Analog Integrated-Circuit Design and Analysis

COURSE SYLLABUS

Course Description

In ELEC 2400 and 3400, Analog Integrated Circuit Design I and II, students learned how to analyze and design single-stage and two-stage amplifiers. Due to the time limit, important topics, such as frequency response, feedback, stability and compensation, were not covered.

These important topics will be discussed in detail in this course. In addition, ELEC 4420 will introduce some advanced amplifier design techniques to the students, including other advanced amplifier topologies, input offset, rail-to-rail contstant-transconductance amplifiers, variable-gain amplifiers, etc.

Throughout the course, both CMOS and bipolar implementation will be discussed in parallel, and whenever possible, focus will be placed on low-voltage and low-power design consideration.

Prerequisites

Students must have taken ELEC 3400 or equivalent and must have basic skills in analyzing and designing simple amplifiers. It will be assumed that students are familiar with transistor modeling, current sources, active loads, and two-stage amplifiers. Knowledge on device physics and basic signal-and-system theories will be a plus.

Textbook

Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer, *Analysis and Design of Analog Integrated Circuits*, New York, Wiley, 5th ed., 2010. (highly recommended and will be on reserve)

B. Razavi, *Fundamentals of Microelectronics*, New York, Wiley, 3rd ed., 2021 (highly recommended and will be on reserve)

B. Razavi, *Design of Analog CMOS Integrated Circuits*, Mc-Graw Hill, 2nd ed., 2016. (highly recommended and will be on reserve)

T. Carusone, D. Johns, and K. Martin, *Analog Integrated Circuit Design*, New York, Wiley, 2nd ed., 2012 (highly recommended and will be on reserve)

Class Web Page and Lecture Notes

A class home page has been set upon Canvas at https://canvas.ust.hk/courses/, where lecture notes, class assignment, important announcement, and relevant information will be posted there for access and reference. In addition, when necessary, review notes will also be posted.

In parallel, an email alias for the whole class, elec4420-l1-fall@lists.ust.hk, has been created and will be used extensively for general announcement and communication.

Homework Assignment

Homework is assigned approximately once every three or four weeks and is due via Canvas by 11:59 PM on the due date. *No late homework will be accepted.*

Exam and Project

There will be *one open-booked midterm exam*, tentatively scheduled around October 28, covering everything discussed in the lectures until then.

There will be no final exam. Instead, there will be *one final class project*, in which students will be asked to design and simulate an amplifier using HSPICE to meet some given specifications. Students are encouraged to work in groups of two or three. Project description will be given in full detail later. Tentatively, a preliminary report is due around November 22 and a final report is due around December 6.

Tutorials

There will be one tutorial session every week during which the TAs will go over the lecture material, solve sample problems, and answer questions. Although it is optional, the students are strongly encouraged to attend and to make the best use of it.

Grading

The grade weighting for the class will be as follows:

Homework	10 %
Class Participation	5 %
Midterm Exam	25 %
Preliminary Project Report	10 %
Final Project Report	50 %

Staff Information

Name	Duty	Email	Phone	Office	Office Hours
Dr. Howard LUONG	Lecturer	eeluong	x8514	2453	W: 5:00 PM - 7:00 PM, or by appointment
TBA					