# RTU Course "Introduction to Computer Architecture"

## 12216 Department of Computer Networks and Systems Technology

*General data*

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| Code | DST203 |
| Course title | Introduction to Computer Architecture |
| Course status in the programme | Compulsory/Courses of Limited Choice |
| Course level | Undergraduate Studies |
| Course type | Academic |
| Field of study | Computer Science |
| Responsible instructor | Aigars Riekstiņš |
| Academic staff | Dmitrijs Bļizņuks<br>Igors Ščukins<br>Andrejs Kalniņš<br>Ēriks Kļaviņš<br>Lāsma Lēruma-Gūtmane<br>Gundars Miezītis |
| Volume of the course: parts and credits points | 1 part, 3.0 Credit Points, 4.5 ECTS credits |
| Language of instruction | LV, EN |
| Annotation | Data representation; minimization and technical implementation of logical functions; basic functional elements in computers and their synthesis; organization and architecture of computers; control unit; memory and its addressing modes; input/output subsystems; direct memory; virtual memory; computer buses; machine cycle; computer architecture concept; management of computer systems; RISC and CISC architectures; |
| Goals and objectives of the course in terms of competences and skills | To train specialists, who are able to discuss the computer architecture from a theoretical point of view, compare different computer systems and CPU architectures. |
| Structure and tasks of independent studies | A student has to read additional literature and answer the questions given at the end of each lecture to be able to participate in classroom discussions. A student should be able to discuss the topics of the last two lectures. |
| Recommended literature | 1.Computer Organization and Architecture, 6th Ed. by William Stallings (Prentice Hall, 2002).<br>2.D.A. Patterson and J.L. Hennessy, Computer Architecture: A Quantitative Approach, 4rd edition, (Morgan-Kaufmann, 2006).<br>3.Aldis Baums, Datoru athitektūra un organizācija, 2010. ISBN 978-9984-49-083-0 |
| Course prerequisites | Mathematics, basic eletrical elements |

*Course outline*

| Theme | Hours |
|---|---|
| Terminology and introduction to computer architecture and performance metrics | 4 |
| Structure of classic CPU | 2 |
| Instruction formats and addressing modes | 4 |
| Instruction level parallel execution | 8 |
| Instruction level parallel execution at a hardware level | 4 |
| Thread-level parallel execution | 4 |
| Computer memory structure | 4 |
| Hierarchical and virtual memory | 4 |
| Today’s CPU in real-time application | 2 |
| Input/output organization | 6 |
| Multi-CPU and multicomputer systems | 6 |

*Learning outcomes and assessment*

| Learning outcomes | Assessment methods |
|---|---|
| Able to discuss the basic principles of the computer systems, main advantages and limitations; to demonstrate the knowledge of basic elements and technology life cycles. | Positively assessed examination that includes both theoretical questions and case studies |
| Able to compare different computer architectures. | Positively assessed practical (laboratory) assignment. |
| Able to demonstrate the understanding of manufacturers' manuals, guidelines. | Positively assessed practical (laboratory) assignment. |
| Able to demonstrate the understanding of operation principles of different types of computer memory, I/O and other subsystems. | Positively assessed practical (laboratory) assignment. |
| Able to demonstrate the understanding of different types of computer performance and reliability enhancement techniques. | Positively assessed practical (laboratory) assignment. |

*Study subject structure*

| Part | CP | Hours per Week | | | Tests | | |
|---|---|---|---|---|---|---|---|
| | | Lectures | Practical | Lab. | Test | Exam | Work |
| 1. | 3.0 | 2.0 | 1.0 | 0.0 | | * | |