

**ELEC 60B Course Outline as of Fall 2017****CATALOG INFORMATION**

Dept and Nbr: ELEC 60B Title: ELECTRONIC DEVICES

Full Title: Fundamentals of Electronic Devices

Last Reviewed: 2/23/2015

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	6.00	Lecture Scheduled	5.00	17.5	Lecture Scheduled	87.50
Minimum	6.00	Lab Scheduled	3.00	10	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	8.00		Contact Total	140.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 175.00

Total Student Learning Hours: 315.00

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:**

Introduction to electronic devices. Concepts of solid-state rectifier and amplifier circuits.

**Prerequisites/Corequisites:**

Course Completion of ELEC 60A; OR

Course Completion of ELEC 60 and ELEC 60L; OR

Course Completion of ELEC 70A and ELEC 70AL and ELEC 70B and ELEC 70BL

**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: Introduction to electronic devices. Concepts of solid-state rectifier and amplifier circuits. (Grade Only)

Prerequisites/Corequisites: Course Completion of ELEC 60A; OR

Course Completion of ELEC 60 and ELEC 60L; OR

Course Completion of ELEC 70A and ELEC 70AL and ELEC 70B and ELEC 70BL

Recommended:

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>		Effective:	Inactive:
<b>UC Transfer:</b>		Effective:	Inactive:

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

**Outcomes and Objectives:**

Upon completion of the course, the student will be able to:

1. Identify the characteristics of semiconductor materials and PN 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 ( $Z_{in}$ ), output impedance ( $Z_o$ ) 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.

**Topics and Scope:**

- I. Semiconductor physics of a PN 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. Bipolar power supplies
- V. Voltage multiplier circuits
- VI. Solid state device structures and characteristics
  - A. bipolar junction transistor (BJT)

- B. junction field effect transistor (JFET)
- C. metal oxide substrate field effect transistor (MOSFET)
- D. load lines
- F. biasing
- G. amplification
  - 1. input impedance ( $Z_{in}$ )
  - 2. output impedance ( $Z_o$ )
- H. thermal stability
- VII. 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
- VIII. Series and parallel resonance, Q factor and bandwidth
- IX. Amplifier classes: A, AB, B, C
- X. Regulated power supplies
  - A. three terminal fixed
  - B. three terminal adjustable

## LABORATORY MATERIAL

- I. Diodes & Rectification
- II. Limiters & Clampers
- III. Power supply filtering
- IV. Power supply types - single voltage, bipolar voltage & voltage multipliers
- V. Bipolar Junction Transistor (BJT) biasing - load line
- VI. BJT Common Emitter (CE) linear amplifier
- VII. BJT Common Collector (CC) and Common Base (CB) linear amplifiers
- VIII. Junction Field Effect Transistor (JFET) Common Source (CS) linear amplifier
- IX. JFET Common Drain (CD) & Common Gate (CG) linear amplifiers
- X. Metal Oxide Substrate (MOSFET) switch mode operation

### Assignment:

- 1. Textbook readings, 20 - 30 pages per week.
- 2. 1-2 weekly homework/lab assignments.
- 3. 8-14 lab reports
- 4. 4-8 quizzes; midterm; final exam.

### 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
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Writing 20 - 30%
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**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: objective examinations include multiple choice, true/false, matching items, completion

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:**

Electronic Devices, 9th edition. Floyd, Thomas L. Prentice Hall publishers: 2012

Semiconductor Circuit Approximations, 4th edition. Malvino, Albert Paul. McGraw-Hill: 1985 (classic)