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 Information Radio Technologies, Media Engineering
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	Information Radio Technologies, Media 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, 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	**Content module 1. Physical foundations of mechanics. (1st semester)** Topic 1. Kinematics. Dynamics of translational motion. Topic 2. Work and energy. Topic 3. Dynamics of rotational motion. Topic 4.. Mechanical oscillations. **Content module 2. Electrostatics.** Topic 5. Electric field in vacuum. Topic 6. Electric field in dielectrics. Topic 7. Conductors in an electric field. Topic 8. Direct current. **Content module 3. Magnetic field.(2nd semester)** Topic 9. Magnetic field in vacuum. Topic 10. Magnetic field in matter. Topic 11. The phenomenon of electromagnetic induction. **Content module 4. Oscillations and waves. Optics.** 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.
11.	Competences, knowledge, skills, understanding, which is acquired by the applicant of higher education in the process of learning	**During the study of the discipline, applicants acquire the following competencies:** General competencies: GC1 Ability to abstract thinking, analysis and synthesis. GC2 Ability to apply knowledge in practical situations. GC3. Ability to plan and manage time. GC4. Knowledge and understanding of the subject area and understanding of professional activity. Professional competencies: PC1. Ability to understand the essence and significance of information in the development of a modern information society. PC6. Ability to conduct instrumental measurements in information and telecommunication networks, telecommunication and radio engineering systems.

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<tr><td></td><td></td><td>PC8. Ability to promote the implementation of promising technologies and standards.
PC13. Ability to organize and implement occupational health and safety measures during the operation and maintenance of information and communication network equipment, telecommunication and radio engineering systems.
PC15. The ability to perform calculations in the process of designing structures and facilities of information and telecommunication networks, telecommunication and radio engineering systems, in accordance with the technical specifications using both standard and software design automation tools.</td></tr>
<tr><td>12.</td><td>Learning outcomes of higher education</td><td>Program learning outcomes that directly link physics with the practice of the educational and professional programs "Information Radio Technologies" and "Media Engineering", which must be demonstrated by a higher education applicant:
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.
P2. Apply the results of personal search and analysis of information to solve qualitative and quantitative tasks of a similar nature in information and communication and radio engineering systems.
P4. Explain the results obtained as a result of measurements in terms of their significance and link them to the appropriate theory.
P5. Skills in evaluating, interpreting and synthesizing information data.
P6. Adapt in the conditions of changing technologies of information and communication networks, telecommunications and radio engineering systems.
P9. Analyze and evaluate the effectiveness of design methods for information and telecommunications networks, telecommunications and radio engineering systems.
P17. Understanding and compliance with domestic and international regulatory documents on the development, implementation and technical operation of information and telecommunications networks, telecommunications and radio engineering systems.</td></tr>
<tr><td>13.</td><td>Assessment system for each task for passing the test / exam</td><td>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 final grade P_n is translated into national and ECTS according to the scale:
<table>
<tr><th>Assessment in the discipline</th><th>Assessment on a national scale</th><th>Assessment on the ECTS scale</th></tr>
<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>
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14.	The quality of the educational process	Adherence to the principles of academic integrity (http://lib.nure.ua/plagiat). The content of the academic discipline may be updated 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. Zbirnyktestiv z kursufizyky/ O.M. Kovalenko ta in.-Harkiv: HNURE,2006.-124s. 2. 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. 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 6. **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 Alexander Myagky aleksandr.mjagky@nure.ua