GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electricity and magnetism, PG_00051065		
Field of study	Technical Physics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department Of Solid State Physics -> Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Waldemar Stampor	
	Teachers	dr inż. Marcin Dampc dr hab. inż. Waldemar Stampor	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	45.0	0.0	0.0	0.0	75

E-learning hours included: 0.0

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	75	5.0	70.0	150

Subject objectives

The aim of the course is to teach students the basics of electricity and magnetism

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] learns independently, obtains information from literature, databases and other properly selected sources	Can learn independently, relying on the recommended literature on the subject and is able to critically obtain information from the Internet and other source materials	[SU2] Assessment of ability to analyse information
[K6_W01] understands the importance of physics and its applications in connection to civilization	He knows the physical foundations of the phenomena in the field of electromagnetism in the modern world	[SW1] Assessment of factual knowledge
[K6_W02] has systematized knowledge of the basics of physics, including mechanics, thermodynamics, electricity and magnetism, optics, atomic and particle physics, solid-state physics, nuclear and elementary particle physics	* Student knows properties of electric charge. Student Student calculates forces between charges. * Student applies Gauss low for electric field calculations. * Student explains the terms of potential and capacitance. * Student calculates forces between charges. . * Student explains the terms of current intensity and current density * Student calculates electric circuits parameters. Student describes motion of charges in magnetic field. * Student explains Biot-Savart and Ampere laws. * Student explains Maxwell equations. * Student explains influence of matter on electric and magnetic fields.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>ELECTROSTATICS. Electric charge. Electric field strength: Coulomb's law and Gauss's law. Electric potential and the relationship of the potential with the electric field strength. Electric dipole and its behavior in an external electric field. Electric field in matter, conductors and dielectrics. Three electrical vectors: E, D, and P.

ELECTRIC CURRENT. Electric current intensity and density. Electrical conductivity and Ohm's law. Kirchhoff's laws for electrical circuits.

MAGNETOSTATICS. Lorentz force. Magnetic induction vector: Gauss's law, Biot-Savart law and Ampere's law. Electrodynamic force. Magnetic dipole and its behavior in an external magnetic field. Magnetic field in matter, types of magnetics. Three electric vectors: E, D and P and three magnetic vectors: B, H and M. Maxwell's equations in electro- and magneto-statics.

ELECTRODYNAMICS. The phenomenon of electromagnetic induction and Faraday's law. Self-induction. Generalized Faraday's law. Generalized Ampere's law and displacement current. Maxwell's equations.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>No requirements</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>Midterm colloquium</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Written exam</td><td>50.0%</td><td>30.0%</td></tr>
<tr><td>Oral exam</td><td>50.0%</td><td>30.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. D. Halliday, R. Resnick, J. Walker. Podstawy fizyki tom 3; PWN, Warszawa 2003 lub wydania późniejsze.
2. Cz. Bobrowski. Fizyka. Krótki kurs. WNT, Warszawa 2004 lub wydania późniejsze.
3. I.W. Sawieliew, Kurs fizyki tom 2, PWN 1989 lub wydania późniejsze.
4. Fizyka dla szkół wyższych tom 2. OPENSTAX POLSKA 2018. https://openstax.org/details/books/fizyka-dla-szkół-wyższych-polska.</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Electric field strength and magnetic field induction vector.Coulomb's law and Biot-Savart's law.Gauss's law for an electric field and Gauss's law for a magnetic field.Ampere's law for a magnetic field.Maxwell's equations in electro- and magnetostatics.Electric dipole and its behavior in an external electric fieldMagnetic dipole and its behavior in an external magnetic field.Faraday's law for electromagnetic induction and an example of its application.Maxwell's equations in vacuum and material medium.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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