SAMPLE SYLLABUS

This syllabus is to be used as a guideline only. The information provided is a summary of topics to be covered in the class. Information contained in this document such as assignments, grading scales, due dates, office hours, required books and materials may be from a previous semester and are subject to change. Please refer to your instructor for the most recent version of the syllabus.

ABET Course Syllabus EEE433

1. **Course: EEE 433 Analog Integrated Circuits**
2. **Credits and Contact Hours:** 4 Credit Hours (lecture, lab), Topics: Engineering
3. **Course Coordinator:** S. Kiaei, Professor, David Allee, Professor
4. **Textbook:** Analog Integrated Circuit Design, Carusone, Johns, Martin, ISBN-978-0 047077010-8
   Supplemental materials: Reading assignments are listed on the tentative schedule. Students will be expected to have read the assignment before the day it is listed on the schedule and be ready to ask questions, work examples, etc. from this assignment. In some cases, the reading will be supplemented by lecture notes.
5. **Specific course information**
   a. **Catalog description:** Analysis, design, and applications of modern analog integrated circuits, Apply the methods learned in class to design and implement practical projects.
   b. **Prerequisites or co-requisites:** Engineering BS/BSE student, EEE 334, EEE335.
   c. **Required/elective/selected elective:** Elective
6. **Specific goals for the course**
   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 culminating in the design of a gamma or neutron radiation detector. The design, analysis, and simulations will be done using CADENCE, and Matlab. Students will simulate and layout the circuit.
   a. **Outcomes of instruction:**
      - 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.
   b. **Outcomes of Criterion 3 addressed by the course:**
      (1) Students with Analog/Mixed signal background are highly sought after upon graduation. All the design and computer tool skills taught as applications of math, physics and engineering principles and are used in modern analog/mixed signal industries.
      Students completing 433 have basic knowledge of analog/mixed signal design. Students have extensive exposure to Cadence circuit analysis in 433. Cadence tools and PSPICE used for layout, simulation and extraction as well as contemporary methods in electronic circuit analysis. Cadence tools will be used in five years; course material geared toward analog electronics expected over next five years. Students are taught problem solving through circuit design, circuit analysis, layout of circuits, extraction of layout parameters, and design analysis.
      (6) 3 hours of hardware and Cadence simulation required per week, which require students to design and conduct experiments.
      (7) Literature surveys and reference development outside class for their projects. Industry speakers give presentations on applications of course knowledge.
7. **Brief list of topics to be covered**
   - MOS device physics, DC, AC, Parasitics, High Freq. Model;
   - Current Mirrors;
   - Amp Models, Single-stage Amplifiers;

- Layout, Parasitics;
- Review of Freq. Response, BODE Plot;
- Frequency response of amps and analog circuits – Ch4
- Feedback Amp – Ch 5
- Folded Cascode Op-Amp – Ch 6
- Noise- Ch 9

Computer Usage:
The labs use Cadence software for simulations. All lab work will occur in GWC273 CAD lab. Students can login the system from any ASU computer, but you must be within the ASU domain computer to run CADENCE (no off campus access to CADENCE tools). Students can also login from your computer.

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. For the students enrolled at 591 (graduate students), they will be performing projects and advance labs using the CAD tools.

Lab 1: CADENCE Tutorial, MOS IV Curves
Lab 2: CS with Passive, Active, Source Degeneration
Lab 3: Current Mirror, Cascode Mirror
Lab 4: Diff Amp
Lab 5: Frequency Response
Lab 6: Project

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.

Person preparing this description and date of preparation: : Sayfe Kiaei, K. Tsakalis, June, 2021.