

The syllabus of the discipline
"Materials and components of electronic equipment"

№	Field name	Detailed content, comments
1.	Name of the faculty	Information radio technology and technical protection of information
2.	Level of higher education	Bachelor
3.	Code and name of the specialty	172 - Telecommunications and radio engineering
4.	Type and name of educational program	Media engineering
5.	Code and name of the discipline	OK2.1. Materials and components of electronic equipment
6.	Number of ECTS credits	3
7.	Discipline structure (distribution by types and fields of study)	Lectures - 18 hours, Practical classes - 6 hours, Laboratory work - 12 hours, Consultations - 6 hours, Semester control - credit - 2 hours. In total - 44 hours.
8.	The schedule of studying the discipline	1 course, 1 semester of study
9.	Prerequisites for studying the discipline	- Know: Purpose, construction, basic physical properties and characteristics of materials used for the manufacture of structural elements, passive and active components of REA. Principles of operation, basic parameters and marking systems of REA components. The structure of the electron-hole transition, the physical basis of semiconductor devices. The main types of bipolar and unipolar transistors and their parameters. The structure of the basic elements of digital chips: OR-NO, AND-NO, made by the technology of TTL, TTLsh, KMON, EZL. - Be able to: with the help of reference books to determine the labeling of passive and active elements of REA, their type and characteristics and with the help of measuring devices to determine the characteristics and performance of electronic devices; calculate the mode of operation of active elements of REA, correctly choose the component base for its effective use in REA.
10.	Discipline abstract	Content module 1. Materials used for the manufacture of REA elements. Topic 1. Introduction. Purpose, structure, main types and properties of REA materials. Topic 2. Metal (conductive) materials. Electrical insulating (dielectric) materials. Topic 3. Magnetic materials. Semiconductor materials. Construction materials. Content module 2. The main components of REA, purpose, construction and their characteristics. Topic 4. Purpose and general characteristics of REA components. Resistors. Topic 5. Capacitors. Inductors. Topic 6. Semiconductor diodes. Topic 7. Bipolar transistors. Topic 8. Field-effect transistors. Topic 9. The structure of the basic elements of digital chips.
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant in higher	Integral competence. Ability to solve complex specialized problems and practical problems in the field of telecommunications and radio engineering, characterized by complexity and uncertainty of conditions. ZK.1. Ability to abstract thinking, analysis and synthesis.

	education in the learning process	ZK.2. Ability to apply knowledge in practical situations. ZK.4. Knowledge and understanding of the subject area and understanding of professional activity. ZK8. Ability to identify, pose and solve problems. ZK9. Safe activity skills. FC1. The ability to understand the essence and significance of information in the development of the modern information society. FC3. Ability to use basic methods, processing and storage of information. FC5. Ability to use regulatory and legal documentation related to information and telecommunication networks, telecommunication and radio systems (laws of Ukraine, technical regulations, international and national standards, recommendations of the International Telecommunication Union, etc.) to solve professional problems. FC6. Ability to perform instrumental measurements in information and telecommunication networks, telecommunication and radio systems. FC8. Willingness to promote the introduction of advanced technologies and standards. FC9. Ability to accept and develop new equipment in accordance with current regulations. FC10. Ability to carry out installation, adjustment, adjustment, adjustment, experimental check of working capacity, tests and commissioning of constructions, means and equipment of telecommunication and radio engineering. FC11. Ability to compile regulatory documentation (instructions) for operational and maintenance of information and telecommunications networks, telecommunications and radio systems, as well as test programs.
12.	Learning outcomes of higher education	P1. Analyze, argue, make decisions in solving specialized problems and practical problems of telecommunications and radio engineering, which are characterized by complexity and uncertainty of conditions. P14. Applying an understanding of the basic properties of the component base to ensure the quality and reliability of telecommunications, radio systems and devices. P16. Applying an understanding of the basics of metrology and standardization in the field of telecommunications and radio engineering in professional activities. P17. Understanding and compliance with domestic and international regulations on the development, implementation and maintenance of information and telecommunications networks, telecommunications and radio systems. P18. Find, evaluate, and use information from a variety of sources needed to solve professional problems, including reproducing information through electronic search. P22. Monitor the technical condition of information and communication networks, telecommunications and radio systems in the process of their technical operation in order to identify deterioration in the quality of operation or failures, and its systematic fixation by documentation.

13.	Evaluation system according to each task for passing the test	The form of final control is a test. With this type of control, the final score P_{Π} is calculated by the formula: $P_{\Pi} = 0,6 Q_{\text{сем}} + 0,4 Q_{\text{зач}}$ where, $Q_{\text{сем}}$ - a score for the semester in a 100-point system, Q_{credit} - a score for a credit in a 100-point system. To evaluate the student's work during the semester, the final rating $Q_{\text{сем}}$ is calculated as the sum of grades for different types of classes and control activities. <table><tr><th>Type of lesson / control measure</th><th>Rating</th></tr><tr><td>Lb № 1, 2</td><td>(8-14)x2 = (16-28)</td></tr><tr><td>Pz № 1, 2</td><td>(5-9)x2 = (10-18)</td></tr><tr><td>Checkpoint 1</td><td>26-46</td></tr><tr><td>Lb № 3</td><td>(8-14)x1 = (8-14)</td></tr><tr><td>Pz № 3</td><td>(5-9)x1 = (5-9)</td></tr><tr><td>Checkpoint 2</td><td>13-23</td></tr><tr><td>Final control testing</td><td>20-30</td></tr><tr><td>Total for the semester</td><td>60-100</td></tr></table>	Type of lesson / control measure	Rating	Lb № 1, 2	(8-14)x2 = (16-28)	Pz № 1, 2	(5-9)x2 = (10-18)	Checkpoint 1	26-46	Lb № 3	(8-14)x1 = (8-14)	Pz № 3	(5-9)x1 = (5-9)	Checkpoint 2	13-23	Final control testing	20-30	Total for the semester	60-100
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14.	The quality of the educational process	The content of the discipline is updated on the basis of the policy of academic integrity and scientific achievements and the discovery of new types of materials for the construction of modern elements of REA.																		
15.	Methodical support	Pashintsev PO Radio components. Passive and active, discrete and integral: textbook / P.O. Pashintsev, OO Adamenko; Ministry of Defense of Ukraine - X.: SMITH Company, 2007. - 540 p. Kechiev LN Design of printed circuit boards for digital high-speed equipment / L.N. Kechiev - M.: LLC "IDT Group", 2007. - 616 p. F.N. Pokrovsky. Textbook. Materials and components of RES. - Moscow, 2005. -350 p. Complex of educational and methodical support of the discipline "Materials and components of radio electronic equipment" in the direction of preparation of the bachelor of specialty 172 "Telecommunications and radio engineering" specialization "Radio engineering" - 120 hours / (Kharkov: KNURE, 2018.) Methodical instructions for practical classes in the discipline "Materials and components of REA" for full-time and part-time students in the direction of 6.050901 - Radio Engineering / Uporyad. I.B. Savchenko - Kharkiv: KhNURE, 2011. - 52 p.																		
16.	Syllabus developer	Associate Professor of MIREs, Shapovalov Sergey Viktorovich, serhii.shapovalov@nure.ua																		