The syllabus of the discipline
Technologies of TCRT means

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Field name	Detailed content, comments
Name of the faculty	Faculty of Infocommunications
Level of higher education	First (bachelor's)
Code and name of the specialty	172 Telecommunications and radio engineering
Type and name of educational program	EPP "Information and Network Engineering"
Name of the discipline	Technologies of TCRT means
Number of ECTS credits	6
Discipline structure (distribution by types and hours of study)	36 hours - 18 lectures, 16 hours - 8 practical classes, 20 hours - 5 laboratory classes, 12 hours - 6 consultations, 96 hours - homework, **type of control**: exam
Schedule (terms) of studying the discipline	2nd year, IV semester
Prerequisites for studying the discipline	students must study the subjects "Computer Science and Microprocessors", "Programming" and "Local area networks" for a systematic view of features of network equipment configuration.
Competences, knowledge, skills, understanding, which is acquired by the applicant in higher education in the learning process	The discipline is used for formation the following competencies: develop topologies and technological algorithms of telecommunication and information networks; to conduct technical and economic substantiation of network projects; use theoretical positions in their design.
The quality of the educational process	Educational-methodical and material-technical resource provision of the educational program, within the framework of which the discipline is studied, meets the licensing requirements and accreditation conditions of the educational activity of the university. Annual monitoring and revision of the curriculum of the discipline in accordance with the requirements and recommendations of the Ministry of Education and Science, state certification of acquired competencies of graduates, standards of cooperation with employers to ensure a competitive level of training. Adherence to the principles of academic integrity (https://lib.nure.ua/plagiat). Contains public information on the requirements, competencies, level of education within the current educational program.

Description and content of the discipline

The purpose of the discipline is to provide students with knowledge, skills and abilities in the field of analysis, modeling and design of telecommunications and information networks and telecommunications facilities.

The discipline considers general information about telecommunications and information networks; principles and software packages of their simulation modeling; methods and algorithms of topological design, analysis and distribution of network flows, analysis of reliability and survivability of networks; bipolar network models and characteristics of information delivery in them; queue network models and characteristics of information delivery in them; main tasks of packet-switched network design.

Content

Content module 1.
Topic 1. Introduction. General information about telecommunications and information networks
Topic 2. The main indicators of efficiency and tasks of designing infocommunication networks. Network modeling
Topic 3. Analysis of network topologies based on their graph models
Topic 4. Analysis of network topologies based on their matrix models
Topic 5. Synthesis of optimal network topologies
Topic 6. Distribution of flows in networks through routing

Content module 2.
Topic 7. Finding bipolar maximum flows in networks
Topic 8. Generalization of problems about maximum flows in networks
Topic 9. Analysis of the reliability and survivability of networks
Topic 10. Bipolar network models and characteristics of information delivery in them
Topic 11. Models of queue networks and information delivery characteristics for them
Topic 12. Algorithms for managing packet queues in network nodes

Learning outcomes of higher education

As a result of studying the discipline, students must:

KNOW: classification of telecommunication and information networks, their elements, structures and structural properties of networks for various purposes, quality indicators, methods of servicing information flows, principles of modeling and design of telecommunication and information networks.

TO BE ABLE: to develop topologies and technological algorithms of telecommunication and information networks, to carry out technical and economic substantiation of projects of networks, to use theoretical positions at their designing.

Assessment system according to each task for passing the test / exam

To evaluate the student's work during the semester, the final rating Qsem is calculated as the sum of grades for different types of classes and control activities. Each practical lesson is estimated at 1.5 points (0.5 points for attendance and 1 point for work in class). Each laboratory work is evaluated in 6 points (2 points for practice, 4 points for defense). Tests (CR) - 15 and 25 points. The maximum rating during the semester is 100 points.

The form of final control for the discipline is a combined exam. A student receives admission to the exam if during the semester the student received at least 60 points in the 100-point system for all control activities.

The final grade is calculated as the sum of the grade for the semester weighing 0.6 and the grade for the exam weighing 0.4.

Type of lesson / control measure	Rating
Lb №1	6
Pr №1-3	1,5
Lb №2	6
Pr №4	1,5
Lb №3	6
Lc №1-9	9
Ct № 1	15
Control point № 1	48
Pr №5-7	1,5
Lb №4	6
Pr №8	1,5
Lb №5	6
Lc №10-18	9
Ct № 2	25
Control point № 2	52
Total	100

Qualitative evaluation criteria in the national scale and ECTS

Satisfactory, D, E (60-74). Have a minimum of knowledge and skills. Work out and defend all laboratory work and PrW.

