ESE 516
Integrated Electronic Devices and Circuits I

Fall 2011

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Classes : MW 10:40am-12:00pm, in LGT ENGR LAB 154
Office hours : MW 12:00pm-2:00pm, or by appointment

Textbooks :
D.A. Johns and K. Martin, "Analog Integrated Circuit Design", 1st edition, Wiley 1996.
References :
B. Razavi, "Design of Analog CMOS Integrated Circuits"
P.R. Gray, P.J. Hurst, S.H. Lewis, and R.G. Meyer, "Analysis and Design of Analog
Integrated Circuits"

Course Description

This is an advance circuit design course that will discuss the principles, concepts and
techniques required to produce successful designs of analog and digital integrated circuits.
Fundamentals of devices, circuits and basic topologies will be reviewed. Topics considered
will include design of high-performance operational amplifiers, comparators, continuous-
time filters and switched-capacitor circuits.

Course Schedule

Week 1	Introduction to VLSI technology, fundamentals of devices (BJT and MOS), modeling.
Week 2,3	Single-stage amplifiers and basic analog building blocks: differential pair and current mirrors.
Week 4	High-gain amplifiers: "classic" two-stage amplifier, "current-mirror" amplifier, "telescopic" and "folded cascode" architectures.
Week 5	High-gain buffered amplifiers (op-amps)
Week 6	"Small-signal/moderate frequency" transistor models. Frequency response of amplifiers; feedback; compensation.
Week 7	Deviations from idealities of practical op-amps and designs that minimize some of them.
Week 8	Noise analysis. Power estimation and optimization. Biasing.
Week 9	Comparators.
Week 10	Discrete-time analog signal processing.

Week 11,12   Switched-capacitor circuits.
Week 13   Project presentations.

Homework

To help prepare for the midterm and final exams, some homework exercises will be assigned. They will not be graded. Solutions will be given a week after they are assigned.

Credit Distribution

1. Midterm (30%)
2. Final (40%)
3. Project (30%)