# Syllabus selective component of VC

## **Computer networks**

Subjects:	Computer networks
Course page in Moodle:	https://dl2022.khadi-kh.com/course/view.php?id=3008
The scope of the	3 credits (120 hours)
educational	
component	
Final control form	Exam
Consultations:	on schedule
Name of the department:	department of computer technologies and mechatronics
Teaching language:	English
Course leader:	Serhiy Mykolayovych Neronov, senior lecturer of the KTM
	department
Contact phone number:	+38-067-703-64-16
Email:	Sernikner@gmail.com

## Brief content of the educational component:

## 1. Pre-requisites and post-requisites of the academic discipline:

prerequisites: "Informatics and programming", "Computer architecture",
 "Operating systems", "Computing systems, networks and telecommunications";

- **post requisites** (disciplines and competences that are necessary in the professional activity of a specialist): the discipline "Network technologies and system administration" is the basis for studying such special disciplines as "Computer networks", "Web programming", "Human-machine interaction" ".

## 2. Characteristics of the discipline:

The program for studying the educational discipline "Computer networks" is compiled in accordance with the educational and qualification characteristics and the curriculum of the bachelor's degree in the specialty 121 Software engineering.

**2.1.** <u>Appointment of the academic discipline</u> consists in students acquiring theoretical knowledge and practical skills in the administration of local networks based on the most popular operating systems.

**2.2.** <u>The purpose of studying the discipline</u>"Network technologies and system administration" is the study of the basic principles and methods of managing information systems and networks.

**2.3.** <u>Tasks of studying the discipline.</u> The process of studying the discipline is aimed at the formation and development of the ability to use basic theoretical knowledge to solve professional tasks and to apply basic professional skills in practice.

As part of studying the discipline, the formation of the following competencies is ensured:

• the ability to use knowledge about the modern natural picture of the world in educational and professional activities, to apply methods of mathematical information processing, theoretical and experimental research;

• willingness to interact with colleagues, to work in a team;

• readiness to use basic methods, methods and means of obtaining, storing, processing information, readiness to work with a computer as a means of information management;

• the ability to work with information in global computer networks horr

or; • the ability to understand the essence and significance of information in modern development

information society, to be aware of the dangers and threats arising in this process, to comply with the basic requirements of information security, including the protection of state secrets;

• the ability to use basic methods of scientific research in educational activities.

# After completing the study of discipline c, students should:

Professional competences that students receive after studying the academic discipline:

General competences:

ability to apply knowledge in practical situations;

the ability to communicate in the state language both orally and in writing.

Ability to communicate in a foreign language both orally and in writing.

Professional competences

the ability to analyze, choose and apply methods and means to ensure information security;

ability to algorithmic and logical thinking.

Program learning outcomes:

to know, analyze, purposefully search for and choose information and reference resources and knowledge necessary for solving professional tasks, taking into account modern achievements of science and technology;

know and be able to apply information technologies for data processing, storage and transmission, including using geo-information systems;

to know and be able to develop and implement modern innovative information technologies of design in the field of intelligent transport systems and mechatronic systems and complexes.

**2.4.** <u>Content of the academic discipline:</u>corresponds to the educational and work programs of the discipline and is coordinated with the requirements of the labor market.

		Number of	
lop	Name of topics (LK, LR, PR, SZ, SR)	hours	
10 NO		ocula	extramu
		r	ral
	LK.Introduction to the basics of computer networks	2	
1	PR (LR, SZ)Installation and testing of cable and wireless transmission	2	
	lines. Installation and configuration of network OS Windows Server,		
	Linux, FreeBSD on a virtual machine.		
	SRDetermining the compatibility of OSI model protocol stacks	2	
	Methods of data encoding.		
	LKLocal computer networks	2	
2	PR (LR, SZ)Software for analyzing traffic in Ethernet computer	2	
2	networks. Administration of channel-level devices in local	2	
	networks.		
	SRLocal network speed testing programs.	2	
	LKNetwork level data transmission technologies	2	
3	PR (LR, SZ)ICMP Internet Control Message Protocol utilities.	2	
	SRProcedure for assigning IP addresses.	2	
	LKTCP and UDP transport layer protocols	2	
4	PR (LR, SZ)Implementations of the client-server architecture based on	2	
	the Windows Sockets API.		
	SRManagement of the transmission flow in the TCP / IP protocol.	2	
	LKGeneral properties and classification of routing protocols.	2	
5	PR (LR, SZ)Implementation of DNS and routing protocols in	2	
	Windows, Linux, FreeBSD and Mikrotik routers.		
	SRInternal and external gateway protocols.	4	
	LKApplication layer protocols of the TCP/IP stack	2	
6	PR (LR, SZ)Installation and testing of the web server as part of	2	
	Apache, PHP, MySQL, SMTP.		
	SROverview of modern antivirus software	4	
	LKNetwork security.	2	
7	PR (LR, SZ)Configuring Firewall on FreeBSD OS and Mikrotik	2	
	CCR-1036 router. Installing the SQUID proxy server		
	SREncryption algorithms, VPN channels.	4	
	LK Remote administration utilities. Command line utilities	2	
8	PR (LR, SZ) Command line utilities	2	
_	SR. Network scanners.	4	
	LK Modeling of computer networks	2	
9	PR (LR SZ) Modeling of computer networks using Cisco Packet	2	
	Tracer	-	
	SROuasi-emulation method	4	

