EEE 4361 – Electronics 2

Credits: 3 credits

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:** Continuation of EEE 3300. Differential amplifiers, frequency response, feedback amplifiers, oscillators, power amplifiers, integrated electronics.
b. **Prerequisites:** *EEL 3300*
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 both the theory and applications of Differential Amplifiers; (ii) Power Amplifiers; (iii) High-Frequency Response of Transistor Amplifiers; (iv) Feedback in Electronic Amplifiers ; (v) Analysis, Design and applications involving the 555 Timer; (vi) Electronic applications covered in Laboratory 2

Brief list of topics to be covered:

1. The student will be able to analyze and design current mirror DC current sources.
2. The student will understand the use of current sources for transistor biasing and loading.
3. The student will be able to design multi-stage transistor amplifier (an op-amp implementation) to meet CMRR and input resistance specifications.
4. The student will understand the properties and design of the three basic BJT amplifier configurations - CE, CB and CC.
5. The student will understand the high-frequency performance of all transistor amplifier configurations, including the Cascode Amplifier and the Miller Effect.
6. The student will understand the Feedback concept, and ability to analyze the effect of feedback on an amplifier's voltage and current gains, input and output resistance and bandwidth.
7. The student will learn the concept of the four amplifier types - voltage, current, transconductance and transresistance.
8. The student will able to design a feedback amplifier to meet gain, input and output resistance and bandwidth specifications.
9. The student will able to compensate a feedback amplifier.
10. The student will understand Class A and B power amplifiers - biasing, efficiency and crossover distortion elimination.
11. The student will able to design a wide band audio amplifier.
12. The student will able to design oscillators and one-shot multi-vibrators using the 555 timer.
13. The student will able to use ADS to analyze amplifier's performance – including new

skills such as multi-runs for parametric sweep, Monte-Carlo Simulation and Worst Case Analysis, use of ABM components and editing of EVAL and Breakout Components.

14. The student will understand Design Tradeoffs: Gain vs. Input Resistance vs. Bandwidth vs. Swing.
15. The student will understand Laboratory 2 topics that include: Active Filters, Wideband Amplifiers, Class-C Amplifiers, and Colpitts Oscillator.