EEE 433 Analog Integrated Circuits

Course (Catalog) Description:
Analysis, design, and applications of modern analog integrated circuits, Apply the methods learned in class to design and implement practical projects.

Prerequisite:
Engineering BS/BSE student and a grade of C or better in EEE 334, EEE335

Textbook:

1) A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, Oxford University Press.
2) Analog CMOS Integrated Circuits by Behzad Razavi, second edition and some homework problems will come from this text.
3) I will be using my own class notes heavily

Instructor

Ahmed Helmy, faculty Associate, ahmed.helmy@asu.edu office hours after every class for as long as it takes, also as needed Zoom meetings

Course Objectives:
Design, analysis, simulations, and testing of analog circuits, analog electronics, with focus on integrated circuit design, included topics: DC biasing, op-amp.
The labs will focus on designing operational amplifiers. The design, analysis, and simulations will be done using CADENCE. Students will simulate and layout the circuit.

Course Outcomes:
Design, analysis, simulations, and testing of analog circuits, analog electronics, with focus on integrated circuit design, included topics: DC biasing, op-amp.
Cadence for Simulation Labs and Homework problems.

Course Topics:

1. Introduction
2. MOSFET Transistors
3. Bode plots and dBs
4. Integrated Common Source Amplifiers
5. Cascode Amplifiers, Buffers and Mirrors
6. Differential Pair Amplifiers
7. CMOS Operational Amplifier Design for High Bandwidth
8. CMOS Operational Amplifier Design Example
9. Feedback Amplifiers
10. Noise Fundamentals
11. Analog IC Design Rules & Layout

Computer Usage:
The labs use Cadence software for simulations.

Laboratory Experiments:
There is a weekly project/Lab. The labs will be either using a CAD tool for simulations (PSPICE/CADENCE) and layout of Integrated Circuits (IC), or hardware lab. All hardware labs work will occur in GWC273 under an open lab system. You may do your work anytime the lab is open.

1. Cadence Tutorial
2. Common Source and Cascode Amplifiers
3. Differential Amplifier Design
4. CMOS Operational Amplifier Design

Grading: 9 HW's: 10% total
2 Exams: 25% Each,
4 Labs 40% total

Course Contribution to Engineering Science and Design:
EEE433 contributes to engineering science through circuit analysis, problem solving, computer solutions, and applications of mathematics, physics, and electronics. Design occurs through weekly design projects as well as a four-week final design project.