

SYLLABUS
in the discipline "Physics"
for students of the first (bachelor's) level of higher education
specialties 152 Metrology and information-measuring equipment
educational and professional program Technical examination
Kharkiv National University of Radio Electronics

1.	Name of the faculty	Faculty of Infocommunications
2.	Level of higher education	bachelor
3.	Code and name of the specialty	152 Metrology and information-measuring equipment
4.	Type and name of educational program	educational and professional program Technical examination
5.	Code and name of the discipline	Physics
6.	Number of ECTS credits	10
7.	Discipline structure (distribution by types and hours of study)	1st semester 150 hours, of which: lectures 30 hours, practical 14 hours, laboratory 16 hours, consultations 12 hours, independent work 78 hours 2nd semester 150 hours, of which: lectures 30 hours, practical 14 hours, laboratory 16 hours, consultations 12 hours, independent work 78 hours
8.	The schedule of studying the discipline	1 course, 1,2 semesters
9.	Prerequisites for studying the discipline	Knowledge of the main sections of higher mathematics, in particular linear and vector algebra, differential and integral calculus
10.	Discipline abstract	<p style="text-align: center;">Module 1</p> <p>Content module 1. Electrostatics and direct current. Theme 1. Electric field in vacuum. Theme 2. Electric field in dielectrics. Theme 3. Conductors in an electric field. Theme 4. Electric current.</p> <p>Content module 2. Magnetism. Electromagnetic oscillations and waves. Theme 5. Magnetic field in vacuum. Theme 6. Magnetic field in matter. Theme 7. The phenomenon of electromagnetic induction. Theme 8. Electromagnetic field. Theme 9. Electromagnetic oscillations. Theme 10. Alternating current.</p> <p style="text-align: center;">Module 2</p> <p>Content module 3. Waves. Optics. Theme 1. Waves Theme 2. Geometric optics. Theme 3. Wave optics. Theme 4. Quantum optics.</p> <p>Content module 4. Elements of quantum mechanics and solid state physics. Theme 5. Quantum mechanics. Theme 6. Quantum theory of the structure of atoms and molecules. Theme 7. Spontaneous and forced radiation. Theme 8. Electrical conductivity of metals and semiconductors. Contact phenomena.</p>
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant	<p>Competences that provide the study of the discipline: Ability to abstract and logical thinking, analysis Ability to apply knowledge in practical situations</p>

	in higher education in the learning process	Ability to model physical phenomena, perform theoretical and experimental studies. Ability to learn independently, to master new knowledge Ability to work with scientific equipment and measuring instruments, process and analyze the results of scientific research																																												
12.	Learning outcomes of higher education	<p>The study of this discipline gives the student the opportunity to:</p> <p><u>know:</u> basics of physical laws and fundamental physical concepts, laws and theories of classical and modern physics, the essence of physical phenomena, areas of their practical application, physical principles of modern technological equipment and apparatus in the field of professional activity; purpose and possibilities of application of the experimental equipment for carrying out physical research.</p> <p><u>be able to:</u> analyze the relationship of physical phenomena of different nature; apply physical knowledge to solve practical problems that arise during the development and operation of telecommunications systems, infocommunications, telecommunications networks, radio systems and television and radio broadcasting systems, etc .; to analyze the influence of physical phenomena on the modes of operation of modern technology; plan and conduct the simplest physical experiments using modern equipment and process the results of these experiments; highlight specific physical content in the applied problems of the future specialty</p> <p><u>have:</u> modern methods of physical research, basic methods of working with physical equipment.</p>																																												
13.	Assessment system according to each task for passing the exam	<p>To evaluate the student's work during the semester, the final rating O_{sem} is calculated as the sum of grades for different types of classes and control activities, which include practical classes, laboratory work, individual calculation task and modular testing.</p> <p>The distribution of points for different types of classes / tests is given in the tables:</p> <p style="text-align: center;">Module 1</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Control measure</th> <th>Rating O_{sem}</th> </tr> </thead> <tbody> <tr><td>Lw №1</td><td>1-2</td></tr> <tr><td>Lw №2</td><td>1-2</td></tr> <tr><td>Lw №3</td><td>1-2</td></tr> <tr><td>Lw №4 Control lesson</td><td>5-8</td></tr> <tr><td>Pc №1</td><td>2-3</td></tr> <tr><td>Pc №2</td><td>2-3</td></tr> <tr><td>Pc №3</td><td>2-3</td></tr> <tr><td>Pc №4</td><td>2-3</td></tr> <tr><td>Test 1</td><td>9-15</td></tr> <tr><td>Checkpoint 1</td><td>25-41</td></tr> <tr><td>Lw №5</td><td>1-2</td></tr> <tr><td>Lw №6</td><td>1-2</td></tr> <tr><td>Lw №7</td><td>1-2</td></tr> <tr><td>Lw №8 Control lesson</td><td>5-8</td></tr> <tr><td>Pc №5</td><td>2-3</td></tr> <tr><td>Pc №6</td><td>2-3</td></tr> <tr><td>Pc №7</td><td>2-3</td></tr> <tr><td>Test 2</td><td>9-15</td></tr> <tr><td>SGT</td><td>12-21</td></tr> <tr><td>Checkpoint 2</td><td>35-59</td></tr> <tr><td>Total for the semester</td><td>60-100</td></tr> </tbody> </table>	Control measure	Rating O_{sem}	Lw №1	1-2	Lw №2	1-2	Lw №3	1-2	Lw №4 Control lesson	5-8	Pc №1	2-3	Pc №2	2-3	Pc №3	2-3	Pc №4	2-3	Test 1	9-15	Checkpoint 1	25-41	Lw №5	1-2	Lw №6	1-2	Lw №7	1-2	Lw №8 Control lesson	5-8	Pc №5	2-3	Pc №6	2-3	Pc №7	2-3	Test 2	9-15	SGT	12-21	Checkpoint 2	35-59	Total for the semester	60-100
Control measure	Rating O_{sem}																																													
Lw №1	1-2																																													
Lw №2	1-2																																													
Lw №3	1-2																																													
Lw №4 Control lesson	5-8																																													
Pc №1	2-3																																													
Pc №2	2-3																																													
Pc №3	2-3																																													
Pc №4	2-3																																													
Test 1	9-15																																													
Checkpoint 1	25-41																																													
Lw №5	1-2																																													
Lw №6	1-2																																													
Lw №7	1-2																																													
Lw №8 Control lesson	5-8																																													
Pc №5	2-3																																													
Pc №6	2-3																																													
Pc №7	2-3																																													
Test 2	9-15																																													
SGT	12-21																																													
Checkpoint 2	35-59																																													
Total for the semester	60-100																																													

