

I074	Distributed Systems	L	P	S	ECTS 6
		2	1	1	

Course objectives. Introduce students to distributed systems. Acquire the skills of using at least one tool to develop distributed programs. Learn how to execute process and call procedure in distributed systems. Analyze and learn how to use synchronization and become acquainted with problem of consistency in distributed systems. Introduce students to the implementation of reliability and recovery and the implementation of security in distributed systems.

Prerequisites. No prerequisites.

Course content.

1. Distributed Systems: definition, architecture. Client - server models.
2. Processes: client and server execution, code migration.
3. Communication in Distributed Systems: Remote Procedure Call, Message-oriented Communication.
4. Naming: entity naming, identifiers and addresses.
5. Synchronization: clock synchronization, mutual exclusion, election algorithms.
6. Consistency and replicas: consistency protocols.
7. Error recovery: reliable client-server communication, reliable group communication, recovery
8. Security: secure channels, access control, security management.

LEARNING OUTCOMES

No.	LEARNING OUTCOMES
1.	Define distributed systems.
2.	Explain process execution in distributed systems.
3.	Describe Remote Procedure Call and Message-oriented Communication.
4.	Analyze synchronization in distributed systems: clock synchronization, mutual exclusion, election algorithms.
5.	Argument and analyze the problems of data replication and data consistency in distributed systems.
6.	Implement the reliability and recovery of distributed systems in case of an error.
7.	Define the concept and ways of implementation of security in distributed systems

RELATING THE LEARNING OUTCOMES, ORGANIZATION OF THE EDUCATIONAL PROCESS AND ASSESSMENT OF THE LEARNING OUTCOMES

TEACHING ACTIVITY	ECTS	LEARNING OUTCOME **	STUDENT ACTIVITY*	EVALUATION METHOD	POINTS	
					min	max
Attending lectures and exercises	1	1-7	Lecture attendance, discussion, teamwork and independent work on given tasks	Attendance lists, tracking activities	0	5
Homework Assignments	1	1-7	Solving given project tasks independently or in team and presentation of solution	Evaluating solutions and presentation	0	25
Written exam (Mid-terms)	2	1-7	Preparing for written exam	Evaluation	25	40

Final exam	2	1-7	Revision	Oral exam	25	40
TOTAL	6				50	110

Teaching methods and student assessment. Lectures and exercises are obligatory. The exam consists of a written and an oral part. Upon completion of the course, students can take the exam. Successful midterm exam scores replace the written exam. Exercises are performed as auditory, and partly as laboratory using computers. Students can influence their final grade by doing final project.

Can the course be taught in English: Yes

Basic literature:

1. A. Tanenbaum, M. V. Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2007.

Recommended literature:

1. G. Coulouris, J. Dollimore, T. Kindberg, G. Blair: Distributed Systems: Concepts and Designs, Addison – Wesley, 2012.
2. A. D. Kshemkalyani, M. Singhal, Distributed Computing: Principles, Algorithms, and Systems, Cambridge University Press, 2008.
3. A. Silberschatz, P. B. Galvin, G. Gagne, Operating System Concepts, Wiley, 2013.