GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics II, PG_00047733		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Katedra Fizyki Atomowej i Luminescencji -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sebastian Bielski	
	Teachers	dr inż. Sebastian Bielski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 42926 Fizyka II dla IBM 25/26
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42926

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	5.0	65.0	100

Subject objectives

The aim of the subject is to provide students with the basic knowledge of physics helpful in further education.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	Knowledge and understanding of phenomena, concepts and laws related to electromagnetism and the fundamentals of quantum mechanics.	[SW1] Assessment of factual knowledge
[K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions	The ability to solve problems related to electricity and magnetism, as well as elementary problems in quantum mechanics.	[SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Lecture:
Coulomb's force. Electric field. Gauss law. Electric potential energy and potential. Electric dipole. Electric field of an infinite uniformly charged plane. Magnetic field. Lorentz force. Magnetic field of a moving charge. Biot-Savart law. Magnetic field of a straight current. Action of a magnetic field on a current-carrying conductor. Interaction of two parallel straight currents. Ampère's law. Electromagnetic induction. Faradays law. Generalized Ampères law. Matter waves. Schrödinger equation. Solution of the Schrödinger equation for a free particle. Potential well problem. Hydrogen atom. Energy quantization. Probability density of finding an electron at a distance r from the nucleus. Stern-Gerlach experiment. Electron spin. Electron magnetic moment. Electron state notation. Emission and absorption of light. Stimulated emission. Principle of laser operation. Band structure and electrical properties of solids. Selected applications of lasers.

Tutorial:
Problems on Coulomb's force, electric field, electric potential energy and electric potential. Relation between electric field and potential. Application of the Biot-Savart law to calculate magnetic fields. Calculation of magnetic fields using Ampères law. Problems related to the wave properties of matter. Heisenbergs uncertainty principle. The potential well problem. Bohr's model of hydrogen atom. Problems concerning parameters of a laser beam.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Lecture: final test</td><td>50.0%</td><td>67.0%</td></tr>
<tr><td>tutorials: 2 tests</td><td>50.0%</td><td>33.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Halliday D., Resnick R., Walker J., Fundamentals of physics
2. Openstax, University physics
3. Griffiths D. J. , Introduction to Electrodynamics</td></tr>
<tr><td>Supplementary literature</td><td>1. Sidney B. Cahn, Boris E. Nadgorny, and Paul D. Scholten, A Guide To Physics Problems.

2. Jackson J. D., Classical Electrodynamics</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>An electron in an infinite quantum well

Schrödinger's wave equation.

Faraday's law.

Energy density of electric and magnetic field.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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