EE-320 **IC design I**

Shoaran Mahsa

Cursus	Sem.	Type
Electrical and Electronical Engineering	BA5	Opt.
HES - EL	H	Opt.
Microtechnics	MA1, MA3	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

Introduction to the design of analog CMOS integrated circuits at the transistor level. Understanding and design of basic structures.

Content

- Review of physics of bipolar and MOS transistor
- MOS transistor: operating modes, large and small signal models, parasitic effects
- Basic building blocks for linear analog integrated circuits: single-stage amplifiers, current mirrors, differential pairs, and cascodes
- Transistor-level design of operational amplifiers and operational transconductance amplifiers
- Frequency response of amplifiers
- Noise: basic mechanisms, analysis of basic circuits
- Layout techniques for analog integrated circuits, variation effects

Keywords

Transistor, CMOS, analog integrated circuit

Learning Prerequisites

Recommended courses

Electronics I and II

Learning Outcomes

By the end of the course, the student must be able to:

- Design simple analog circuits
- Analyze simple analog circuits
- Develop an ability to parse large circuits into smaller, analyzable subunits
- Develop an intuition for analog circuit behavior
- Use CAD tools

Transversal skills

• Access and evaluate appropriate sources of information.

Teaching methods

Ex cathedra lectures, exercise sessions and practical work (simulation with CAD tools)

Assessment methods

Written

Supervision

Office hours	Yes
Assistants	Yes
Forum	No

Resources

Bibliography

• Lecture slides
• *Design of Analog CMOS Integrated Circuits*, 2nd Edition, B. Razavi, McGraw-Hill
• *Analysis and Design of Analog Integrated Circuits*, 5th Edition, Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, and Robert G. Meyer, Wiley

Ressources en bibliothèque

• Design of Analog CMOS integrated circuits / Razavi
• Analysis and Design of Analog Integrated Circuits / Gray
• CMOS: circuit design, layout, and simulation / Baker