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Computer network organization

2023

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Course Name	
	Computer network organization

Lecturer (s)	
	Oleksandr Nesterenko, professor at the Department of Information Technology, Doctor of Engineering, professor

Lecturer's profile	
	https://it.ieu.edu.ua/pro-yeash/struktura-yeash/kafedra-informatsiinykh-tekhnolohii/sklad#zzz-001

Consultations	
online consulting	https://meet.google.com/sww-grmx-cii
offline consulting	Thursday 3 p.m. – 5 p.m.

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Discipline page	
	https://dist.ieu.edu.ua/course/view.php?id=445

Form of final control	test	def. test	exam
	☐	☐	☒

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1	Brief discipline annotation

The Computer network organization academic discipline is designed for Bachelors of the knowledge area: 12 Information Technology, specialty: 121 Software Engineering. It is one of the professional disciplines for future software developers.

2	Background for studying discipline

The program is based on the study of such disciplines as Physics (selected sections) and Methods and tools of information technology.

3	Goal and objectives of the discipline

The goal of the Computer network organization discipline is to provide future Bachelors of Software Engineering with theoretical knowledge and practical skills in basics of design, construction, configuration and operation of computer networks, their architecture, individual components, practical joint use of appropriate types of network equipment, as well as tools for modeling the structure of computer networks.

Key objectives of the discipline:
- to master basic information about computer networks, network models, network devices;
- to study levels of OSI and TCP/IP network models, IP addressing schemes;
- to acquire skills in describing IP addressing schemes, performing binary calculations to describe subnets, describing TCP ports and connectors;
- to develop the ability to use different ways of Internet connection - using cables, wireless, cellular and optical fiber connections;
- the ability to make decisions on practical aspects of troubleshooting network problems using tools of the main operating systems.

4	Learning outcomes

To know the purpose, functionality and rules of using basic system applications, Internet services, rules of searching and processing information in the global network.
To be able to use Internet technologies for data collection and analysis.
To select initial data for design, relying on formal methods of requirements description and modeling.

After learning the discipline, students should
know:
- computer network structure;
- basics of network system administration;
- cloud computing principles, services and cloud storage.

be able to:
- apply acquired skills to create routing descriptions, IP addressing schemes, TCP ports and connectors;
- use practical measures and troubleshooting techniques and methods for network troubleshooting, server management and configuration methods and tools.

5	ECTS credits

4 ECTS credits / 120 academic hours

6   Course Content

Topics	Type of classes/hours		
	Lectures	Laboratory classes	Independent work
Topic 1. Basics of computer networks	4	8	20
1.1. Basic information about computer networks.	1		5
1.2. The concept of network model levels.	1		5
1.3. Network level.	1	4	5
1.4. Transport and application levels.	1	4	5
Topic 2. Basics of Internet	4	8	16
2.1. History of the Internet and the future of computer networks	1		6
2.2. Network services.	1	4	5
2.3. Practical aspects of network configuration and troubleshooting.	2	4	5
Topic 3. Network infrastructure system administration	4	8	20
3.1. Basics of system administration.	1		5
3.2. Network services and IT infrastructure services.	1		5
3.3. Software and platform services.	1	4	5
3.4. Directory Services.	1	4	5
Topic 4. Data recovery and backup	4	8	16
4.1. Development of an emergency renewal plan.	1		6
4.2. Backup and testing of the update.	1	4	5
4.3. Assessment and maintenance of the IT infrastructure.	2	4	5

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7	List of obligatory tasks

1. IP addressing scheme and binary calculus to describe subnets
2. TCP ports and connectors
3. VPN and proxy services
4. Windows network configuration tools.
5. Cisco Packet Tracer network modeling tool.
6. Virtual Local Area Network VLAN modeling
7. Data backup
8. IT infrastructure design

8	List of selective tasks

1. Delay and packet loss in packet-switched networks.
2. Comparison of routing protocols.
3. DNS system and name server configuration

9	Discipline features

Period of teaching	Semester	International disciplinary integration	Year of study	Courses: general training/ professional training/elective
1 semester	3rd semester	available	2nd year	Professional training

10	Assessment system and requirements. General system of discipline assessment

Personal computer, Windows and Linux OS, system utilities

11	Admission to final control

As part of discipline teaching, one carries out the current and final control of students' knowledge. The final grade is given according to the total rating of students.

