SYLLABUS
of the discipline Physics
for students of the first (bachelor's) level of higher education
speciality 125 Cybersecurity.
Educational and professional program "Information and communication systems security" of
Kharkiv National University of Radio Electronics.

1	Name of the faculty	Faculty of Computer Engineering and Control
2	Level of higher education	bachelor
3	Code and name of the specialty	125 Cyber security
4	Type and name of educational program	Educational and professional program "Information and communication systems security"
5	Code and name of the discipline	Physics
6	Number of ECTS credits	6
7	Discipline structure (Distribution by type and hours of study)	**1-st semester:** totally 90 hours of which: lectures - 20 hours, practical classes - 10 hours, laboratory classes - 12 hours, consultations -6 hours, self-study 42 hours. **2-nd semester:** totally 90 hours of which: lectures - 20 hours, practical classes - 8 hours, laboratory classes - 8 hours, consultations -8 hours, self-study 46 hours. 23
8	The schedule of studying the discipline	1 course, 1-st and 2-nd semester
9	Preconditions for studying the discipline	Knowledge of the main sections of higher mathematics, including linear and vector algebra, differential and integral calculus.
10	Discipline annotation	The main purpose of the course teaching is to create in students the basics of broad theoretical training in the field of physics, which will allow them to orient in the flow of scientific and technical information, to apply new physical principles in the fields of engineering according to their future specialization **Learning module 1. Classical mechanics.** Topic 1. Kinematics. Topic 2. Dynamics Topic 3. Laws of conservation. **Learning module 2. Classical electrodynamics.** Topic 4. Electric field in vacuum. Topic 5. Electric field in dielectrics. Topic 6. Magnetic field. Topic 7. Conductors in an electric field Topic 8. Magnetic field in vacuum (magnetostatics) **Learning module 3. Electromagnetic induction, magnetic field in substance and electromagnetic field** Topic 9. Electromagnetic induction. Topic 10. Magnetic field in substance. Topic 11. Electromagnetic field. **Learning module 4.** Electromagnetic oscillations and waves. Topic 12 .Electromagnetic oscillations.

<table>
<tr><td></td><td></td><td>Topic 13.Alternating current.
Topic 14. Electromagnetic waves.
Learning module 5. Optics
Topic 15. Wave optics
Theme 6. Quantum optics</td></tr>
<tr><td>11</td><td>Competences, knowledge and skills which will acquired the candidate for higher education in the learning process</td><td>Competences that provide the study of the discipline:
Ability to abstract thinking and analysis
Ability to apply knowledge in practical situations
Ability to model physical phenomena, perform theoretical and experimental research.
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</td></tr>
<tr><td>12</td><td>Learning outcomes of candidate for higher education</td><td>The study of this discipline gives the student opportunities.
<u>To know:</u> basic physical laws and concepts, the essence of various phenomena and methods of their description, the relationship of physical quantities and their units, methods of research and processing of their results, the application of physical laws and phenomena in modern computer technology.
<u>To be able to:</u> analyze natural phenomena and technical processes; apply physical laws to implement practical knowledge, use modern equipment to prove experimental research and computer processing of the results.</td></tr>
<tr><td>13</td><td>Assessment system according to each task for passing the exam</td><td>To assess the work of students during the 1st semester, a test is taken. The rating score for test is calculated according to the formula:

$Q_{test} = 0{,}3 \cdot Q_{pract} + 0{,}3 \cdot Q_{lab} + 0{,}2 \cdot Q_{ICT} + 0{,}2 \cdot Q_{MD}$,

where Q_{test} – score for the semester test on a 100-point scale; Q_{pract} – grade for practical classes, Q_{lab} – grade for lab classes, Q_{ICT} - grade for individual calculation task, Q_{MD} - grade for module test,

The distribution of points for different types of classes / control measures is given in the table

