

Subject code	Credits
INF3029	4

Course title in Lithuanian

KOMPIUTERIŲ ARCHITEKTŪRA IR OPERACINĖS SISTEMOS

Course title in English

COMPUTER ARCHITECTURE AND OPERATING SYSTEMS

Short course annotation in Lithuanian (up to 500 characters)

Kurso metu suteikiamos pagrindinės teorinės ir faktinės žinios apie kompiuterių organizacijos ir architektūros pagrindus, pagrindinius procesus, vykstančius kompiuteryje (komandų vykdymą, konvejerizavimą, informacijos įvedimą ir išvedimą, t. t.), šiems procesams realizuoti skirtus pagrindinius kompiuterio įtaisus (procesorių, atmintis, įvesties bei išvesties įrenginius, t. t.) ir jų projektavimo principus, taip pat apie operacinės sistemos struktūrą, procesų ir gijų planavimą, valdymą ir tarpusavio sąveiką, atminties valdymo ir virtualios atminties organizavimo principus, įvedimo-išvedimo valdymą ir aklaviečių situacijos išvengimo būdus, failų sistemos struktūrą, apsaugos principus, operacinės sistemos vartotojo sąsajos organizavimo principus.

Short course annotation in English (up to 500 characters)

Students will acquire theoretical and practical knowledge about the basis of computer organization and architecture; main processes, running in the computer (execution of commands, pipelining, input and output, etc.), appropriate devices (processor, memories, input and output devices, etc.) for processes implementation, and the principles of their design, about the structure of operating systems, process and thread planning and interprocess communication, memory management and virtual memory implementation principles, input-output management and deadlock avoidance, file system structure, security management, organizational principles of operating system user interfaces.

Prerequisites for entering the course

Elementary computer and information technology skills; the basics of programming.

Course aim

The course aims to introduce students to the elements of modern computers, their architecture and working principles, to the basic structure and organizational principles of computer operating system, its main management functions as well as main algorithms for accomplishing these functions.

Content

No	Content (topics)
1.	Command set architecture, main categories, examples. MIPS architecture.
2.	Arithmetic logic unit. Numeral systems. Basic mathematical operations using 2's complement system. Computer formats to represent numerals (integer and real values) and characters.
3.	Logical gates and circuits.
4.	Memory architecture. Main memory, cache memory, processor register, virtual memory, external memory.
5.	Pipeline and parallel processing. Input and output. Computer performance and evaluation metrics.
6.	Operating system evolution. Operating system structure and functions.
7.	Process and thread planning and management.
8.	Process communication. Process race conditions and means for avoiding: semaphores, event counts, messages.
9.	Memory management. Virtual memory. Paging. Page replacement algorithms.
10.	Input-output management.
11.	Deadlock conditions and their avoidance.
12.	File system structure and management..
13.	OS selection.

Distribution of workload for students (contact and independent work hours)

Lectures	30 hours
Laboratory work	30 hours
Individual student work	50 hours
Total:	110 hours

Structure of cumulative score and value of its constituent parts

Final written exam (50%), mid-term written exam (17%), assessment of practical work (33%).

Recommended reference materials

No.	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	Self-study rooms	Other libraries
Basic materials						
1.	2013	Hennesy J.L., Patterson D.A. Computer Organization and Design: The Hardware/Software Interface	Morgan Kaufmann Publishers Inc.	2		
2.	2015	Stallings W., Computer Organization and Architecture	Prentice-Hall International, Inc.	2	2	
3.	2014	Andrew S. Tanenbaum. Herbert Boss. Modern Operating Systems	Prentice-Hall International, Inc.	2	3	
4.	2007	Marvin Solomon. Introduction to Operating Systems. FreeTechBooks.com		<i>Free access</i>		
Supplementary materials						
1.	2011	Hennesy J.L., Patterson D.A., Computer Architecture A Quantitive Approach	Morgan Kaufmann Publishers Inc.			
2.	2009	A.Silberschatz, P.B.Galvin, G.Gagne. Operating System Concepts with Java	John Wiley and Sons			
3.	2006	Greg Kroah-Hartman. Linux Kernel in a Nutshell	O'Reilly			

Course programme designed by

Doc.dr.A.Mickus, doc.dr. D.Vitkutė-Adžgauskienė, Department of Applied Informatics
--