

DEPARTMENT ELEC

ELEC 221 – ELECTRONICS I

5 credit hours, 4 hours lecture, 3 hours laboratory

I. Description

This course is a semiconductor device course. The main topics covered are diode characteristics and applications, bipolar junction transistor characteristics, modeling, and operation in small-signal and large-signal amplifier circuits, field-effect transistor biasing and operation. There is also an emphasis on circuit simulation using PSpice.

PREREQUISITE: ELEC 110, or ELEC 101 and ELEC 102.

II. Text

Dailey, Denton J. *Semiconductor Devices and Circuits: Discrete and Integrated*. Upper Saddle River: Prentice, 2001.

III. Objectives

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

- A. Describe the basic operation and characteristics of diode, BJT and FET circuits.
- B. Analyze BJT and FET-based amplifier circuits.
- C. Use the oscilloscope, VOM, DMM, function generator, frequency counter and curve tracer to troubleshoot, test, and design active circuits.
- D. Use PSpice to simulate and analyze small-signal, large-signal, and frequency response characteristics of circuits containing BJTs, FETs and diodes.

IV. Content

- A. Thevenin's and Norton's Theorems.
- B. Diode circuit operation.
- C. Circuit simulation.
- D. Bipolar transistor operation and biasing techniques.
- E. Small-signal BJT amplifier analysis and testing.
- F. Field-effect transistor biasing.
- G. FET Small-signal amplifier analysis and testing.
- H. Power amplifier biasing and large signal analysis.
- I. Basic thyristor operation and applications.

V. Evaluation

The final grade will be based on a minimum of 4 major tests, selected assignments, and selected laboratory reports compiled in a lab notebook.

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VI. Bibliography

Fiore, James M. *Op Amps and Linear Integrated Circuits*. New York:: Delmar, 2000.

Floyd, Thomas A. *Electronic Devices*. Columbus: Merrill, 1984.

Gibilisco, Stan *Tab Encyclopedia of Electronics for Technicians and Hobbyists*.
New York: McGraw, 1996.

Goody, Roy W. *OrCAD PSpice for Windows*. Upper Saddle River: Prentice, 2000

Greeneich, Edwin W. *Analog Integrated Circuits*. New York:: Kluwer Academic, 1997.

Hambly, Allan R. *Electronics*. 2nd ed. Upper Saddle River: Prentice, 2000

Lenk, John D. *McGraw-Hill Circuit Encyclopedia and Troubleshooting Guide*, New York:
McGraw, 1996.

Malvino, Albert P. *Electronic Principles*. 3rd ed. New York: McGraw, 1984.

Malvino, Albert P. *Semiconductor Circuit Approximations*. New York: McGraw, 1984.

Thomas, Roland E. *The Analysis and Design of Linear Circuits*. New York: Wiley, 2000.

VII. Original Approval

VP for Academic Affairs

Date

Revised Spring 2004