

ELN 131
ANALOG ELECTRONICS I

COURSE DESCRIPTION:

Prerequisites: ELC 131

Corequisites: MAT 122

This course introduces the characteristics and applications of semiconductor devices and circuits. Emphasis is placed on analysis, selection, biasing, and applications. Upon completion, students should be able to construct, analyze, verify, and troubleshoot analog circuits using appropriate techniques and test equipment. Course Hours Per Week: Class, 3. Lab, 3. Semester Hours Credit, 4.

COURSE OBJECTIVES:

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

- a. Identify and describe operation of semiconductor devices.
- b. Analyze where and how analog components are used.
- c. Locate and select analog devices using component specifications based on circuit requirements.
- d. Construct operational circuits using analog devices.
- e. Select and demonstrate the use of appropriate test equipment to analyze circuit operation.
- f. Using appropriate troubleshooting techniques evaluate circuit performance applying suitable repair methods.
- g. Identify and demonstrate safe workplace practices.

OUTLINE OF INSTRUCTION:

- I. Introduction to Semiconductor Physics
 - A. N-type and P-type materials
 - B. Electron and hole currents
 - C. PN junction and biasing
- II. Diode Circuit Analysis
 - A. Diode model
 - B. Clipper and clamper circuits
 - C. Special diodes: Zener and LED
- III. Power Supplies
 - A. Rectifiers
 - B. Voltage regulation
 - C. Transient suppressors

- D. Power supply troubleshooting
- IV. Bipolar Junction Transistors
 - A. Transistor types: NPN and PNP
 - B. Transistor ratings and specifications
 - C. Transistor testing
- V. Transistor Amplifier Circuits
 - A. DC biasing
 - B. Practical biasing circuits
 - C. BJT transistor amplifier configurations: common-emitter, -collector, and -base
- VI. Common Emitter Amplifiers
 - A. Equivalent circuit models
 - B. Gain and Impedance
 - C. Troubleshooting common emitter amplifiers
- VII. Other BJT Amplifiers
 - A. Common collector amplifiers
 - B. Common base amplifiers
- VIII. Power Amplifiers
 - A. Classes of amplifiers: A, B, AB, C, and D
 - B. Class AB amplifier analysis

REQUIRED TEXTBOOKS AND MATERIALS:

Paynter, Robert. Introductory Electronic Devices and Circuits, Prentice Hall.

Paynter, Robert. Lab Manual for Introductory Electronic Devices and Circuits, Prentice Hall.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.