. Rectification and Filters
M. FET Amplifier
N. Transistor Amplifier
O. Transistor as a Switch

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

A. Upon completion of the course the student will be able to solve basic AC and DC formulas.
B. Upon completion of the course the student will be able to explain the basic of electricity.
C. Upon completion of the course the student will be able to troubleshoo electronics equipment.

COURSE COMPETENCIES:

Upon completion of the course:

The student will be able to solve basic AC and DC formulas

1. The student will be able to define magnetic properties of circuits and devices

2. *The student will be able to determine the physical and electrical characteristics of capacitors and inductors*
3. *The student will be able to define RC and RL time constants*
4. *The student will be able to identify properties of an AC signal*
5. *The student will be able to identify AC sources*
6. *The student will be able to analyze and measure AC signals using oscilloscope, frequency meter, and generator*

The student will be able to explain the basics of electricity

7. *The student will be able to define the characteristics of AC capacitive circuits*
8. *The student will be able to construct and verify the operation of AC capacitive circuits*
9. *The student will be able to troubleshoot AC capacitive circuits*
10. *The student will be able to define the characteristics of AC inductive circuits*
11. *The student will be able to construct and verify the operation of AC inductive circuits*
12. *The student will be able to troubleshoot AC inductive circuits*
13. *The student will be able to define and apply the principles of transformers to AC circuits*
14. *The student will be able to troubleshoot AC circuits utilizing transformers*

The student will be able to troubleshoot electronic circuits

15. *The student will be able to define the characteristics of RLC circuits (series, parallel, and complex)*
16. *The student will be able to construct and verify the operation of RLC circuits*
17. *The student will be able to define the characteristics of series and parallel resonant circuits*
18. *The student will be able to construct and verify the operation of series and parallel resonant circuits*
19. *The student will be able to define the characteristics of filter circuits*
20. *The student will be able to troubleshoot filter circuits*

The student will be able to use basic electronics equipment

21. *The student will be able to set up and operate a VOM for AC circuits*
22. *The student will be able to set up and operate a DMM for AC circuits*
23. *The student will be able to set up and operate oscilloscopes for AC circuits*
24. *The student will be able to set up and operate frequency counters for AC circuits*
25. *The student will be able to set up and operate signal generators for AC circuits*

26. *The student will be able to set up and operate capacitor/inductor analyzers for AC circuits*

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook
https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.