SYLLABUS
in the discipline "Physics"
for students of the first (bachelor's) level of higher education
specialty F2 Software Engineering
educational and professional programs Computer Engineering
Kharkiv National University of Radio Electronics

1.	Name of the faculty	Faculty of Computer Science
2.	Higher education level	Bachelor
3.	Code and name of the specialty	F2 Software Engineering
4.	Type and name of educational program	«Software 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 10 hours, laboratory 12 hours, consultations 6 hours, self-work 42 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, 1st, 2nd semester
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.** 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. **Content module 4. Waves and optics. Elements of quantum mechanics.** Topic 1. Electromagnetic oscillations and alternating current. Topic 2. Electromagnetic waves. Topic 3. Wave optics. Topic 4. Quantum optics.
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant of higher education in the process of learning	**Competencies provided by the study of the discipline:** Epistemological approach to the study of natural phenomena and the development of technology. Knowledge of the fundamental laws of physics and the ability to apply them in practice. Understanding the concepts of basic physical quantities, determining their content, means and units of their measurement.

<table>
<tr><td></td><td></td><td>The ability to work with scientific equipment and measuring instruments, process and analyze the results of scientific research.
GC-1. Ability to abstract thinking, analysis and synthesis.
GC -2. Ability to apply knowledge in practical situations.
FC-2. Ability to participate in software design, including modeling (formal description) of its structure, behavior and functioning processes.
FC-3. Ability to develop architectures, modules and components of software systems.
FC-8. Ability to apply and develop fundamental and interdisciplinary knowledge to successfully solve software engineering problems.
FC-14. Ability to algorithmic and logical thinking.</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 physical laws and concepts, the essence of various phenomena and methods of their description, the relationship between physical quantities and their units of measurement, methods of research and processing their results, the application of physical laws and phenomena in modern computer technology.
Be able to: 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 obtained.
PLO -5 Know and apply relevant mathematical concepts, methods of domain, system and object-oriented analysis and mathematical modeling for software development.</td></tr>
<tr><td>13.</td><td>Assessment system for each task for passing the test / exam</td><td>To evaluate student work during the semester, the rating score is calculated as the sum of the grades for various types of classes and tests, which include practical classes, laboratory work and individual homework. The distribution of points for various types of classes/tests is given in the table:
<table>
<tr><th>Type of lesson / test</th><th>Rating $O_{сем}$</th></tr>
<tr><td colspan="2">Module 1</td></tr>
<tr><td>Lw №1</td><td>3 . . . 6</td></tr>
<tr><td>Lw №2</td><td>3 . . . 6</td></tr>
<tr><td>Lw № 3</td><td>4 . . . 8</td></tr>
<tr><td>Pl №1</td><td>3 . . . 6</td></tr>
<tr><td>Pl №2</td><td>3 . . . 6</td></tr>
<tr><td>Pl №3</td><td>4 . . . 8</td></tr>
<tr><td>Checkpoint 1</td><td>20 . . . 40</td></tr>
<tr><td>Lw №4</td><td>4 . . . 6</td></tr>
<tr><td>Lw №5</td><td>4 . . . 6</td></tr>
<tr><td>Lw №6</td><td>4 . . . 6</td></tr>
<tr><td>Pl №4</td><td>4 . . . 6</td></tr>
<tr><td>Pl №5</td><td>4 . . . 6</td></tr>
<tr><td>Individual homework</td><td>20 … 30</td></tr>
<tr><td>Checkpoint 2</td><td>40 … 60</td></tr>
<tr><td>Total per semester</td><td>60 … 100</td></tr>
<tr><td colspan="2">Module 2</td></tr>
<tr><td>Lw №1</td><td>5 … 10</td></tr>
<tr><td>Lw №2</td><td>5 . . . 10</td></tr>
</table></td></tr>
</table>

		Pl №1 — 5 . . . 10 Pl №2 — 5 . . . 10 **Checkpoint 1** — 20 … 40 Lw №3 — 5 … 8 Lw №4 — 5 … 8 Pl №3 — 5 … 7 Pl №4 — 5 … 7 Individual homework — 20 … 30 **Checkpoint 2** — **40 . . . 60** **Total per semester** — **60 . . . 100** The form of final control in the 1st module is a test. The final grade is determined as the number of points received by the student for completing the control measures during the semester. The form of final control in the 2nd module is a combined exam. With this type of control, the final grade is calculated according to 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 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 — 2 (unsatisfactory) — F
14.	The quality of the educational process	Compliance with the principles of academic integrity (http://lib.nure.ua/plagiat). Timely updating of the content of the academic discipline depending on the current 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'nыhotdelenyj/ 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