		Module 2	
		Control measure	Rating O_{sem}
		Lw №1	1-2
		Lw №2	1-2
		Lw №3	1-2
		Lw №4 Control lesson	5-8
		Pc №1	2-3
		Pc №2	2-3
		Pc №3	2-3
		Pc №4	2-3
		Test 1	9-15
		Checkpoint 1	25-41
		Lw №5	1-2
		Lw №6	1-2
		Lw №7	1-2
		Lw №8 Control lesson	5-8
		Pc №5	2-3
		Pc №6	2-3
		Pc №7	2-3
		Test 2	9-15
		SGT	12-21
		Checkpoint 2	35-59
		Total for the semester	60-100
		<p>The combined exam is used as a form of final control for the discipline "Physics". With this type of control, the final grade is calculated by the formula: $P_n = 0,6 \cdot O_{sem} + 0,4 \cdot O_{ex}$, where O_{sem} – grade for the semester in a 100-point system, O_{ex} – grade for the exam in a 100-point system.</p> <p>The final grade is translated into national and ECTS according to the scale:</p>	
		Grade from the discipline	Score on a national scale
		ECTS scale score	
		96-100	5 (perfectly)
		90-95	5 (perfectly)
		75-89	4 (good)
		66-74	3 (satisfactorily)
		60-65	3 (satisfactorily)
		35-59	2 (unsatisfactorily)
		1-34	
			A
			B
			C
			D
			E
			FX
			F
14.	The quality of the educational process	The content of the discipline can be updated depending on the modern needs of the specialty.	
15.	Methodical support	<p>Basic literature</p> <p>1. General physics with examples and problems. Part 2. Electricity and magnetism: textbook. manual./ IM Kibets and others. - Kharkiv: SMITH Company, 2009-424p .;</p> <p>2. General physics with examples and problems. Part 3, item 1. Optics: textbook / IM Kibets and others. - H.: SMITH Company, 2012. - 232p.</p> <p>Supporting literature</p>	

		<p>1. Elementary physics in examples and problems: textbook. Manual for preparatory departments / A.D. Tevyashev et al. - Kharkov: KNURE, 2005. - 628p.</p> <p>2. Collection of tests from the course of physics / O.M. Kovalenko and others.- Kharkiv: KNURE, 2006.-124p.</p> <p>3. Dictionary of physical terms: textbook / TB Tkachenko.- Kharkiv: KNURE, 2004.-80p.</p> <p>4. Savelyev IV Physics course. T.1,2,3.-M .: Nauka, 1989.</p> <p>Methodical instructions for different types of classes</p> <p>1. Methodical instructions for software in the course of physics (part 1) / Edited by: VO Storozhenko and others. –Kharkiv: KhNURE, 2013.-152p.</p> <p>2. Methodical instructions for software in physics (part 2) / Edited by: VO Storozhenko and others. –Kharkiv: KhNURE, 2013.-140p.</p> <p>3. Methodical instructions for laboratory work in physics. Part 2. Electricity and magnetism. / Edited by: RP Orel and others. - Kharkiv: KNURE, 2019. - 120p.</p> <p>4. Methodical instructions for laboratory work in physics. Part 3. Optics. Atomic physics and solid state physics / Emphasis. Malik SB etc. - Kharkiv: KNURE, 2011.</p> <p>5. Methodical instructions for computer laboratory work in physics./ O.M. Kovalenko and others.- Kharkiv: KNURE, 2006-124p.</p> <p>Information support: http://physic.nure.ua http://catalogue.nure.ua/knmz/?subdivision=24&level=0&query=undefined</p>
16.	Syllabus developer	Head of the Department of Physics Kovalenko Olena Mykolayivna, olena.kovalenko@nure.ua