Syllabus
Course Program

TECHNOLOGIES OF TRANSPORT NETWORKS

Specialty
172 Electronic communications and radio engineering

Institute
Institute of Computer Modeling, Applied Physics and Mathematics

Educational program
Network technologies and telecommunications

Department
Information systems named after V.O. Kravets (169)

Educational level
Master's degree

Course type
Elective

Semester
1

Language of teaching
English

Lecturers and course developers

Maksym Tolkachov

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Associate professor of NTU "KhPI", associate professor of the department "Information systems named after V. O. Kravets " NTU "KhPI". Experience works - 23 years _ Author over 3 0 scientific and educational and methodical works _ Leading lecturer in the disciplines : "Computer and telecommunication networks", "Design and administration of computer networks", "Technologies of transport networks", "System software of information communication systems"
Learn more about the teacher on the department's website

General information

Abstract

The discipline "Technology of transport networks" is one of the directions of development of data processing systems, which arose in connection with the need to combine geographically dispersed computing resources into a single system. Modern transport networks provide the user with a wide range of services and allow the creation of a number of automated systems of distributed information processing, which include information search, dialogue, and distributed computing systems. .

Purpose and goals disciplines

Formation of students tall professional qualities of the future specialist , mastery the latest technologies designing software systems in its practical activities . The basis of the discipline makes up assimilation modern software technologies that _ are used to create scalable systems level enterprises . special WARNING is provided practical training in the development of such software systems, in particular , group training developers software systems.
Teaching disciplines due to by necessity students ' formation clear systems ideas about modern software technology as a basis development and operation computer systems.

Format of classes

Lectures, practical work, independent work, consultations. Final control - credit.

Competence _

GK6. Ability to use information and communication technologies.
SC9. The ability to solve current scientific problems in the field of electronic communications and radio engineering with the justified use of modern theoretical and experimental research methods.
SCS - 8 Ability and willingness to apply programming principles in the creation, configuration and recovery after failures of telecommunications information and computer networks.
SCS - 9 The ability to ensure the security of data transmission, protection against interference in the process of their transmission based on the application of knowledge of the theory of coding, information protection, the architecture of information and computer systems and data transmission protocols.

Learning outcomes

LO1 – the ability to apply the legislative and regulatory framework, as well as state and international requirements, practices and standards in order to carry out professional activities in the field of computer engineering.
LO7 - the ability to use and implement new technologies, including technologies of smart, mobile, green and secure computing, to participate in the modernization and reconstruction of computer systems and networks, various embedded and distributed applications, in particular with the aim of increasing their efficiency.
LO11 – knowledge and understanding of features and characteristics of modern global and local computer networks.

Scope of the discipline

The total volume of the discipline is 120 hours. (4 credits ECTS): lectures – 32 hours, practical work – 16 hours, independent work – 72 hours.

Prerequisites for studying the discipline (prerequisites)

"Architecture of computer networks", "Higher mathematics", "Probability theory", "Programming", "Object-oriented programming" "Architecture of computer networks", "System software of telecommunication systems"

Features of the discipline, methods and technologies of education

In the course of teaching the discipline, the teacher uses explanatory -illustrative (informational-receptive) and reproductive teaching methods. Presentations, conversations, individual group projects , and master classes are used as teaching methods aimed at activating and stimulating the educational and cognitive activity of applicants .

Program of educational discipline

Topics of lectures

Topic 1. The role of transport communication networks in the infrastructure of Ukraine .
Topic 2. Standardization of transport network technologies.
Topic 3. Transmission systems for the transport network.
Topic 4. Routing methods in telecommunication networks.
Topic 5. RDH transmission systems.
Topic 6. Fundamentals of operation of SDH systems.
Topic 7. Synchronization of the transport network.
Topic 8. Architecture of ATM networks. ATM transport network.
Topic 9. B-ISDN technology. Structure of ATM protocols.
Topic 10. Traffic management in MPLS (Traffic Engineering).

Topics of practical classes

Topic 1. List recommendations on technologies tradition data in transport communication networks .
Topic 2. Construction networks and analysis work multiplexers and regenerators .
Topic 3. Analysis of the operation of multiplexers and regenerators.

Topic 4. Creation of a software module working with routing tables.
Topic 5. Measurement of code error parameters. Communication of code and bit errors.
Topic 6. Technology measured in RDH systems.
Topic 7. Operational switching in the SDH system. Reservation.
Topic 8. Creating a network with an SDH transmission system
Topic 9. Traffic analysis and QoS calculation .
Topic 10. Creating a network with the MPLS transmission system .
Topic 11. Cloud CLI and SDK.

Topics of laboratory works

Laboratory work within the discipline is not provided.

Independent work

A student's independent work is one of the forms of organization of learning, the main form of mastering educational material in free time from classroom training. During independent work, students study lecture material, perform coursework, prepare for laboratory and control tests and assessment .