## 2.5. Thematic plan:

	LK Software products for work in corporate and home networks.	2	
10	PR (LR, SZ) Remote administration programs.	2	
	SR Remote administration	4	
	LK Creation of a computer network project	2	
11	PR (LR, SZ) Computer network project	2	
	SR Project development	4	
	LK Designing computer networks at the physical level	2	
12	PR (LR, SZ) Design of a structured cable system of a computer	2	
	network		
	SR Principles and methods of switching	4	
	LK Technologies of digital subscribed lines	2	
thirte	PR (LR, SZ) CSMA/CD data transmission medium technology	2	
en	SR Global communications based on digital dedicated lines	4	
	LK Email and file transfer protocol.	2	
14	PR (LR, SZ) Protocol for the transmission of hypertext messages	2	
	SR Protocols and protocol structures	4	
15	LK Technologies of data backup and archiving.	2	
	PR (LR, SZ) Technologies for backing up server systems and	2	
	databases to NAS network storage.		
	SR Categories of backup / archiving programs	4	
	LK Requirements for backup systems. Types of backup.	2	
16	PR (LR, SZ) Network storage (NAS).	2	
	SR Cloud data storage.	4	
Tog	LK	32	
ethe	PR (LR, SZ)	32	
r	SR	56	

## Individual educational and research task:

Detailed examination by students of individual theoretical provisions of the academic discipline and the formation of skills and abilities in their practical application by performing the assigned tasks.

## **Teaching methods:**

- 1) verbal: 1.1 traditional: lectures, explanations, stories, etc.;
- 1.2 interactive (non-traditional): problem lectures, discussions, etc.;
- 2) visual: the method of illustrations, the method of demonstrations
- 3) practical: 3.1 traditional: practical classes, seminars;
- **3.2** interactive (non-traditional): trainings, "round table", brainstorming method.

## **Evaluation system and requirements:**

#### **Current performance**

**1** The current success of applicants for the performance of educational types of work in training sessions and for the performance of independent work tasks is evaluated using a four-point rating scale with subsequent transfer to a 100-point scale. During the evaluation of the current performance inare countedall types of work provided by the curriculumprogram

**1.1** Lectures occupation are evaluated by definition quality implementation of specified tasks

**1.2** Practical classes are evaluated by the quality of performance of a control or individual task, performance and design of practical work.

- **1.3** Laboratory occupation are evaluated quality implementation reportsabout implementationlaboratory work.
- **1.4** Seminary occupation are evaluated quality implementation individualassignment/abstract.

**2** Evaluation of the current success rate of higher education applicants is carried out at each practical session(laboratoryor seminary) on a four-point scale("5", "4", "Z", "2")and are enteredinaccounting

journalacademicsuccess

- "excellent": acquirerflawlessly mastered the theoretical material, demonstrates deepknowledge of relevant topic or academic discipline, main provisions;

- "good": the applicant has mastered the theoretical material well, possesses the main aspects from primary sources and recommended literature, presents it in a reasoned manner; has practical skills, expresses his thoughts on certain problems, but certain inaccuracies and errors are assumed in the logic of the presentation of theoretical content or in the analysis of practical ones;

- "satisfactory": the applicant has basically mastered the theoretical knowledge of the educational topic or discipline, orients himself in primary sources and recommended literature, but answers unconvincingly, confuses concepts, answers additional questions uncertainly, does not have stable knowledge; when answering questions of a practical nature, reveals inaccuracy in knowledge, does not know how to evaluate facts and phenomena, connect them with the future profession;

- "unsatisfactory": the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, hardly orients himself in primary sources and recommended literature, lacks scientific thinking, practical skills are not formed.

**3** Final scorebycurrent activity is recognized as an arithmetic averagesumpoints for each lesson, for individual work, current control works according to the formula:

$$K^{current} = \frac{K1 + K2 + \dots + Kn}{n},$$

where  $K^{current}$  – final assessment of success based on the results of current control;

 $K1, K2, \dots, Kn$ - evaluation of success*n*-th measure of current control;

*n*- the number of measures of current control.

Grades are converted inpoints according to the calculation scale (table 1).

