

CS-472: Design Technologies for Integrated Systems

IC/STI — Fall 2024

Instructors

Lecturer: Prof. Giovanni De Micheli [giovanni.demicheli@epfl.ch]

Teaching Assistant: Andrea Costamagna [andrea.costamagna@epfl.ch]

Teaching Assistant: Mingfei Yu [mingfei.yu@epfl.ch]

Schedule

Tuesday 8:15 – 10:00, INM 10 (lecture)

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, algorithm design and programming.

Syllabus

- Modeling languages and specification formalisms,
- High-level synthesis and optimization methods (scheduling, binding, data-path and control synthesis),
- Representation and optimization of combinational logic functions (encoding problems, binary decision diagrams),
- Representation and optimization of multiple-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.

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) at the secretary’s office:

Chantal Demont [chantal.demont@epfl.ch], INF 340.

Grading

The course grade is determined by the following assignments:

Homework	30%
Midterm exam	20%
Project	15%
Final exam	35%

All 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. If a student submits an assignment after the due date without having made arrangements, a minimum of 20% will be deducted for each day, or part thereof, that the assignment is late.

Homework and Exercise Sessions

Graded homeworks are programming assignments and will be graded based on the number of passing testcases using automatic testing scripts. Unless a flaw in the testing script is detected, no change to the grades will be possible. It is the students' responsibility to make sure their code compiles and runs in the pre-defined environment and follows the submission rules (e.g., file name, compression format, etc.) written in the assignment description.

The midterm and final exams will be testing the theories taught in the lectures and there will be no programming involved in the exams. Thus, in the exercise sessions, a pen-and-paper problem set will be given each week, and the solutions will be discussed in the next week. These exercises are not graded and do not need to be handed in.

Teamwork

Students may discuss in-between solutions of the programming assignments but each student needs to individually program the solution code. Plagiarism checks may be performed and students may be asked to explain their solutions during practical sessions. **Students are required to do the exams and the project individually.**