Literature and educational materials

Basic literature

1. Computer networks , book.1. Educational manual for technicians of specialties of universities (comm . MES of Ukraine) / Mykytyshyn A.G., Mytnyk M.M. , Stuhlyak P.D. – Lviv: Magnolia 2006, 2021. – 256 p.
2. Burov E.V. Computer networks : Textbook / E.V. Burov, M.M. Mytnyk ; In general _ ed. Pasichnyk V.V. Lviv : Magnolia 2019. – 204 p. (Ministry of Education and Science of Ukraine)
3. Vorobienko P.P., Nikityuk L.A., Reznichenko P.I. Telecommunications and information networks : Textbook for higher education educational institutions ./ P.P. Vorobienko , L.A. Nikityuk, P.I. Reznichenko . - K.: SUMMIT-BOOK, 2010. - 708 p.
4. COMPUTER NETWORKS Part. 2. TRAINING MANUAL [Electronic resource]: training . help _ for students specialty 121 " Engineering software provision » and126 « Informational systems and technologies ", specializations " Engineering Software informative control systems" and " Information security robotic systems" / B. Yu. Zhurakovskyi , I.O. Zeniv ; KPI named after Igor Sikorsky . - Electronic textual data (1 file: 5.7 MB). – Kyiv : KPI named after Igor Sikorsky , 2020. – 372 p.
5. Oleshchenko L.M. Organization of computer networks: summary of lectures [Electronic resource] / L. M. Oleshchenko : KPI named after . I. Sikorsky . - Electronic textual data _ - Kyiv: KPI named after I. Sikorsky , 2018. – 225 p.
6. Computer networks : educational manual / O. S. Horodetska , V. A. Hykavy , O. V. Onyshchuk . - Vinnytsia : VNTU, 2017. - 129 p .
7. Cisco Networking Academy Program: CCNA 1 and 2. Companion Guide, Third Edition. - Cisco Press, 2004. - 1048 p.
8. Cisco Networking Academy Program: CCNA 3 and 4. Companion Guide, Third Edition. - Cisco Press, 2004. - 948 p.
9. Cisco Networking Academy Program: Networking Essentials Companion Guide CiscoPress , 2022. - 544 p.
10. Balcer M. Executable UML: A Foundation for Model-Driven Architecture. — Addison Wesley , 2002. — 416p.
11. Object Management Group: Semantics of a foundational subset for executable UML models (fUML), v1.0. — OMG, 2011. — 404p. — http://www.omg.org/spec/FUML/.
12. Object Management Group: Concrete Syntax For UML Action Language (Action Language For Foundational UML - ALF). — OMG, 2010. — 425 p. — http://www.omg.org/spec/ALF/.
13. Schwaber K., Sutherland J. — The Scrum Guide: The Definitive Guide to Scrum – The Rules of the game. — 2011. — 17 p. — http://www.scrum.org/Scrum-Guides.
14. Kruchten P. The 4+1 View Model of Architecture // IEEE Software. — vol. 12, no. 6, November 1995. — pp. 42–50.

Additional literature

1. Computer networks . general principles of functioning computer networks. Tutorial . S. V. Minukhin , S. V. Kavun, S. V. Znahur . – Kharkiv : Ed. Khneu, 2008. - p. (Ukrainian language) p.
2. Pohoriliy S. D. Computer networks . hardware facilities protocols transfers data : a textbook for university students . teach _ institutions / S. D. Pohoriliy , D. M. Kalita; order _ O. V. Tretyaka . - K.: VOC " Kyiv University", 2007. - 455 p.
3. Computer networks : educational manual / [AzarovO . D., Zakharchenko S. M., Kaduk O. V. and others] – Vinnytsia : VNTU, 2013. – 371 p.

Evaluation system

Criteria for evaluating student performance and distribution of points

Points are awarded as follows ratio :
• laboratory work : 30% of the semester evaluations ;
• independent work: 20% of the semester evaluations ;
• exam : 50% of the semester assessments .

Rating scale

Total points	National rating	ECTS
90–100	Perfectly	A
82–89	Fine	B
75–81	Fine	C
64–74	Satisfactorily	D
60–63	Satisfactorily	E
35–59	Unsatisfactory (requires further study)	FX
1–34	Unsatisfactorily (re-study required)	F

Norms of academic ethics and policy of the course

The student must adhere to the "Code of Ethics of Academic Relations and Integrity of NTU "KhPI": show discipline, education, benevolence, honesty, responsibility. Conflict situations should be openly discussed in study groups with the teacher, and if it is impossible to resolve the conflict, it should be brought to the attention of the employees of the institute's directorate.
Regulatory and legal support for the implementation of the principles of academic integrity of NTU "KhPI" is posted on the website: http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/

Coordination

Syllabus agreed	02.06.2023	Head of Department Pavel PUSTOVOYTOV
	02.06.2023	Guarantor OP Vitaliy BRESLAVETS