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, Innovus), Synopsys (Design Compiler) and Mentor Graphics (Modelsim) will be used. VHDL editing using Sigasi. The integrated circuit technologies used are mentioned above.

Keywords

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
Virtual desktop infrastructure (VDI)
Yes

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

Websites
• http://eda-tuts.epfl.ch/TDDDF

Moodle Link
• http://moodle.epfl.ch/course/view.php?id=119