Summary
The course introduces the students to the basic notions of computer architecture and, in particular, to the choices of the Instruction Set Architecture and to the memory hierarchy of modern systems.

Content
- Complex digital systems in VHDL.
- Basic components of a computer.
- Instruction Set Architectures.
- Assembly-level programming.
- Multi-cycle implementation of processors.
- Caches.
- Virtual memory.

Keywords
Computer Architecture, Basic Processor Architecture, Instructions Sets, Cache Hierarchies, Virtual Memory.

Learning Prerequisites
Required courses
Digital system designing

Important concepts to start the course
- Digital design in VHDL
- FPGA design software: Intel Quartus
- Simulation and verification of digital systems behavior: ModelSim.

Learning Outcomes
By the end of the course, the student must be able to:
- Design and implement a processor at the register transfer level using logic synthesizers and simulators.
• Develop assembly language programs.
• Justify the organization of a modern memory system including cache hierarchy.
• Design and implement a cache memory.

Teaching methods
• Ex cathedra / online lectures and exercises.
• Labs on dedicated FPGA boards.

Expected student activities
• Attending the course and exercise/lab sessions (in person or online)
• Completing the lab assignments.
• Homework: solving individually the exercises in the course exercise book.
• Participating in the discussions on the forum.

Assessment methods
Graded labs, during the semester (30%)
Final exam, during the exam session(70%)

Supervision
Office hours Yes
Assistants Yes
Forum Yes

Resources
Virtual desktop infrastructure (VDI)
Yes

Bibliography

Ressources en bibliothèque
• Computer organization and design

Websites
• https://parsa.epfl.ch/course-info/cs208/

Moodle Link
• https://moodle.epfl.ch/course/view.php?id=14225

Prerequisite for
Computer architecture II