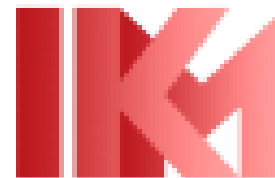




Syllabus Course Program



SYSTEM SOFTWARE OF TELECOMMUNICATION SYSTEMS

Specialty

172 Electronic communications and radio engineering

Educational program

Network technologies and telecommunications

Educational level

Master's degree

Semester

1

Institute

Institute of Computer Modeling, Applied Physics and Mathematics

Department

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

Course type

Special (professional) training

Language of teaching

English

Lecturers and course developers



Maksym Tolkachov

maksym.tolkachov@khpi.edu.ua

Associate professor of NTU "KhPI", associate professor of "Information systems named after V. O. Kravets" NTU "KhPI". Work experience - 23 years. Author of more than 30 scientific and educational and methodological 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 is aimed at obtaining theoretical knowledge and practical skills in modeling complex information and communication systems. It conditions and provides highly qualified training for the implementation of technologies for development and justification of network configuration, traffic estimation in segments, use of computer equipment, network equipment, and application software in solving theoretical and practical problems in designing and debugging networks.

Purpose and goals disciplines

Formation in students of high professional qualities of the future specialist, mastering the latest technologies of designing software systems in their practical activities. The basis of the discipline is the assimilation of modern software technologies used to create scalable enterprise-level systems. Special attention is paid to practical training in the development of such software systems, in particular, group development of software systems.

The teaching of the discipline is conditioned by the need to form students a clear system of ideas about modern software technologies as the basis for the development and operation of computer systems.

Format of classes

Lectures, laboratory work, coursework, independent work, consultations. The final control is an exam.

Competences

GC6. 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.

SC - 8 Ability and willingness to apply programming principles in the creation, configuration and recovery after failures of telecommunications information and computer networks.

SC - 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

LO 8 – apply general and specialized programming languages, analytical and simulation modeling packages, as well as software and hardware development tools to solve complex problems of telecommunications and radio engineering

LO 1 – 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 1 2 0 hours. (4 credits ECTS): lectures – 16 hours, laboratory work – 32 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 activities of applicants.

Program of educational discipline

Topics of lectures

Topic 1. DevNet developer environment

Topic 2. Software development.

Topic 3. Understanding and using the API.

Application deployment and security.

Topic 4. Continuous Integration/Continuous Deployment (CI / CD).

Topic 5. Application security.

Infrastructure automation with Cisco.

Topic 6. Automation of testing.

Network simulation and VIRT.

Topic 7. Cisco network management.

Topic 8. Cisco security platforms.

Topics of practical classes

Practical work within the discipline is not provided.

Topics of laboratory works

Topic 1. Study of DevNet resources.

Parsing different data types using Python.

Topic 2. REST research API with API simulator and Postman .

Topic 3. Creating a sample web application in a Docker container.

Topic 4. Creating a CI/CD pipeline using Jenkins.

Topic 5. Automated software testing and deployment.

Topic 6. Reverse Proxy.

Topic 7. Cross-site scripting (Cross-Site Scripting, XSS).

Topic 8. Cross-site fake request (Cross-Site Request Forgery, CSRF).

Topic 9. DevOps and SRE.

Topic 10. Basic tools for writing scripts

Topic 11. Cloud CLI and SDK.

Topic 12: Using Ansible for device backup and configuration.

Topic 13. Learning automated testing using pyATS and Genie.

Topic 14. Cisco SD - WAN using REST API interfaces in Python .

Topic 15. Comparison of the use of CLI and SDN controller in the process of network management.

Topic 16. Using the REST API with the SDN controller.

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. Study guide for technical specialties of universities (recommended by the Ministry of Education and Culture 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 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]: education. manual for students specialties 121 "Software engineering" and 126 "Information systems and technologies", specializations "Software engineering of information control systems" and "Information security of robotic systems" / B. Yu. Zhurakovsky, I.O. Zeniv; KPI named after Igor Sikorskyi. – Electronic text data (1 file: 5.7 MB). – Kyiv: Ihor Sikorskyi KPI, 2020. – 372 p.
5. Oleshchenko L.M. Organization of computer networks: summary of lectures [Electronic resource] / L. M. Oleshchenko: KPI named after I. Sikorskyi. – Electronic text data. – Kyiv: KPI named after I. Sikorskyi, 2018. – 225 p.
6. Computer networks: study guide / 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 of 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 and data transmission protocols: a textbook for university students. education institutions / S. D. Pohoriliy, D. M. Kalita ; charge O. V. Tretyaka. - K.: VOC "Kyiv University", 2007. - 455 p.
3. Computer networks: study guide / [Azarov O. 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 according to the following ratio:

- laboratory work: 30% of the semester grade;
- independent work: 20% of the semester grade;
- exam : 50% of the semester grade .

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