SYLLABUS
in the discipline "Physics"
for students of the first (bachelor's) level of higher education
specialty 123 Computer Engineering
educational and professional programs Computer Engineering
Kharkiv National University of Radio Electronics

1.	Name of the faculty	Faculty of Computer Engineering and Control
2.	Higher education level	Bachelor
3.	Code and name of the specialty	123Computer Engineering
4.	Type and name of educational program	Computer Engineering
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 8 hours, laboratory 8 hours, consultations 8 hours, self-work 46 hours 2nd semester 90 hours, of which: lectures 20 hours, practical 8 hours, laboratory 8 hours, consultations 6 hours, self-work 48 hours
8.	Schedule of study of the discipline	1st year, 2nd semester
9.	Prerequisites for studying the discipline	Knowledge of the beginning of mathematical analysis (integral and differential computation), analytical geometry and linear algebra (actions with vectors), chemistry (atomic-molecular theory, structure of atoms and molecules).
10.	Discipline abstract	The main purpose of teaching the course is to create in students the basics of broad theoretical training in physics, which will allow them to navigate in the flow of scientific and technical information, to apply new physical principles in engineering in their future profession. **Module 1** **Content module 1. Mechanics.** Topic 1. Kinematics. Topic 2. Dynamics of translational motion. Topic 3. Work and energy. Topic 4. Dynamics of rotational motion. Topic 5. Mechanical oscillations **Content module 2. Electricity**. Topic 1. Electric field in vacuum. Topic 2. Electric field in dielectrics. Topic 3. Conductors in an electric field. Topic 4. Direct electric current. **Module 2** **Content module 3 Magnetism.** Topic 1. Magnetic field in vacuum. Topic 2. Electromagnetic induction. Topic 3. Magnetic field in matter. Topic 4. Electromagnetic field. Topic 5. Electromagnetic oscillations and alternating current. **Content module 4. Waves and optics. Elements of quantum mechanics.** Topic 1. Electromagnetic waves. Topic 2. Wave optics. Topic 3. Quantum optics. Topic 4. Bohr's theory of the structure of the hydrogen atom. Topic 5. Elements of quantum

11.	Competences, knowledge, skills, understanding, which is acquired by the applicant of higher education in the process of learning	**Competence, which provides the study of the discipline:** Ability to abstract thinking, analysis Ability to apply knowledge in practical situations 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	**The study of this discipline gives the student the opportunity to:** <u>know</u>: basic concepts, laws and theories that explain physical phenomena, as well as physical quantities by which to describe physical phenomena and processes; the essence of physical phenomena, their mechanisms, causal relationships in physical processes; limits of application of physical laws and theories of physics; theoretical and experimental methods of physical research; physical principles of operation of modern technological equipment and apparatus; purpose and possibilities of application of the experimental equipment for carrying out physical research. <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 modern technology; 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 <u>have</u>: the ability to carry out experimental research with modern methods and process their results, the ability to apply basic knowledge of physics to the extent necessary to provide engineering training in the chosen profession.
13.	Assessment system for each task for passing the test / exam	For assessment 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. The combined exam is used as a form of final control for the discipline "Physics". With this type of control, the final grade P_n 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 amount of knowledge required to receive a positive assessment.* 1. Basic concepts, laws and models of mechanics, electricity, magnetism, oscillations, waves, quantum physics, statistical physics, thermodynamics, nuclear physics. 2. Limits of application of physical concepts and laws. 3. Principles of building physical models and their use. *The necessary amount of skills to receive a positive assessment.* 1. Calculation of parameters of physical objects, applying basic concepts, laws and models of mechanics, electricity, magnetism, oscillations, waves, quantum physics and thermodynamics to solve practical problems. 2. Conducting the simplest physical experimental studies. 3. Processing the results of experimental studies, using methods of evaluating the results of experiments and calculating their errors

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

Assessment in the discipline	Assessment on a national scale	Assessment on the ECTS scale
96-100	5 (excellent)	A
90-95	5 (excellent)	B
75-89	4 (good)	C
66-74	3 (satisfactory)	D
60-65	3 (satisfactory)	E
35-59	2 (unsatisfactory)	FX
1-34		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	**Basic Literature:** 1. Zagal'nafizyka z prykladamyizadachamy. Chastyna 1. Mehanika. Molekuljarnafizyka ta termodynamika: navch. Posibnyk/ V.O. Storozhenko ta in.-Harkiv: TOV «Kompanija SMIT», 2006. – 320 s. 2. Zagal'nafizyka z prykladamyizadachamy. Chastyna 2. Elektryka ta magnetyzm: navch. posibnyk. / I.M. Kibec' ta in. - Harkiv: «Kompanija SMIT», 2009 – 424s.; 3. Zagal'nafizyka z prykladamyizadachamy. Chastyna 3, t.1. Optyka: navch.posibnyk / I.M. Kibec' ta in. – H.:Kompanija SMIT, 2012. – 232s. 4. Zagal'nafizyka z prykladamyizadachamy. Chastyna 3, t.2. Kvantova ta atomnafizyka. Fizykatverdogotila. Jadernafizyka: navch.posibnyk / I.M.Kibec' ta in. –H.:Kompanija SMIT, 2013.–304s.. **Additional literature:** 1. Elementarnajafyzyka v prymerah y zadachah: ucheb. Posobyedljapodgotovytel'ныhotdelenyj/ A.D. Tevjashev y dr. – Har'kov: HNURE, 2005. - 628s. 2. Zbirnyktestiv z kursufizyky/ O.M. Kovalenko ta in.-Harkiv: HNURE,2006.-124s. 3. Slovnykfizychnyhterminiv: navch.-dovidkovyjposibnyk/ T.B. Tkachenko.-Harkiv: HNURE,2004.-80s. **Methodical instructions to take up views:** 1. Metodychnivkazivky do PZ z kursufizyky (chastyna 1)/Uporjad.:V.O.Storozhenko ta in. –Harkiv:HNURE, 2013.-152s. 2. Metodychnivkazivky do PZ z fizyky (chastyna2)/Uporjad.:V.O.Storozhenko ta in. –Harkiv:HNURE, 2013.-140s. 3. Metodychnivkazivky do laboratornyhrobit z fizyky. Chastyna 1. Mehanika ta molekuljarnafizyka. / Uporjad.: O.V. Vyshnivec'kyj ta in. – Harkiv: HNURE, 2009. – 84s. 4. Metodychnivkazivky do laboratornyhrobit z fizyky. Chastyna 2. Elektrykaimagnetyzm. / Uporjad.: R. P. Orel ta in. – Harkiv: HNURE, 2019. – 120s. 5. Metodychnivkazivky do laboratornyhrobit z fizyky. Chastyna 3. Optyka. Atomnafizyka ta fizykatverdogotila / Upor. Malyk S.B. ta in.-Harkiv: HNURE, 2011. 6. Metodychnivkazivky do komp'juternyhlaboratornyhrobit z fizyky./ O.M. Kovalenko ta in.- Harkiv:HNURE, 2006-124s.

		Information support: http://physic.nure.ua http://catalogue.nure.ua/knmz/?subdivision=24&level=0&query=undefined
16.	Syllabus developer	Associated Professor of Physics Department Andrey Onishchenko, andrey.onishchenko@nure.ua