

SYLLABUS

DATE OF LAST REVIEW:	09/2019
CIP CODE:	15.1201
SEMESTER:	Departmental Syllabus
COURSE TITLE:	Circuit Analysis I
COURSE NUMBER:	ENGR-0115
CREDIT HOURS:	3
INSTRUCTOR:	Departmental Syllabus
OFFICE LOCATION:	Departmental Syllabus
OFFICE HOURS:	Departmental Syllabus
TELEPHONE:	913-334-1100
EMAIL:	<i>KCKCC issued email accounts are the official means for electronically communicating with our students.</i>
PREREQUISITE(S):	ENGR-0108 Electronic Circuit Fundamentals

COURSE DESCRIPTION: This course primarily concentrates on small signal analysis of circuits. It introduces Superposition Theorem, Thevenin's Theorem and Norton's Theorem as circuit analysis tools. Students will learn how voltage, current, and power interact with resistance, capacitance, and inductance interact for time-varying signals. Students will learn to do small signal analysis of amplification circuits. All concepts will be reinforced with associated laboratory work so that students see both theory and practical applications related to their fields of interest.

METHOD 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, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE:

- I. Unit 1. 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. Unit 2. Inductance & Capacitance in D.C. Circuits
 - A. LR Circuit Operation
 - B. Instantaneous Current and Voltage in LR Circuits

- A. Open-Circuiting an Inductive Circuit
 - C. LR circuit Waveforms
 - D. CR Circuit Operation
 - E. Instantaneous Current and Voltage in CR Circuits
 - F. Discharging A Capacitor
 - G. CR Circuit Waveforms
- III. Unit 3. 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. Unit 4. A.C. Network Analysis
 - A. AC Sources and Kirchoff'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. Unit 5. Transformers
 - A. Principle of Transformer Operation
 - B. EMF Equation
 - C. Transformer on No-Load
 - D. Transformer on Load
 - E. Referred Resistance and Reactance
 - F. Transformer Voltage Regulation
 - G. Transformer Efficiency
 - H. Open-Circuit and Short-Circuit Tests
 - I. Autotransformer
 - J. Current Transformer
 - K. Audio Transformer
- VI. Unit 6. 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. Unit 7. Basic Amplifiers
 - A. Amplifier Configurations
 - B. Amplifier Biasing
 - C. Feedback Biasing
 - D. Voltage Divider Biasing
 - E. Classification
 - F. Amplifier Couplings

- VIII. Unit 8. Power Supplies
- A. Rectifier Circuits
 - B. Power Supply Filters
 - C. Voltage Multipliers
 - D. Voltage Regulators
 - E. Power Supply Circuits

Laboratory Work

- 1. Alternating Voltage and Current
- 2. Inductive Reactance
- 3. Capacitive Reactance
- 4. RC Time Constant
- 5. Alternating-Current Circuits: RLC Series
- 6. Superposing Alternating Current on Direct Current
- 7. Series Resonance
- 8. Parallel Resonance
- 9. Filters
- 10. PN Junction
- 11. Diode Characteristics Rectification
- 12. Rectification and Filters
- 13. FET Amplifier
- 14. Transistor Amplifier
- 15. Transistor as a Switch

EXPECTED LEARNER OUTCOMES:

- 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 basics of electricity.
- C. Upon completion of the course the student will be able to troubleshoot electronic circuits.
- D. Upon completion of the course the student will be able to use basic 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

Upon completion of the course 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

Upon completion of the course 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

Upon completion of the course 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 LEARNER OUTCOMES:

Assessment methods may include, but are not limited to, the following: Homework, Assignments, Quizzes, Class Participation, Chapter Tests, and Final Exam. The grading scale and the process for calculating the course grades are to be determined by the individual instructors. This information will be included in each instructor's syllabus.

SPECIAL NOTES:

This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student's progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college's policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the disabilities services office at (913) 288 - 7664.

All enrolled students at Kansas City Kansas Community College are subject to follow all rules, conditions, policies and procedures as described in both the Student Code of Conduct as well as the Student Handbook. All Students are expected to review both of these documents and to understand their responsibilities with regard to academic conduct and policies. The Student Code of Conduct and the Student Handbook can be found on the KCKCC website.