

ELN 131
ELECTRONIC DEVICES

COURSE DESCRIPTION:

Prerequisites: ELC 131

Corequisites: MAT 122

This course includes semiconductor-based devices such as diodes, bipolar transistors, FETs, thermistors, and related components. Emphasis is on analysis, selection, biasing, and applications in power supplies; small signal amplifiers; and switching and control circuits. Upon completion, students should be able to construct, analyze, verify, and troubleshoot discrete component 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. Analyze diode circuits.
- b. Identify, select, and handle transistors and diodes.
- c. Analyze linear power supply circuits.
- d. Analyze transistor amplifier circuits.
- e. Identify the fundamental types of transistor amplifier circuits.
- f. Test semiconductors using the curve tracer.
- g. Perform graphical analysis of measured data.
- h. Conduct voltage and power gain measurements.
- i. Assess component acceptability for circuit applications.

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 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.