EEE 3300 – Electronics 1

Credits : 4

Text book, title, author, and year: Sedra and Smith, "*Microelectronic Circuits*", Sixth Edition, Oxford University Press, 2010

a. **Supplemental materials:** none.

Specific course information

a. **Catalog description:** Introduction to solid state devices (diodes, BJTs, FETs); op-amps, small signal amplifier analysis, large signal analysis. Use of circuit analysis programs (SPICE, etc.).
b. **Prerequisites:** *EEL 3111*
c. **Required, elective, or selected elective:** required

Specific goals for the course

a. **Specific outcomes of instruction:** By the end of the course students will be able to: (i) understand the applications of solid state devices (diodes, BJTs, FETs); op-amps, small signal amplifier analysis, large signal analysis; (ii) Use of circuit analysis programs (SPICE, etc.).

Brief list of topics to be covered:

1) Understanding of op-amp operation and limitations when configured as feedback amplifier.
2) Familiarity with op-amp amplifier applications, which include inverting and non-inverting amplification, buffering, linear summation of signals, voltage level shifting, integration, differential amplification and low-pass filtering.
3) Understanding of op-amp operation and limitations when configured as a comparator.
4) Familiarity with op-amp comparator applications that include Schmitt Trigger design and Astable Multivibrator (square-wave oscillator) design.
5) Understanding of diode and Zener diode operation - specifically, ability to analyze DC operation of resistor-diode circuits. Also - understanding of the role played by diode models of various complexities.
6) Ability to design and analyze a regulated DC voltage supply, using transformers, diodes and Zener diodes.
7) Familiarity with diode applications, including voltage limiting and clamping. (only if time permits)*
8) Understanding of the operation of a BJT transistor. Specifically, ability to analyze NPN and PNP transistor DC conditions in active, saturation and cutoff modes.
9) Understanding of the concept of transistor biasing, and familiarity with common biasing techniques.
10) Understanding of the concept of a small-signal transistor model, and ability to analyze simple amplifier circuits.
11) Ability to design BJT common-emitter and emitter-follower amplifiers to meet voltage gain and input resistance specifications. (only if time permits)
12) Understanding of the principle of operation of a MOSFET transistor, and ability to analyze simple (single transistor, at Level 1 modeling) NMOS and PMOS DC circuits.

Specifically, ability to find out at what mode of operation (saturation, triode or cutoff) the transistor operates.

13) Understanding the concepts of simple Common-Source Amplifiers.