4-point scale	100- point scale	4-point scale	100- point scale	4-point scale	100- point scale	4-point scale	100-point scale
5	100	4.45	89	3.90	78	3.35	67
4.95	99	4.4	88	3.85	77	3.3	66
4.9	98	4.35	87	3.80	76	3.25	65
4.85	97	4.3	86	3.75	75	3.2	64
4.8	96	4.25	85	3.7	74	3.15	63
4.75	95	4.20	84	3.65	73	3.1	62
4.7	94	4.15	83	3.60	72	3.05	61
4.65	93	4.10	82	3.55	71	3	60
4.6	92	4.05	81	3.5	70	from 1.78 to 2.99	from 35 to 59
						reassembly	
4.55	91	4.00	80	3.45	69	from 0 to 1.77	from 0 to 34
4.5	90	3.95	79	3,4	68	repeated stud	у

Table 1-	- Recalculation o	f the average	grade for the	current activity in	nto a multi-point	scale
			Brand Tor mine	•••••••••••••••••••••••••••••••••••••••	neo w monte pome	

#### **Final assessment**

**1** The exam is held after studying everyonetopics of the discipline and is composed of students of higher education during the examination session after the end of all classroom classes

**2** Applicants of higher education who have completed all types of work prescribed by the curriculum in the discipline are admitted to the exam:

- were present ateveryoneclassroom classes (lectures, seminars, practical);

- completed all missed classes on time;

- scored the minimum number of points for the current academic performance (at least 36 points, which responds on a national scale"3");

If the current success in the discipline is lower than 36 points, the higher education applicant has the opportunity to increase his current point to the minimum before the beginning of the examination session.

**3** Assessment of the knowledge of applicants when taking the exam is carried out on a 100-point scale.

Assessment of the knowledge of applicants through testing is carried out according to the following scale:

- "Excellent": at least 90% of correct answers;

- "Very good": 82% to 89% correct answers;

- "Good": from 74% to 81% of correct answers;

- "Satisfactory": from 67% to 73% of correct answers;

- "Fair enough": 60% to 66% correct answers;

- "Unsatisfactory": less than 60% of correct answers.

4 The final grade for the academic discipline is defined as a weighted average grade that takes into account the overall grade for the current academic performance and the grade for passing the exam.5 The calculation of the overall final grade for the study of an academic discipline is carried out according to the formula:

## PKekz=0.6·Kpotoch+0.4·IS,

where  $PC^{ex}$ - final assessment of success in disciplines, in the form of a final report controls for which there is an exam;

 $K^{current}$  – final assessment of success based on the results of current control (on a 100-point scale);

IS- assessment based on the results of the exam (on a 100-point scale).0.6 and 0.4 – coefficients of the ratio of points for current success conducting the exam.

**6** For performing individual independent work and participating in scientific events, winners are awarded additional points.

**6.1** Additional points are added to the total points scoredcakeof higher education for the current educational activity (for disciplines for which the final form of control is a credit), or to the final assessmentwithdisciplines, the final form of control for which is an exam.

**6.2** The number of additional points awarded for different types of individual tasks depends on their volume and importance:

- prizes in the discipline at the international / all-Ukrainian competition of scientific student works - 20 points;

- prize places in the discipline at the All-Ukrainian Olympiads - 20 points;

participation in the international / all-Ukrainian competition of scientific student works
 15 points

- participation in international / all-Ukrainian scientific conferences of students and young scientists - 12 points;

- participation in all-Ukrainian Olympiads in the discipline - 10 points

- participation in olympiads and scientific conferences of the Khnadu in the discipline - 5 points;

- performance of individual scientific and research (educational and research) tasks of

increased complexity - 5 points.

**6.3** The number of additional points cannot exceed 20 points.

**7** General final rating by study educational disciplines not maybeexceed 100 points.

The overall final assessment for the study of the academic discipline is determined according to the scale given in Table 2. Table 2 – The scale for assessing the knowledge of the students based on the results of the final control of the academic discipline

Score	Assessment	Evaluation according to the ECTS scale
-------	------------	--

in	by nation	nal	Rating	Criteria
points	scale			
	examinati	test		
90-100	on		Α	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered
	Perfectly	Enrolled		material have been formed, all the educational tasks provided for in the training program have been completed, the quality of their performance has been assessed by the number of points close to to the maximum
80-89	ıy		В	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have mainly been formed, all educational tasks provided for in the training program have been completed, the quality of most of them has been evaluated with a number of points close to the maximum
75-79	Oka	ırolled	WITH	The theoretical content of the course has been mastered completely, without gaps, some practical skills of working with the mastered material have not been sufficiently developed, all the educational tasks provided for by the training program have been completed, the quality of none of them has been evaluated with a minimum number of points, some types tasks were completed with errors
67-74	actorily	Enr	D	The theoretical content of the course is partially mastered, but the gaps are not of a significant nature, the necessary practical skills for working with the mastered material are basically formed, most of the educational tasks provided by the training program have been completed, some of the completed tasks, may contain errors
60–66	Satisf		E	The theoretical content of the course has been partially mastered, some practical work skills have not been formed, many of the educational tasks provided by the training program have not been completed, or the quality of some of them has been assessed with a number of points close to minimal

