

COURSE SYLLABUS

LAST REVIEW	Fall 2021
COURSE TITLE	Semiconductor Devices
COURSE NUMBER	ELEC-0212
DIVISION	Math, Science, Business & Technology
DEPARTMENT	Electronics Engineering Technology
CIP CODE	15.0303
CREDIT HOURS	4
CONTACT HOURS/WEEK	Class: 3 Lab: 2
PREREQUISITES	
COREQUISITES	ELEC-0210 AC Circuits
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

This course is an introduction to semiconductor materials, the concept of junction and biasing, diodes, transistors, and some integrated circuits. Topics will include special purpose diodes, bipolar junction transistors (BJT), field effect transistors (FET), operational amplifiers (Op-Amps), voltage regulators, and four-layer semiconductors. Both circuit analysis and understanding, and circuit construction and trouble shooting will be emphasized.

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

COURSE OUTLINE

- I. Semiconductor Materials, Construction, and Background
- II. Diodes and Diode Applications
- III. Special Purpose Diodes
- IV. Bipolar Junction Transistors
- V. Small-signal Bipolar Amplifiers
- VI. Power Amplifiers
- VII. Field-Effect Transistors (FETs)
- VIII. Small-signal FET Amplifiers
- IX. Amplifier Frequency Response
- X. Operational Amplifiers (Op-amp)
- XI. Op-amp Frequency Response, Stability and Compensation
- XII. Op-amp Applications
- XIII. Active Filters
- XIV. Oscillators and Phase-Locked Loops
- XV. Voltage Regulators
- XVI. Four and More Layer Semiconductor Devices

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Be able to describe the characteristics of semiconductor, insulator and conductor materials.
- B. Be able to describe the characteristics of PN junctions.
- C. Be able to explain, analyze and troubleshoot common diode applications.
- D. Be able to explain, analyze and troubleshoot special purpose diode applications.
- E. Be able to describe the characteristics of bipolar junction transistors (BJTs).
- F. Be able to analyze bipolar junction transistor (BJT) biasing circuits.
- G. Be able to analyze bipolar junction transistor (BJT) small signal amplifiers.
- H. Be able to explain and analyze the operation of power amplifiers.
- I. Be able to describe the characteristics and analyze the biasing of field-effect transistors (FETs).
- J. Be able to explain and analyze the operation of small-signal FET amplifiers.
- K. Be able to analyze the frequency response characteristics of amplifiers.
- L. Be able to describe op-amp characteristics.
- M. Be able to discuss op-amp frequency characteristics.
- N. Be able to describe op-amp amplifier applications.
- O. Be able to analyze active filter circuits.
- P. Be able to analyze op-amp oscillator circuits.
- Q. Be able to apply IC voltage regulators.
- R. Be able to explain how multi-layer semiconductor devices operate.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

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.

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>.