COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Computer architecture	

Academic staff	Core academic unit(s)
Coordinating: Assist. Prof., Dr. Konstantinas Korovkinas **Other:**	Kaunas faculty Institute of applied Informatics Muitines str. 8, LT-44280 Kaunas

Study cycle	Type of the course unit
First ☒ Second ☐	Compulsory Course ☒ Optional Couse ☐ Course Unit (Module) of the General University Studies ☐ Course Unit (Module) of Individual Studies ☒ Interdisciplinary Studies Course Unit (Module) ☐

Mode of delivery	Semester or period when it is delivered	Language of instruction
Auditorium	1 semester	English

Requisites	
Prerequisites: -	**Co-requisites (if relevant): -**

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	130	48	82

Purpose of the course unit		
The goal of the subject is to develop the ability to understand, describe, and explain modern computer components, their architecture, and principles of operation, while providing theoretical and practical knowledge of fundamental computer processes, their implementation devices, and their characteristics.		
Learning outcomes of the course unit	**Teaching and learning methods**	**Assessment methods**
Will be able to understand the fundamentals of computer architecture and its principles of operation, as well as explain their application in practical work.	Lectures-seminars, practical tasks, reports	Reports, colloquium, exam
Will be able to describe and explain the structure and operating principles of the main computer devices (processor, memory, input, and output devices), as well as understand the performance of computer systems.		

Will be able to perform various mathematical operations in different computing systems and apply logical elements and operations in the study of computer arithmetic.		
Will be able to understand and apply the principles of coding of textual, graphic, audio, and visual information.		
Will be able to understand the structure of operating systems and their basic principles of operation; describe and explain operating system functions for process, memory, input/output, and file system management, as well as the algorithms that implement them; and understand and apply the operating principles of the MS Windows, UNIX, and Apple OS X operating systems.		
Will be able to understand the principles of computer network operation and become familiar with cloud computing solution architectures.		
Students will be able to explain the architecture and operating principles of distributed systems.		
Will be able to understand the fundamentals of system virtualization technology and its core operating principles.		

Content	**Contact hours**							**Individual work: time and assignments**	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	**Contact hours, total**	**Individual work**	**Tasks for individual work**
1. Basic Computer Architecture Concepts. Development of the computer. Computer Generation and Classification.	1		2				**2**	**6**	Literature analysis, report preparation.
2. Computing systems. Mathematical operations in various computing systems. Logic Elements and Operations. Logic Schemes.	2		2				**4**	**6**	Literature analysis, report preparation, practical tasks.
3. Information encoding (text, graphic, audio, video information). Representing integer also real numbers and symbols on a computer.	2		2				**4**	**6**	Literature analysis, report preparation, practical tasks.
4. Processor structure and operating principles.	1		4				**5**	**6**	Literature analysis, report preparation.

5. Computer memory system. Memory devices and their characteristics.	1		2				**5**	**6**	Literature analysis, report preparation.
6. Computer input and output systems.	1		2				**2**	**6**	Literature analysis, report preparation.
7. Data processing equipment and trunks. Computer Performance Metrics.	1		2				**3**	**6**	Literature analysis, report preparation, practical tasks.
8. System and application software. Basic operating system structure, operation principles, control functions and algorithms implementing them. MS Windows, UNIX and Apple OS X operating systems.	2		2				**4**	**6**	Literature analysis, report preparation, practical tasks.
9. Computer networks. Data transmission channels. Cloud computing.	2		4				**6**	**6**	Literature analysis, report preparation, practical tasks.
10. High-performance computers, their architecture and application.	1		2				**3**	**6**	Literature analysis, report preparation.
11. Distributed system architecture.	1		2				**3**	**6**	Literature analysis, report preparation.
12. System virtualization.	1		2				**3**	**6**	Literature analysis, report preparation, practical tasks.
Exam		4					**4**	**10**	
Total	**16**	**4**	**28**				**48**	**82**	

Note: Up to 6 contact hours may be replaced by guest lectures given by social partners or educational visits to social partner organisations.

Assessment strategy	Weight %	Deadline	Assessment criteria
A report on a selected topic (R)	20%	Appointed time	Each student prepares and presents two reports on a selected topic (proposed by the lecturer or chosen independently).
Colloquium (C)	30%	Appointed time	The colloquium consists of two open-ended theoretical questions based on the course material covered up to the date of the colloquium, and a practical task.
Exam (E)	50%	During exam session	The exam consists of two open-ended questions based on the theoretical course material covered up to the exam date and a practical task.
Final assessment (FA)	100%	During exam session	A ten-point proportional grading system is applied for the assessment of acquired knowledge. The exam is considered passed if the final assessment (FA) >= 5. Final Assessment (FA) Calculation Formula: FA = 0,20*R + 0,30*C + 0,5*E, where C – colloquium mark, E – exam mark, R –reports mark, R = (R1+R2)/2 – average report grade.

REGARDING THE EXTERNAL EXAMINATION OF THE COURSE UNIT

Mark ☒					**If permitted, please provide the conditions**
Not permitted	☐	**Permitted**	☒		When completing the course as an external student, two reports (20%) are prepared and submitted to the lecturer by email (or

					uploaded to the e-learning environment) no later than five working days before the exam. After submitting the reports, a colloquium is taken (30%), followed by the final exam (50%). The same assessment criteria are applied to the evaluation of reports, the colloquium, and the exam as for students studying the course in the regular mode.

REGARDING THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (GenAI) TOOLS (SUCH AS "CHATGPT", ETC.) WHEN STUDYING THE COURSE UNIT

Mark ☒				**If permitted, please provide the conditions**
Not permitted	☐	**Permitted**	☒	GenAI may only be used if the lecturer specifies that a particular assignment may be completed using GenAI; otherwise, **it will not be graded**. If the use of GenAI tools is permitted for completing assignments, the citation requirements set forth in the Guidelines for the Use of Artificial Intelligence at Vilnius University must be strictly followed."

REGARDING ACADEMIC PROGRESS

A student who (1) **throughout the semester consistently** fails to demonstrate **progress in achieving the expected learning outcomes of a subject (module)** during the practical classes (seminars, exercises, laboratory work, etc.) and (2) fails to complete all interim assessment requirements and tasks within the time specified in the course description, is not allowed to participate in the examination session.

Author (-s)	**Publishing year**	**Title**	**Issue of a periodical or volume of a publication**	**Publishing house or web link**
Required reading				
1. Stallings, W.	2021	Computer Organization and Architecture: Designing for Performance	11th edition	Pearson
2. Englander, I., Wong, W.	2021	The Architecture of Computer Hardware, Systems Software, and Networking: An Information Technology Approach	6th edition	Wiley
Recommended reading				
1. Portnoy, M.	2023	Virtualization Essentials	3rd edition	Sybex
2. Comer, D.	2021	The Cloud Computing Book: The Future of Computing Explained	1st edition	Chapman and Hall/CRC
3. Da Fonseca, N. L., Boutaba, R. (Eds.).	2015	Cloud Services, Networking, and Management		Wiley-IEEE Press

NOTE: *Including Open Educational Resources in the reading list is recommended*