Study programmes: Bachelor studies - Informatics

Course name: R220 - Introduction to computer organization and architecture 2

Lecturers: Saša Malkov and other teachers from Department of Computer Science

Status: Compulsory

ECTS: 6

Attendance prerequisites: R120

Course aims: Acquiring general and specific knowledge in the field of computer architecture, building components of a computer system and their interconnecting.

Course outcome: After the course is finished, the student should have basic knowledge about logical circuits and fundamental functional components of a computer system. The student should understand the way these components are interconnected. The student should know the functional units of a processor and understand how a processor works. The student should be aware of main processor implementation techniques.

Course content:

- Combinatorial and sequential circuits. Logic gates, elementary sequential circuits. Encoders, decoders, multiplexers, demultiplexers, adders, comparators, counters, registers and other important circuits. Combinatorial and sequential circuits design.
- Basic elements of a computer architecture. Von-Neumann's architecture.
- Buses: bus types, synchronous and asynchronous buses, bus operations, bus arbitration, examples.
- Internal memory: types, characteristics, hierarchy, implementation, interleaving, interconnecting.
- Cache memory: purpose, principles, mapping functions, write and cache line replacement policies.
- Virtual memory: the concept of virtual memory and its implementation.
- Input/output interconnection: principles, techniques, I/O controllers, DMA, interrupts. Examples.
- Processors: instruction set architecture (ISA), data adressing, arithmetic-logic unit (ALU), control unit. Microprogrammed implementation of a control unit. Advanced architectures. Examples.

Literature:

1. Andrew S. Tanenbaum: Structured Computer Organization (fifth edition). Prentice Hall. 2005.
2. Sivarama P. Dandamudi: Fundamentals of Computer Organization and Design. Springer. 2002.

(a teacher may also choose other contemporary literature)

Number of hours: 5	**Lectures: 3**	**Tutorials: 2**	**Laboratory: -**	**Research: -**

Teaching and learning methods: Frontal, Group, Exercises

Assessment (maximal 100 points)

Course assignments	points	Final exam	points
Lectures	10	Written exam	-
Exercises / Tutorials	-	Oral exam	-
Colloquia	35	Written-oral exam	55
Essay / Project	-		