Score	Asses	sment		Evaluation according to the ECTS scale
in	by national		Rating	Criteria
points	scale			
	examinati	test		
	on			
35–59	Unsatisfactorily	ot counted	FX	The theoretical content of the course has been partially mastered, the necessary practical work skills have not been formed, most of the prescribed training programs of educational tasks have not been completed, or the quality of their implementation has been assessed with a number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the performance of educational tasks (with the possibility of repeated drafting)
0–34	V Unacceptable		F	The theoretical content of the course has not been mastered, the necessary practical work skills have not been formed, all completed educational tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the performance of educational tasks (with a mandatory repeat course)

## **Course policy:**

- the course involves working in a team, the environment in the classroom is friendly, creative, open to constructive criticism;

- mastering the discipline involves mandatory attendance at lectures and practical classes, as well as independent work;

- independent work involves the study of individual topics of the academic discipline, which are presented in accordance with the program for independent study, or were considered briefly;

- all tasks provided by the program must be completed within the set time;

- if the student of higher education is absent from classes for a valid reason, he presents the completed tasks during independent preparation and consultation of the teacher;

- course work must be protected no later than a week before the beginning of the examination session;

- while studying the course, students of higher education must adhere to the rules of academic integrity

set forth in the following documents: "Rules of Academic Integrity participants

educational process LOOKING

FOR"(<u>https://www.khadi.kharkov.ua/fileadmin/P\_Standart/pologeniya/stvnz\_67\_01\_dobroch\_1.p\_df</u>), "Academic integrity. Verification of academic, scientific and qualification texts

works on plagiarism"

(https://www.khadi.kharkov.ua/fileadmin/P\_Standart/pologeniya/stvnz\_85\_1\_01.pdf),

"Moral and ethical code of participants in the educational process of the National Academy of Sciences (<u>https://www.khadi.kharkov.ua/fileadmin/P\_Standart/pologeniya/stvnz\_67\_01\_MEK\_1.pdf</u>).

- in case of detection of plagiarism, the applicant receives 0 points for the task and must repeat the tasks provided for in the syllabus;

- writing off during tests and exams is prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing.

## 3. List of recommended sources

## Basic

- 1. Burov E.V. Computer networks, Lviv: Magnolia, 2006, 2010, 262p.
- 2. Informatics. Computer Engineering. Computer technologies: Textbook for students of higher educational institutions / Ed. O.I. Pushkarya.-K.: Publishing center "Akademiya", 2002. 704p.
- 3. Kulakov Yu.O., Lutskyi H.M. Computer networks: Textbook edited by Yu.S. Kovtanyuk Kyiv.: "Yunior" Publishing House, 2005. 397p.
- 4. Lozikova H.M. Computer networks: Educational and methodological guide.– K.: Center of educational literature, 2004.–128p.
- 5. 13. A.G. Mykytyshyn, M.M. Mytnyk, P.D. Stuhlyak, V.V. Beekeeper
- 6. Computer Networks Book 1: A Study Guide for Technicians
- 7. of specialties of higher educational institutions Lviv, "Magnolia 2006",
- 8. 2013. 256 p.
- 9. 14. Matvienko O.V. Internet technologies for designing Web pages. K.:
- 10.Center of educational literature, 2004.
- 11.Yakovyna V.S. Basics of computer network security: Training manual / Ed.
  D.V. Fedasyuk Lviv: "Ukrainian Technologies" National Fund, 2008.
   396 p.

## Additional

- 1. Building Scalable Cisco Networks, Catherine Paquet, Diane Teare. 792 p.; 2004; ISBN 5-8459-0307-6, 1-5787-0228-3; Williams; Cisco Press series.
- Cisco Router Configuration Handbook (2nd Edition), David Hucaby, Steve McQuerry, Andrew Whitaker 736 p.; 2012; ISBN 978-5-8459-1755-3, 978-1-58-714116-4; Williams; Cisco Press series.
- 3. CCNA ICND2 Official Exam Certification Guide (CCNA Exams 640-816 and 640-802) (2nd Edition), Wendell Odom 736 p.; 2012; ISBN 978-5-8459-1442-2, 978-1-58720-181-3; Williams; Cisco Press series.
  - 1. <u>http://forum.sources.ru</u>
  - 2. http://wikipedia.org
  - 3. <u>http://www.linux.org.ru</u>

Developer(s) the syllabus of the academic discipline\_\_\_\_\_

Sergey NERONOV

signature

Full name

Head of Department

Oleg NIKONOV

signature

Full name