

DESCRIPTION/Syllabi of Curricula/Module

Short Name of the University/Country code	DSEA
Date (Month / Year)	Jan 2019
TITLE OF THE MODULE	Code
Distributed computer systems and networks	

Teacher(s)	Department
Coordinating: Olexander Altukhov, PhD Others:	Department of Computer and Information Technology (CIT)

Study cycle (BA/MA)	Level of the module (Semester number)	Type of the module (compulsary/elective)
Master	1 th semester (first year) for Master	compulsary

Form of delivery (theory/lab/exercises)	Duration (weeks/months)	Language(s)
Lectures, lab	8 weeks	Ukrainian / English

Prerequisites	
Prerequisites: the study of the disciplines "System programming and operating systems", "Circuit engineering", "Computers and microprocessor systems" and "Organization of Databases and Knowledge"	Co-requisites (if necessary): the study of the disciplines "Administration of information systems", "Web-programming"

ECTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
4,5	135	45	90
Aim of the module (course unit): competences foreseen by the study programme			
Students should be able to: formation of cognitive, affective and motor competencies in the field of studying and explaining a set of basic concepts and knowledge in the field of development and operation of distributed systems and services, architectures and technologies of distributed computing, interaction of distributed system components, software for distributed systems and networks, and development and the formation of students' complex knowledge and skills in the technological cycle of creating software products for distributed data processing. The discipline is aimed at developing students' theoretical and practical skills in working with distributed computing technologies.			
Learning outcomes of module (course unit)	Teaching/learning methods (theory, lab, exercises)	Assessment methods (written exam, oral exam, reports)	
Knowledge: <ul style="list-style-type: none"> • to teach the future specialist in computer science knowledge and use of fundamental concepts and practical solutions that underlie modern distributed computing; • acquaintance with the basic principles of distributed data processing; • consideration of architectures and technologies of distributed computing; • gaining skills of analysis and algorithmic thinking, the formation of arguments in choosing the architecture and technology of distributed computing and knowledge and algorithms for distributed data processing; • formation of skills and abilities to use development tools to create distributed systems and networks. 	Work with the lecture notes as well as on the available fundamental subject literature	Knowledge test	
Skills: <ul style="list-style-type: none"> - to develop computerized systems using system programming languages and software development methods that interact with the components of computer systems, based on knowledge of network technologies and computer network architecture; - plan, organize, implement and control the implementation of information security systems in enterprises and organizations, 	Lectures, lab, consultation	Active attendance on lectures, individual project and presentation	

<p>using the concepts of information security, database security, network security, cryptography, including ethical issues of storage and access to medical data;</p> <ul style="list-style-type: none"> - to ensure the efficiency of processing large data sets, including the use of parallel and distributed computing, to apply numerical methods and algorithms for parallel structures, parallel programming languages. 		
<p>Competences:</p> <ul style="list-style-type: none"> - ability to take into account the basic requirements of information security, ethical and legal aspects of the use of information in various subject areas (technical, organizational, technical and medical purposes); - ability to use network technologies of data transmission, appropriate programming languages and equipment, when creating and researching computerized systems; - ability to conduct research and provide, through the development and implementation of software systems, protection of information in enterprises and organizations; - ability to reasonably choose and apply methods of parallel and distributed computing in order to develop software to accelerate the execution time of data processing algorithms. 	<p>Lectures, practical work, consultation</p>	<p>Individual project and presentation</p>

Themes	Contact work hours							Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practical work	Laboratory work	Placements	Total contact work	Individual work	Tasks
<p>1. Introduction to distributed computing systems. Definition of a distributed computer system (DCS). Intermediate software. DCS terminology.</p>	3				-		3	10	Study exam/ complete exercise

Classification of DCS.									
2. Cluster architecture. Client-server architecture. Distributed systems architecture.	3				-		3	10	Study exam/ complete exercise
3. Web. Client-server model. Object distributed systems. Agent technologies. Service-oriented architecture. Web services. Peer-to-peer network technologies. GRID technologies. Cloud computing.	3				3		6	10	Study exam/ complete exercise
4. Ensuring security in distributed systems. Task flow management services in distributed systems. Interaction of system-wide services of GRID and cloud structure. Monitoring services. Methods for estimating process states in spatially distributed systems.	3				-		3	10	Study exam/ complete exercise
5. SOA concept. Connectivity of software systems. Principles of SOA construction. SOA approach.	3				4		7	10	Study exam/ complete exercise
6. GRID architecture. GRID standards. Globus system. UNICORE system. Parametric models of GRID performance.	4				4		8	10	Study exam/ complete exercise
7. Definition of cloud computing. Components of cloud applications. Advantages and disadvantages of cloud computing. Classification of clouds. The most common cloud platforms. Comparison of GRID and cloud computing.	5				4		9	10	Study exam/ complete exercise
8. Transition systems. Systems with synchronous and asynchronous messaging. Property of fairness of execution of system.	3				-		3	10	Study exam/ complete exercise
9. Dependent and independent events. Causal order of events. Performance equivalence. Logical clock.	3				-		3	10	Study exam/ complete exercise
Total	30				15		45	90	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
written exam theory	40%	during the semester / exam	Good response to the questions
Practical exam on a computer	60%	during the semester / exam	the work is done completely without mistakes or minor errors

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
Compulsory literature				
Christel Baier, Luís Caires	2018	Formal Techniques for Distributed Objects, Components, and Systems		Springer International Publishing, ISBN 978-3-319-92611-7, 978-3-319-92612-4
Giancarlo Fortino, A.B.M. Shawkat Ali, Mukaddim Pathan, Antonio Guerrieri, Giuseppe Di Fatta	2018	Internet and Distributed Computing Systems		Springer International Publishing, ISBN 978-3-319-97794-2, 978-3-319-97795-9
Magnús M. Halldórsson (auth.), Paola Flocchini, Jie Gao, Evangelos Kranakis, Friedhelm Meyer auf der Heide (eds.)	2014	Algorithms for Sensor Systems: 9th International Symposium on Algorithms and Experiments for Sensor Systems, Wireless Networks and Distributed Robotics, ALGOSENSORS 2013, Sophia Antipolis, France, September 5-6, 2013, Revised Selected Papers		Springer-Verlag Berlin Heidelberg, ISBN 978-3-642-45345-8, 978-3-642-45346-5
Additional literature				
Бойчук В.О., Огневий О.В., Хмельницький Ю.В.	2013	Компютерні системи паралельної обробки даних: навч. посібник		ХНУ