CS-472: Design Technologies for Integrated Systems
IC/STI — Fall 2025

Instructors

Lecturer: Prof. Giovanni De Micheli [giovanni.demicheli@epfl.ch]
Lecturer: Dr. David Mallasén Quintana [david.mallasen@epfl.ch]
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Teaching Assistant: Tommaso Terzano [tommaso.terzano@epfl.ch]
Teaching Assistant: Anna Burdina [anna.burdina@epfl.ch]

Schedule

Tuesday 8:15 – 10:00, AAC 137 (lecture) !Room may change; check Moodle for updates.
Thursday 10:15 – 11:00, INR 219 (lecture)
Thursday 11:15 – 13:00, INR 219 (exercise session)

Objectives

Students will learn the techniques used for designing integrated circuits and systems starting from design languages and formalism to the synthesis and optimization of digital circuits in terms of logic gates.

Prerequisites

Good knowledge of digital design and algorithm design.

Syllabus

- Modeling languages and specification formalisms,
- High-level synthesis and optimization methods (scheduling, binding, datapath and control synthesis),
- Representation and optimization of combinational logic functions (encoding problems, binary decision diagrams),
- Representation and optimization of multi-level networks (algebraic and Boolean methods, “don’t care” set computation, timing verification and optimization),
- Modeling and optimization of sequential functions and networks (retiming),
- Semi-custom libraries and elements of physical design,
- Introduction and hands-on experience with Synopsys Fusion Compiler and DSO.ai.

Textbook

Synthesis and Optimization of Digital Circuits, by Giovanni De Micheli.

A copy of the textbook can be borrowed (with a deposit of 50 CHF) upon an email request -> Put Subject as "BOOK DTIS" :

Monday/Thursday/Friday: Tommaso Terzano [tommaso.terzano@epfl.ch]
Tuesday/Wednesday/Friday: Anna Burdina [anna.burdina@epfl.ch]

Grading

The course grade is determined by the following assignments:

Midterm exam	30%
Projects	30%
Final exam	40%

All Project assignments are to be done remotely under a strict deadline. All assignments must be submitted no later than the due date unless prior arrangements are made with the lecturer and a new due date is established.

The midterm and final exams will be testing the theories taught in the lectures and there will be no programming involved in the exams.

Homework and Exercise Sessions

Pen-and-paper homework is provided solely for practice and self-evaluation; it will not be graded. Solving these exercises is strongly recommended, as they reflect the level of complexity you can expect in the midterm and final exams. Solutions will be reviewed in the following week's exercise sessions.

Projects

There will be two projects provided by Synopsys, which will be monitored and evaluated by the Synopsys team. These projects will be supported through the exercise sessions, with professional guidance offered remotely. Each project will then be completed and its evaluation process explained during the classes.

In addition, the third project will be introduced after the mid-term exam, which will be explained later throughout the course.

Teamwork

Students may discuss ideas and approaches among themselves, but each student must individually complete the project assignments. Plagiarism checks may be performed, and students may be asked to explain their work during practical sessions. Students are required to complete both the exams and the project assignments individually.