The results of the current control of students' knowledge is assessed in general between 0 and 60 scores.

Students are admitted to the final control if they fulfil the requirements of the training program and obtain at least 36 scores for the current learning activity.

Final assessment of students' knowledge is conducted in the form of exam.

The maximum amount of scores that can be obtained during the exam is 40 scores.

The overall score of the discipline is 100. The total grade for the discipline is given according to the national and European scale.

12	Discipline policy

Teaching of the discipline is based on cutting-edge educational technologies aimed at increasing the level of students' interest in the course, providing theoretical and practical knowledge of the discipline.

To activate the learning and cognitive activity of students, the discipline includes the consolidation of knowledge obtained at the lecture and acquisition of practical skills in lecture topics during laboratory classes and independent work.

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13	Policy of absence and late task performance

Scores are not given for missed lectures. If students miss a laboratory work, they should perform all tasks of the missed laboratory work before the next laboratory work and present the results to the lecturer.

Students who have missed classes without valid reasons and have not participated in current control activities are not admitted to the final semester control. In this case, a mark 'non-admission' is put in the exam record on the day of the exam.

Repeated taking of the exam of the discipline is appointed in case of accomplishing all types of educational, individual work stipulated by the working program of the academic discipline and is carried out according to the approved schedule of academic failure liquidation.

14	Academic integrity policy

Tasks and laboratory works submitted later are assessed with a lower grade. The grade is reduced by one point for each week of lateness.

15	Recommended sources of information

PRIMARY (BASIC) LITERATURE:
1. Burov Y. Computer networks. Lviv: BaK, 1999.
2. Olifer V.H., Olifer N.A. Computer networks. Principles, technologies, protocols. St. Petersburg: Peter, 1999.
3. Slipchenko V.H. Local computer networks. Design, use and programming: study guide / V.H. Slipchenko, V.I. Haidarzhy, V.A. Labzhynskyi. Kyiv: Polytechnic Publishing House, 2002. 184 p.
4. Computer network organization [Electronic resource]: textbook: for students of the 121 Software Engineering and 122 Computer Science specialties / Y.A. Tarnavskyi, I.M. Kuzmenko. Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2018. 259 p.
5. Wilson Ed. Network monitoring and analysis. Methods of fault detection: monograph. Translated from English. M.: Lori, 2002. 368 p.

Additional
1. Stevens U.R. TCP/IP Protocols: practical guide. Translated from English. St. Petersburg: Nevskyi dialect – BHV Petersburg, 2003. 672 p.
2. Hunt K. TCP/IP. Network administration / Translated from English. St. Petersburg: Symbol-Plus, 2004. 816 p.
3. Melnyk I.V. Information computer networks: Study guide for distance learning. K.: Ukraine University Publishing House, 2006. 250 p.
4. Tanenbaum A. Computer networks: Translated from English. 4th edition. St. Petersburg: Peter, 2006. 991 p.
5. Blum A. The Network. Structure and operation of the Internet. St. Petersburg: BHV, 2014. 136 p.

Internet resources
1. Microsoft website. – Available at: https://www.microsoft.com/uk-ua/
2. Cisco website. – Available at: https://www.cisco.com /
3. IT website. - Available at: https://dou.ua/
4. Internet Name and Number Corporation. – Available at: https://www.icann.org/
5. Connection Scientific and Technical Journal. – Available at: https://con.dut.edu.ua/index.php/communication

16	Tips on successful study during the course

Note: examine lecture materials and perform tasks and laboratory works synchronously with the curriculum. Thus, your abilities and insistence will be the key to success!