<u>1-st semester</u>
<table>
<tr><th>Type of class / type of control</th><th>Оцінка $O_{сем}$</th></tr>
<tr><td>Lab №1</td><td>2 … 3</td></tr>
<tr><td>Lab №2</td><td>2 … 3</td></tr>
<tr><td>Lab №3</td><td>5 … 9</td></tr>
<tr><td>practical session №1</td><td>3 ... 6</td></tr>
<tr><td>practical session №2</td><td>3 ... 6</td></tr>
<tr><td>practical session №3</td><td>4 … 6</td></tr>
<tr><td>Test</td><td>8 ... 14</td></tr>
<tr><td>Control point 1</td><td>27 … 47</td></tr>
<tr><td>Lab №4</td><td>2 … 3</td></tr>
<tr><td>Lab №5</td><td>2 … 3</td></tr>
</table></td></tr>
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Lab №6	5 ... 9
practical session №4	4 ... 6
practical session №5	4 ... 6
graphical calculation task	8 ... 12
Test	8 ... 14
Control point 2	**33 ... 53**
Total for the semester	**60 ... 100**

To assess the work of students in the 2st semester, the exam is used. The rating score for the exam is calculated by the formula:

$$P_n = 0,6O_{sem} + 0,4O_{exam}$$

where - O_{sem} the score for the semester in a 100-point system, which is calculated for all types of controls, according to the distribution of points given in the table for module 2,

O_{exam} - score for the exam in a 100-point system.

2-nd semester

Вид заняття / контрольний захід	Оцінка $O_{сем}$
Lab №1	2...4
Lab №2	4…7
practical session №1	4...7
practical session №2	4 ...7
Test	9...15
Control point 1	**21...37**
Lab №3	2…4
Lab №4	13...18
practical session №3	4... 7
practical session №4	4...7
graphical calculation task	7…12
Test	9...15
Control point 2	**39...63**
Total for the semester	**60 ...100**

The final grade is translated into national and ECTS according to the scale:

Grade from the discipline	Score on a national scale	ECTS scale score
96-100	5 (perfectly)	A
90-95	5 (perfectly)	B
75-89	4 (good)	C
66-74	3 (satisfactorily)	D
60-65	3 (satisfactorily)	E
35-59	2 (unsatisfactorily)	FX
1-34	2 (unsatisfactorily)	F

14	The quality of the educational process	The content of the educational discipline can be updated depending on the modern needs of the specialty.
15	Methodical support	**Basic literature** 1. General physics with examples and problems. Part 1. Mechanics. Molecular physics and thermodynamics: textbook. manual / V.O. Storozhenko and others. - Kharkiv: SMIT Company LLC, 2006 - 320p. 2. General physics with examples and problems. Part 2. Electricity and magnetism: textbook. manual / IM Kibets and others. - Kharkiv: SMIT Company LLC, 2012 - 232p. 3. General physics with examples and problems. Part 3. Optics: textbook. manual / I.M. Kibets and others. - Kharkiv: SMITH Company LLC, 2009 - 424p. 4. Lecture notes on physics for bachelors in the field of "Cybersecurity" (Electronic edition) / emphasis. V.O. Storozhenko– Kharkiv: KNURE, 2019 –160p. **Supporting literature** 1. Collection of tests in the course of physics / O.M. Kovalenko and others. - Kharkiv: KNURE, 2006, - 124p. **Methodical instructions for different types of classes** 1. Methodical instructions for software in physics (Part 1) / Edited by: V.O. Storozhenko and others. - Kharkiv: KNURE, 2013 - 152p. 2. Methodical instructions for software in physics (Part 2) / Edited by: V.O. Storozhenko and others. - Kharkiv: KNURE, 2013 - 140p. 3. Guidelines for computer laboratory work in physics for students of all specialties and forms of training / R.P. Orel, A.N. Kovalenko, A.I. Rybalka S.M. Meshkov, V.V. Kalinin, A.A. Onishchenko, A.V. Myagky, A.S. Chubukin, Yu. D. Prymachov - Kharkiv: NURE, 2021. - 133 s 4. Methodical instructions for laboratory work in physics. Part 1. Mechanics and molecular physics / O. V. Vyshnivetsky and others. - Kharkiv: KNURE, 2009– 84p.
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