

**SYLLABUS**  
**in the discipline "Physics"**  
**for students of the first (bachelor's) level of higher education**  
**specialty G5 Electronics, Electronic Communications, Instrument Engineering and Radio Engineering**  
**educational and professional programs Systems, Technology and Computer Tools of Multimedia**  
**Kharkiv National University of Radio Electronics**

1.	Name of the faculty	Information and Analytical Technologies and Management
2.	Higher education level	Bachelor
3.	Code and name of the specialty	G5 Electronics, Electronic Communications, Instrument Engineering and Radio Engineering
4.	Type and name of educational program	Systems, Technology and Computer Tools of Multimedia
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, 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	<p><b>Content module 1. Physical foundations of mechanics. (1st semester)</b>  Topic 1. Kinematics. Dynamics of translational motion.  Topic 2. Work and energy.  Topic 3. Dynamics of rotational motion.  Topic 4.. Mechanical oscillations.</p> <p><b>Content module 2. Electrostatics.</b>  Topic 5. Electric field in vacuum.  Topic 6. Electric field in dielectrics.  Topic 7. Conductors in an electric field.  Topic 8. Direct current.</p> <p><b>Content module 3. Magnetic field.( 2nd semester)</b>  Topic 9. Magnetic field in vacuum.  Topic 10. Magnetic field in matter.  Topic 11. The phenomenon of electromagnetic induction.</p> <p><b>Content module 4. Oscillations and waves. Optics.</b>  Topic 12. Electromagnetic field. Maxwell's equations.  Topic 13. Electromagnetic oscillations. Laws of alternating current.  Topic 14. Elastic waves.  Topic 15. Electromagnetic waves.  Topic 16. Wave optics.</p>
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant of higher education in the process of learning	<p><b>Competencies provided by the study of the discipline:</b>  During the study of the discipline, applicants acquire the following competencies:  General competencies:  1. Ability to abstract thinking, analysis and synthesis.  2. Ability to apply knowledge in practical situations.  5. Ability to communicate in the state language both orally and in writing.  7. Ability to learn and master modern knowledge.</p> <p>Professional competencies:  1. Ability to understand the essence and significance of information in the development of a modern information society.  4. Ability to perform computer modeling of devices, systems and processes using universal application software packages.</p>

		<p>12. Ability to perform work on managing the load flows of information and telecommunication networks.</p> <p>14. Ability to study scientific and technical information, domestic and foreign experience on the subject of an investment (or other) project of telecommunications and radio engineering facilities.</p> <p>15. Ability to perform calculations in the process of designing structures and facilities of information and telecommunications networks, telecommunications and radio engineering systems, in accordance with the technical specifications using both standard and software design automation tools.</p>
12.	Learning outcomes of higher education	<p><b>Program learning outcomes</b> that directly link physics with the practice of the educational and professional program "Systems, Technologies and Computer Tools. Multimedia." that a higher education applicant must demonstrate:</p> <p>P1. Analyze, argue, make decisions when solving specialized tasks and practical problems of telecommunications and radio engineering, which are characterized by complexity and uncertainty of conditions.</p> <p>P4. Explain the results obtained as a result of measurements in terms of their significance and link them to the appropriate theory.</p> <p>P5. Skills in evaluating, interpreting and synthesizing data information.</p> <p>P7. Competently apply the terminology of the field of telecommunications and radio engineering.</p> <p>P9. Analyze and evaluate the effectiveness of methods for designing information and telecommunications networks, telecommunications and radio engineering systems.</p> <p>P13. Application of fundamental and applied sciences for the analysis and development of processes occurring in telecommunications and radio engineering systems.</p> <p>P15. Application of understanding of means of automation of design and technical operation of telecommunications and radio engineering systems in professional activities.</p> <p>P16. Application of understanding of the basics of metrology and standardization in the field of telecommunications and radio engineering in professional activities.</p> <p>P20. Explain the principles of construction and functioning of hardware and software complexes of control and maintenance systems for the development, analysis and operation of information and telecommunications networks, telecommunications and radio engineering systems.</p> <p>P23. Apply skills in setting up and using modern hardware and software tools for design and creation of graphic 2D, 3D content, animation, creation and post-processing of photo and video content.</p> <p>P24. Apply skills in creating multimedia audio content using modern hardware and software tools for recording, processing audio signals, mixing and mastering sounds.</p>

