SYLLABUS
in the discipline "Physics"
for students of the first (bachelor's) level of higher education
specialties 172 Telecommunications and radio engineering
of educational and professional programs Telecommunications, Infocommunication engineering, Information and network engineering
Kharkiv National University of Radio Electronic

1.	Name of the faculty	Faculty of Infocommunications
2.	Level of higher education	bachelor
3.	Code and name of the specialty	172 Telecommunications and radio engineering a
4.	Type and name of educational program	Telecommunications, Infocommunication engineering, Information and network engineering
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 180 hours, of which: lectures 38, practical 20, laboratory 20, consultations 14, independent work 88 2nd semester 120 hours, of which: lectures 26 hours, practical 12 hours, laboratory 12 hours, consultations 10 hours, independent work 58 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. Electricity and magnetism.** Theme 1. Electric field in vacuum. Theme 2. Electric field in dielectrics. Theme 3. Conductors in an electric field. Theme 4. Electric current. Theme 5. Magnetic field in vacuum. Theme 6. Magnetic field in matter. **Content module 2. Electromagnetic oscillations and waves.** Theme 7. The phenomenon of electromagnetic induction. Theme 8. Electromagnetic field. Theme 9. Electromagnetic oscillations. Theme 10. Alternating current. Theme 11. Waves **Content module 3. Optics.** Theme 1. Geometric optics. Theme 2. Wave optics. Theme 3. Quantum optics. **Content module 4. Elements of quantum mechanics and solid state physics.** Theme 4. Quantum mechanics. Theme 5. Quantum theory of the structure of atoms and molecules. Theme 6. Spontaneous and forced radiation. Theme 7. Electrical conductivity of metals and semiconductors. Contact phenomena.
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant in higher education in the	**Competences that provide the study of the discipline:** Ability to abstract and logical thinking, analysis Ability to apply knowledge in practical situations Ability to model physical phenomena, perform theoretical and

<table>
<tr><td></td><td>learning process</td><td>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</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: 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.
be able to: 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
have: modern methods of physical research, basic methods of working with physical equipment.</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, 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 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:
<table>
<tr><td>Grade from the discipline</td><td>Score on a national scale</td><td>ECTS scale score</td></tr>
<tr><td>96-100</td><td>5 (perfectly)</td><td>A</td></tr>
<tr><td>90-95</td><td>5 (perfectly)</td><td>B</td></tr>
<tr><td>75-89</td><td>4 (good)</td><td>C</td></tr>
<tr><td>66-74</td><td>3 (satisfactorily)</td><td>D</td></tr>
<tr><td>60-65</td><td>3 (satisfactorily)</td><td>E</td></tr>
<tr><td>35-59</td><td rowspan="2">2 (unsatisfactorily)</td><td>FX</td></tr>
<tr><td>1-34</td><td>F</td></tr>
</table></td></tr>
<tr><td>14.</td><td>The quality of the educational process</td><td>The content of the discipline can be updated depending on the modern needs of the specialty.</td></tr>
<tr><td>15.</td><td>Methodical support</td><td>Basic literature
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. Elementary physics in examples and problems: textbook. Manual for</td></tr>
</table>

		preparatory departments / A.D. Tevyashev et al. - Kharkov: KNURE, 2005. - 628p. 2. Collection of tests from the course of physics / O.M. Kovalenko and others.- Kharkiv: KNURE, 2006.-124p. 3. Dictionary of physical terms: textbook / TB Tkachenko.- Kharkiv: KNURE, 2004.-80p. 4. Savelyev IV Physics course. T.1,2,3.-M .: Nauka, 1989. **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
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