

ESE 516

Integrated Electronic Devices and Circuits I

Instructor : Milutin Stanacevic
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Classes : WF, 5:20-6:40pm, in TBA

Office hours : MW 11:00am-1:00pm, 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

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| 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 10,11 | Continuous time filters. |
| Week 12 | Switched-capacitor circuits and discrete-time analog signal processing. |
| 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%)