EE-490(b)

Lab in EDA based design

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Cursus	Sem.	Type
Electrical and Electronical Engineering	MA1, MA3	Opt.
MNIS	MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
Hours	**4 weekly**
TP	4 weekly
Number of positions	

Summary

The goal of this lab is to get a working knowledge on the use of industrial state-of-the-art EDA (Electronic Design Automation) tools and design kits for the design of analog and digital integrated circuits.

Content

Introduction (2h)
Course organisation. EDA-based design flow presentation.
Full-custom digital design (10h tutorial, 12h project)
Schematic and layout editing, circuit simulation (DC, transient, small-signal AC, Monte-Carlo), back-end verification (DRC/LVS), parasitics extraction, virtual testbench development. Design of a simple digital component (e.g., mux, adder). Technology: UMC 0.18 micron CMOS.
Semi-custom digital design (8h tutorial, 12h project)
VHDL modeling, logic simulation, and RTL synthesis. Standard-cell placement and routing, delay backannotation. Middle complexity digital component considered (e.g., ALU). Technology: UMC 90nm CMOS, Faraday standard cell library and IP (register file).
Full-custom analog design (12h project)
Same tasks as in full-custom digital design, but applied to an analog component (e.g., OTA). Technology: UMC 0.18 micron CMOS.
EDA tools from Cadence (Virtuoso6, Assura, Spectre, Encounter), Synopsys (Design Compiler) and Mentor Graphics (Modelsim) will be used. The integrated circuit technologies used are mentioned above.

Keywords

Full-custom design. Semi-custom design. Digital design. Analog design. Electronic design automation tool.

Learning Prerequisites

Required courses

IC design I (EE-320). IC design II (EE-330). Digital systems design (EE-334).

Important concepts to start the course

Basic analog and digital integrated MOS components. RTL design. VHDL for synthesis.

Learning Outcomes

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

- Carry out basic analog and digital design flows.
- Manipulate state-of-the-art industrial EDA tools and design kits.

- Apply typical EDA-based design techniques.

Transversal skills

- Use a work methodology appropriate to the task.

Teaching methods

Practical work through guided tutorials and mini-projects.

Expected student activities

Working on Linux computers. Using both GUI-based and script-based design flows. Perform the essential design steps from the specifications to the final layout realisation.

Assessment methods

Tutorial checkpoints. Separate evaluations of the three mini-projects (1/3rd of the final grade each).

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Notes/Handbook

Tutorials. Project descriptions. Selected documentation on EDA tools and design kits.

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=119