CS-208 **Computer architecture I**

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Cursus	Sem.	Type
Communication systems	BA3	Obl.
Computer science minor	H	Opt.
Computer science	BA3	Obl.
HES - IN	H	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
TP	2 weekly
Number of positions	

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 desing

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 and quizzes.
- Homework: solving individually the exercises in the course exercise book.
- Participating in the discussions on the forum.

Assessment methods

Graded labs and quizzes, 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

David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Morgan Kauffman, 5th edition, 2013.

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