

University of Arkansas - Fort Smith
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General Syllabus

ELEC 1393 Solid State

Credit Hours: 3

Lecture Hours: 2

Lab Hours: 2

Prerequisite: ELEC 1233 Fundamentals of Electricity

Effective Catalog: 2018-2019

I. Course Information

A. Catalog Description

Solid-state circuitry, including characteristics of active and passive circuit components. Both DC and AC signal approximations are analyzed to determine correct circuit operation and common failure modes. Rectifier, regulator, and amplifier circuits plus Bipolar, J-FET, MOSFET, SCR, DIAC, and TRIAC circuits are included.

B. Additional Information

The students will be introduced to basic semiconductor theory and then applications. Each theory lecture will be augmented with an appropriate lab experiment. To gain expertise in checking components, building circuits, checking circuit performances and circuit troubleshooting.

II. Student Learning Outcomes

A. Subject Matter

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

1. Accurately measure the characteristics of diodes and bipolar transistors with both VOM and oscilloscope.
2. Using a circuit breadboard, build and successfully operate simple diode and transistor circuits.
3. Understand the operation and application of common diode circuits.
4. Explain, with all essential details, the operation of various transistors bias circuits.
5. Explain, with all essential details, the operation of common transistor amplifier circuits as described in lecture notes and textbook readings.
6. Identify faults in typical diode circuits.

7. Identify faults in common transistor circuits.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking - Students will analyze and troubleshoot faults in typical diode and common transistor circuits. Students will apply analytical troubleshooting techniques to determine faults in circuits in the laboratory.

Quantitative Reasoning - Students will utilize mathematics to solve various electrical problems

III. Major Course Topics

- A. Basic diode theory
- B. Diode approximations and curves
- C. Rectifier circuits
- D. Capacitor filters and Zener regulators
- E. Voltage multiplier circuits
- F. Clippers and clampers
- G. Basic transistor theory
- H. Transistor curves and parameters
- I. Bias circuits
- J. Saturation and cutoff
- K. AC circuit and DC circuit
- L. Small signal C-E amplifiers
- M. Common collector amplifiers
- N. Common base amplifiers
- O. Coupling types
- P. Class A power amps
- Q. Class B push-pull amps
- R. Class C amps
- S. J-FETs and curves
- T. Enhancement/depletion MOSFET
- U. FET biasing
- V. FET amplifiers
- W. Cascaded amplifiers
- X. Decibels
- Y. Voltage regulation

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