Well, C (75-89). It is firm to have a minimum of knowledge and skills. Work out and defend all laboratory work and R / P. Be able comment on the basic tasks and principles of Windows administration.

Excellent, A, B (90-100). Firmly know all the topics. Navigate the official sources of information about Windows. Work out and defend all laboratory work and **PrW**. Thoroughly know the tasks, principles and tools of Windows administration. Be able

to configure and administer Windows, including AD DS administration.

Assessment scale: national and ECTS

The sum of points for all types of educational activities	ECTS assessment	Score on a national scale	
		for exam, course project (work), practice	for offset
90 – 100	**A**	perfectly	credited
82-89	**B**	fine	
74-81	**C**		
64-73	**D**	satisfactorily	
60-63	**E**		
35-59	**FX**	unsatisfactory with the possibility of reassembly	not credited with the possibility of re-assembly
0-34	**F**	unsatisfactory with mandatory re-examination	not credited with compulsory re-study of the discipline

Methodical support

Basic literature

1.   Informatsiini merezhi zviazku. Ch. 1. Matematychni osnovy informatsiinykh merezh zviazku: Navch. posibnyk. / V.M. Bezruk, Yu.M. Bidnyi, A.V. Omelchenko. Pid red. V.M. Bezruka – Kharkiv: KhNURE, 2011.

Supporting literature

2. Telekomunikatsiini ta informatsiini merezhi: Pidruchnyk / P.P. Vorobiienko, L.A. Nikitiuk, P.I. Reznichenko. – K.: SAMMIT-KNYHA, 2010.

3. Steklov V.K., Berkman L.N. Proektuvannia telekomunikatsiinykh merezh: Pidruchnyk. - K.: Tekhnika, 2002.

4. Zaichenko Yu.P. Kompiuterni merezhi. – K.: Slovo, 2003.

5. Teoryia setei sviazy / Pod red. V.N. Rohynskoho. – M: Sviaz, 1979.

6. Morozov V.K., Domanov A.V. Osnovy teoryy ynformatsyonnykh setei. – M: Vysshaia shkola, 1987

7. Vasylev V.K. BurkynA.P., Svyrydenko V.A. Systemy sviazy. - M.: Vysshaia shkola, 1987.

8. Arypov M.N., Zakharov H.P., Malynovskyi S. H., Yanovskyi H.H. Proektyrovanye y tekhnycheskaia ekspluatatsyia setei peredachy dyskretnykh soobshchenyi / Pod red. H.P. Zakharova. - M.: Radyo y sviaz, 1988.

9. Shvarts M. Sety sviazy: protokoly, modelyrovanye, analyz. T. 1 - M.: Nauka, 1992.

10. Kleinrok L. Vychyslytelnye systemy s ocherediamy. - M. Myr, 1979.

11.Kucheriavyi E.A. Upravlenye trafykom y kachestvo obsluzhyvanyia v sety Ynternet. - SPb.: Nauka y tekhnyka, 2004.

Methodical instructions for different types of classes

12. Kompleks navchalno-metodychnoho zabezpechennia navchalnoi dystsypliny "Telekomunikatsiini ta informatsiini merezhi" pidhotovky bakalavra napriamu 6.050903 - Telekomunikatsii [Elektronnyi resurs]. Ch. 1 / KhNURE; rozrob. A. I. Kostromytskyi. – Kharkiv, 2017. – 364 c.

13. Kompleks navchalno-metodychnoho zabezpechennia navchalnoi dystsypliny "Telekomunikatsiini ta informatsiini merezhi" pidhotovky bakalavra napriamu 6.050903 - Telekomunikatsii [Elektronnyi resurs]. Ch. 2 / KhNURE; rozrob. A. I. Kostromytskyi. – Kharkiv, 2017. – 307 c

14. Metodychni vkazivky do kursovoho proektuvannia z dystsypliny "Telekomunikatsiini ta informatsiini merezhi" dlia studentiv usikh form navchannia napriamu 6.050903 "Telekomunikatsii" / Uporiad.: Yu.M. Bidnyi, O.M. Bukhanko – Kharkiv: KhNURE, 2012.

Internet sources
15.   http://lib.nure.ua/enmk.