ELEC 54B Course Outline as of Fall 2022

CATALOG INFORMATION

Dept and Nbr: ELEC 54B Title: ELECTRONIC DEVICES
Full Title: Fundamentals of Electronic Devices
Last Reviewed: 12/13/2021

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	6	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 be Introduced to electronic devices and concepts of solid-state rectifier and amplifier circuits.

Prerequisites/Corequisites:
Course Completion of ELEC 54A

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: In this course students will be Introduced to electronic devices and concepts of solid-state rectifier and amplifier circuits. (Grade Only)
Prerequisites/Corequisites: Course Completion of ELEC 54A
Recommended:
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 and applications of semiconductor materials.
2. Evaluate the characteristics of devices and apply them to the analysis of power supplies and solid state amplifiers.
3. Apply multimeter and oscilloscope measurement techniques to solid state circuits.

Objectives:
At the conclusion of this course, the student should be able to:
1. Identify the characteristics of semiconductor materials and p-n junctions.
2. Identify common diode/rectifier power supply circuits.
3. Compare the characteristics of basic power supply filters.
4. Identify the characteristics of regulated power supplies.
5. Calculate circuit values from existing circuit designs of solid state amplifiers.
6. Calculate input impedance (Zin), output impedance (Zo) and amplifier gain.
7. Recognize the effects of loading upon an individual amplifier stage.
8. Describe the behavior of both series and parallel resonance on amplifier performance.
9. Identify operation amplifier (op amp) circuits.

Topics and Scope:

I. Semiconductor Physics of a p-n Junction for Forward and Reverse Bias Conditions
II. Diode Circuits
  A. Rectifiers
    1. Half-wave
    2. Full-wave
    3. Bridge
  B. Limiters
  C. Clampers
III. Power Supply Filter Circuits
  A. Percent of ripple
  B. Percent of regulation

IV. Regulated Power Supplies
- A. Three terminal fixed
- B. Three terminal adjustable
- C. Common problems

V. Power Supplies
- A. Linear regulators
  1. Series regulators
  2. Shunt regulators

VI. Power Supply Types
- A. Single voltage
- B. Bipolar voltage
- C. Voltage multipliers

VII. Solid State Device Structures and Characteristics
- A. Bipolar junction transistor (BJT)
- B. Junction field effect transistor (JFET) and common source (CS) linear amplifier
- C. Load lines
- D. Biasing
- E. Amplification
  1. Input impedance (Zin)
  2. Output impedance (Zo)
- F. Thermal stability

VIII. Basic Amplifier Configurations and Characteristics
- A. Common input
  1. Common emitter
  2. Common source
- B. Common output
  1. Common collector
  2. Common drain
- C. Common control
  1. Common base
  2. Common gate

IX. Series and Parallel Resonance, Q Factor and Bandwidth

X. Amplifier Classes: A, AB, B, C

XI. Operational Amplifier (Op Amp) Fundamentals as Applied to Systems
- A. Basic parameters
  1. Open and closed loop gain
  2. Cut off frequency
  3. Slew rate
  4. Gain bandwidth product (GBP)
  5. Common mode rejection ratio (CMRR)
- B. BJT differential amp

XII. Oscillators
- A. Resistor capacitor (RC)
- B. Inductor capacitor (LC)
- C. Mechanical
  1. Crystal
  2. Surface acoustic wave (SAW)
- D. Modular

LABORATORY MATERIAL

I. Diodes & Rectification

II. Power Supply Filtering and Regulation

III. Bipolar Junction Transistor (BJT) Biasing - Load Line
IV. BJT Common Emitter (CE) Linear Amplifier and Common Collector (CC)
V. Oscillators
  A. Inductor capacitor (LC)
  B. Resistor capacitor (RC) (Wien-Bridge oscillator)
  C. 555 Oscillator
VI. Amplifier Lab (discrete)
  A. Single stage (Op amp)
  B. Multi stage (Op amp - summing amp)
  C. Operational amplifiers (Op amp) lab
  D. Summing amps and comparators

Assignment:

Lecture
1. Textbook readings (20-30 pages per week)
2. Homework (1-2 per week)
3. Quizzes (2-4)
4. One midterm and one final exam

Laboratory
1. Lab assignments (1-2 per week)
2. Lab Reports (8-14)

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.

None	Skill Demonstrations 0 - 0%

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

Quizzes, midterm and 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: A Systems Approach. Floyd, Thomas L. and Buchla, David M.. Pearson Education, Inc. 2014 (classic)