SYLLABUS
in the discipline "Physics"
for students of the first (bachelor's) level of higher education
specialty 122 Computer Science
educational and professional program
Artificial Intelligence
Kharkiv National University of Radio Electronics

1.	Name of the faculty	Faculty of Computer Science
2.	Level of higher education	bachelor
3.	Code and name of the specialty	122 Computer Science
4.	Type and name of educational program	Artificial Intelligence
5.	Code and name of the discipline	Physics
6.	Number of ECTS credits	6
7.	Discipline structure (distribution by types and hours of study)	**1st semester** 90 hours, of which: lectures 20 hours, practical 10 hours, laboratory 12 hours, consultations 6 hours, independent work 42 hours **2nd semester** 90 hours, of which: lectures 20 hours, practical 8 hours, laboratory 8 hours, consultations 6 hours, independent work 48 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	**Content module 1. Mechanics** Theme 1. Kinematics Theme 2. Dynamics of translational motion. Theme 3. Work and energy. Theme 4. Dynamics of rotational motion. Theme 5. Mechanical oscillations. **Content module 2. Electric field** Theme 6. Electric field in vacuum. Theme 7. Electric field in dielectrics. Theme 8. Conductors in an electric field. Theme 9. Direct current. **Content module 3. Magnetic field** Theme 9. Magnetic field in vacuum. Theme 10. Magnetic field in matter. Theme 11. Electromagnetic induction. Theme 12. Electromagnetic field. **Content module 4. Electromagnetic oscillations and waves. Optics.** Theme 14. Electromagnetic oscillations and alternating current. Theme 15. Electromagnetic waves. Theme 16. Wave optics. Theme 17. Quantum optics**.**
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant in higher education in the learning process	**Competences that provide the study of the discipline:** Ability to abstract thinking, analysis and synthesis Ability to apply knowledge in practical situations Ability to learn and master modern knowledge Ability to search, process and analyze information from various sources Ability to systems thinking, application of systems analysis methodology to study complex problems of different nature, methods of formalization

<table>
<tr><td></td><td></td><td>and solution of system problems with conflicting goals, uncertainties and risks</td></tr>
<tr><td>12.</td><td>Learning outcomes of higher education</td><td>The study of this discipline gives the student the opportunity to:
know: basic concepts, laws and theories that explain physical phenomena, as well as physical quantities, with which they describe physical phenomena and processes; the essence of physical phenomena, their mechanisms, cause-and-effect relationships in physical processes; the limits of application of physical laws and theories of physics; theoretical and experimental methods of physical research.
be able to: apply knowledge of the basic forms and laws of abstract-logical thinking, the foundations of the methodology of scientific knowledge, forms and methods of extraction, analysis, processing and synthesis of information in the subject area of computer science
have: the ability to formulate mathematically and research continuous and discrete mathematical models, substantiate the choice of methods and approaches for solving theoretical and applied problems in the field of computer science, analysis and interpretation
The ability to ensure the organization of computing processes in information systems for various purposes, taking into account the architecture, configuration, performance indicators of the functioning of operating systems and system software</td></tr>
<tr><td>13.</td><td>Assessment system according to each task for passing the exam</td><td>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 and modular testing.
The distribution of points for different types of classes / tests is given in the table:
Semester 1
<table>
<tr><th>Control measure</th><th>Rating O_{sem}</th></tr>
<tr><td>Lw №1</td><td>2 . . . 4</td></tr>
<tr><td>Lw №2</td><td>2 . . . 4</td></tr>
<tr><td>Lw №3 Control lesson</td><td>5 . . . 10</td></tr>
<tr><td>Pc №1</td><td>4 . . . 7</td></tr>
<tr><td>Pc №2</td><td>4 . . . 7</td></tr>
<tr><td>Pc №3</td><td>4 . . . 7</td></tr>
<tr><td>Test</td><td>11 . . . 14</td></tr>
<tr><td>Checkpoint 1</td><td>32 . . . 53</td></tr>
<tr><td>Lw №4</td><td>2 . . . 4</td></tr>
<tr><td>Lw №5</td><td>2 . . . 4</td></tr>
<tr><td>Lw №6 Control lesson</td><td>5 . . . 10</td></tr>
<tr><td>Pc №4</td><td>4 . . . 7</td></tr>
<tr><td>Pc №5</td><td>4 . . . 7</td></tr>
<tr><td>Test</td><td>11 . . . 15</td></tr>
<tr><td>Checkpoint 2</td><td>28 . . . 47</td></tr>
<tr><td>Total for the semester</td><td>60 . . . 100</td></tr>
</table>
Semester 2
<table>
<tr><th>Control measure</th><th>Rating O_{sem}</th></tr>
<tr><td>Lw №1</td><td>3 . . . 5</td></tr>
<tr><td>Lw №2</td><td>3 . . . 5</td></tr>
</table></td></tr>
</table>

Pc №1	4 . . .	7
Pc №2	4 . . .	7
Test	10 . . .	19
Checkpoint 1	**24 . . .**	**43**
Lw №3	3 . . .	5
Lw №4 Control lesson	13 . . .	18
Pc №3	4 . . .	7
Pc №4	4 . . .	7
Test	12 . . .	20
Checkpoint 2	**36 . . .**	**57**
Total for the semester	**60 . . .**	**100**

As a form of final control for the discipline "Physics" credit is used in semester 1. The final grade is determined as the number of points received by the applicant for education for completing control activities during the semester.

The combined exam is used as a form of final control for the discipline "Physics" in semester 2. 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.

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
	exam	credit	
96-100	5 (perfectly)	passed	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)	not passed	FX
1-34			F

14.	The quality of the educational process	Adherence to the principles of academic integrity (http://lib.nure.ua/plagiat). Timely updating of the content of the discipline 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 / Order. T.B. Tkachenko, MI Ukrainian and others. –- Kharkiv, KNURE, 2004. - 108 p. 1. General physics with examples and problems. Part 2. Electricity and magnetism: textbook. manual./ IM Kibets and others. - Kharkiv: SMITH Company, 2009 - 424p .; 2. General physics with examples and problems. Part 3, item 1. Optics: textbook / IM Kibets and others. - H.: SMITH Company, 2012. - 232p. **Supporting literature** 1. Collection of tests from the course of physics / O.M. Kovalenko and others.- Kharkiv: KNURE, 2006. –124s. 2. Dictionary of physical terms: textbook / TB Tkachenko.- Kharkiv: KNURE, 2004.-80p. **Methodical instructions for different types of classes**

		1. Methodical instructions for software in the course of physics (part 1) / Edited by: VO Storozhenko and others. –Kharkiv: KhNURE, 2013.-152p. 2. Methodical instructions for software in physics (part 2) / Edited by: VO Storozhenko and others. –Kharkiv: KhNURE, 2013.-140p. 3. Methodical instructions for laboratory work in physics. Part 2. Electricity and magnetism. / Edited by: RP Orel and others. - Kharkiv: KNURE, 2019. - 120p. 4. Methodical instructions for laboratory work in physics. Part 3. Optics. Atomic physics and solid state physics / Emphasis. Malik SB etc. - Kharkiv: KNURE, 2011. 5. Methodical instructions for computer laboratory work in physics./ O.M. Kovalenko and others.- Kharkiv: KNURE, 2006-124p. **Information support:** http://physic.nure.ua http://catalogue.nure.ua/knmz/?subdivision=24&level=0&query=undefined
16.	Syllabus developer	Head of the Department of Physics Kovalenko Olena Mykolayivna, olena.kovalenko@nure.ua