13.	Assessment system for each task for passing the test / exam	<p>For assessment the student's work during the semester, the final rating <math>O_{sem}</math> 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.</p> <p>The combined exam is used as a form of final control for the discipline "Physics". With this type of control, the final grade <math>P_n</math> is calculated by the formula: <math>P_n = 0,6 \cdot O_{sem} + 0,4 \cdot O_{ex}</math>, where <math>O_{sem}</math> - grade for the semester in a 100-point system, <math>O_{ex}</math> - grade for the exam in a 100-point system.</p> <p>The final grade <math>P_n</math> is translated into national and ECTS according to the scale:</p> <table border="1" data-bbox="549 539 1439 916"> <thead> <tr> <th>Assessment in the discipline</th><th>Assessment on a national scale</th><th>Assessment on the ECTS scale</th></tr> </thead> <tbody> <tr> <td>96-100</td><td>5 (excellent)</td><td>A</td></tr> <tr> <td>90-95</td><td>5 (excellent)</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 (satisfactory)</td><td>D</td></tr> <tr> <td>60-65</td><td>3 (satisfactory)</td><td>E</td></tr> <tr> <td>35-59</td><td rowspan="2">2 (unsatisfactory)</td><td>FX</td></tr> <tr> <td>1-34</td><td>F</td></tr> </tbody> </table>	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
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	Adherence to the principles of academic integrity ( <a href="http://lib.nure.ua/plagiat">http://lib.nure.ua/plagiat</a> ). The content of the academic discipline may be updated depending on the current needs of the specialty.																							
15.	Methodical support	<p><b>Basic Literature:</b></p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Zagal'nafizyka z prykladamyizadachamy. Chastyna 2. Elektryka ta magnetyzm: navch. posibnyk. / I.M. Kibec' ta in. - Harkiv: «Kompanija SMIT», 2009 – 424s.;</li> <li>3. Zagal'nafizyka z prykladamyizadachamy. Chastyna 3, t.1. Optyka: navch.posibnyk / I.M. Kibec' ta in. – H.:Kompanija SMIT, 2012. – 232s.</li> <li>4. Zagal'nafizyka z prykladamyizadachamy. Chastyna 3, t.2. Kvantova ta atomnafizyka. Fyzikatverdgotila. Jadernafizyka: navch.posibnyk / I.M.Kibec' ta in. –H.:Kompanija SMIT, 2013.–304s..</li> </ol> <p><b>Additional literature:</b></p> <ol style="list-style-type: none"> <li>1. Zbirnyktestiv z kursufizyky/ O.M. Kovalenko ta in.-Harkiv: HNURE,2006.-124s.</li> <li>2. Slovnykfizychnyhterminiv: navch.-dovidkovyjposibnyk/ T.B. Tkachenko.-Harkiv: HNURE,2004.-80s.</li> </ol> <p><b>Methodical instructions to take up views:</b></p> <ol style="list-style-type: none"> <li>1. Metodychnivkazivky do PZ z kursufizyky (chastyna 1)/Uporjad.:V.O.Storozhenko ta in. –Harkiv:HNURE, 2013.-152s.</li> <li>2. Metodychnivkazivky do PZ z fizyky (chastyna2)/Uporjad.:V.O.Storozhenko ta in. –Harkiv:HNURE, 2013.-140s.</li> <li>3. Metodychnivkazivky do laboratornyhrobit z fizyky. Chastyna 1. Mehanika ta molekuljarnafizyka. / Uporjad.: O.V. Vyshnivec'kyj ta in. – Harkiv: HNURE, 2009. – 84s.</li> <li>4. Metodychnivkazivky do laboratornyhrobit z fizyky. Chastyna 2. Elektrykaimagnetyzm. / Uporjad.: R. P. Orel ta in. – Harkiv: HNURE, 2019. – 120s.</li> </ol>																							

		<p>5. Metodychni vkazivky do kompiuternykh laboratornykh robit z dystsypliny «FIZYKA» dlia studentiv usikh spetsialnostei i form navchannia / Uporiad.: R. P. Orel, O. M. Kovalenko, A. I. Rybalka ta inshi – Kharkiv: KhNURE, 2021. – 132 s</p> <p>6.</p> <p><b>Information support:</b>  <a href="http://physic.nure.ua">http://physic.nure.ua</a>  <a href="http://catalogue.nure.ua/knmz/?subdivision=24&amp;level=0&amp;query=undefined">http://catalogue.nure.ua/knmz/?subdivision=24&amp;level=0&amp;query=undefined</a></p>
16.	Syllabus developer	<p>Associated Professor of Physics Department Alexander Myagky  aleksandr.mjagky@nure.ua</p>