GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Electrodynamics, PG_00038434 | | |
| Field of study | Electrical Engineering | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | 2025/2026 |
| Education level | first-cycle studies | Subject group | |
| 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 | 5.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Katedra Elektrotechniki i Inżynierii Wysokich Napięć -> Faculty of Electrical and Control Engineering | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Adam Młyński | |
| | Teachers | | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 15.0 | 15.0 | 0.0 | 0.0 | 60 |

E-learning hours included: 0.0

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=16952

**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 | 60 | 10.0 | 55.0 | 125 |

**Subject objectives**

Understanding the fundamental rights of electromagnetic fields. Ability to apply the calculation of the electromagnetic field with technical problems.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| K6_W03 | The student is able to perform engineering calculations of the electromagnetic field and use peripheral models. | [SW1] Assessment of factual knowledge |
| K6_K05 | The student is able to assess the influence of the electromagnetic field on living organisms and technical devices. The student knows the dangers associated with strong electromagnetic fields | [SK5] Assessment of ability to solve problems that arise in practice |
| K6_U04 | The student is able to apply the known methods to calculate the electromagnetic field and use peripheral models. | [SU4] Assessment of ability to use methods and tools |
| K6_W02 | The student knows how to describe electric and magnetic fields, the student can describe the phenomena occurring in the electric and magnetic fields. | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge |

**Subject contents**

Electrostatics: Coulomb's law, Gauss law, electric field and potential, conductor in an electric field, capacitance of various systems lining and wires, dielectrics, polarization, dielectric multilayer, insulation electric strength. Field of the flow current, resistance conductors with different shapes. Magnetostatics: Ampères law, magnetic flux density, Biot-Savarts law, coefficient of self and mutual inductance, dia-, para- and ferromagnetic, mag-netization curve, magnetic circuits, forces. Faradays law, induced and rotational electromotive force, skin and proximity effect.

**Prerequisites and co-requisites**

Knowledge of vector algebra. Learn how to calculate derivatives of functions of several variables. Understand the concept of integral linear, surface and volume.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>The written examination</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Midterm colloquium</td><td>60.0%</td><td>25.0%</td></tr>
<tr><td>Reports on laboratory exercises</td><td>60.0%</td><td>25.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Zahn M.: Pole elektromagnetyczne. PWN Warszawa 1989<br>Griffiths D.J.: Podstawy elektrodynamiki. PWN Warszawa 2001<br>Krakowski M: Elektrotechnika teoretyczna. Pole elektromagnetyczne, tom 2. PWN, Warszawa 1980<br>Piątek Z., Jabłoński P.: Podstawy teorii pola elektromagnetycznego. WNT, Warszawa 2010<br>Sikora R.: Teoria Pola Elektromagnetycznego. WNT, Warszawa 1997<br>Sikora J., Skoczylas J., Sroka J., Wincenciak S.: Zbiór zadań z teorii pola elektromagnetycznego. Oficyna Wyd. Politechniki Warszawskiej. Warszawa 2004<br>Zimny P.: Wykłady z elektrodynamiki technicznej. www.ely.pg.gda.pl/tiwe.</td></tr>
<tr><td>Supplementary literature</td><td>Feynman R.P., Leighton R.B., Sands M.: Feynmana wykłady z fizyki (tom II). PWN Warszawa 2001<br>Kurdziel R.: Podstawy elektrotechniki. WNT, Warszawa 1965<br>Rawa H.: Podstawy elektromagnetyzmu. Wydawnictwo Politechniki Warszawskiej</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Calculate the electric field intensity distribution of a given system point charges placed at specified points in the Cartesian coordinate system.<br>2.What condition should meet the dimensions of the coaxial cable to the maximum intensity of the electric field in the cable was minimal.<br>3. Calculate the capacity of single core cables, coaxial cables having a length L = 5 km, the wire diameter is d = 30 mm, the inner diameter of the screen, D = 40 mm and the relative permittivity of the dielectric is w = 3.5.<br>4. Calculate the leakage coaxial cable of length L = 1.5 km, the diameter of the vein is d = 30 mm, the inner diameter of the screen, D = 40 mm, and is the conductivity of insulation = 20 μS / m.<br>5. Calculate the unit inductance own two-wire line, the wires of diameter d spaced apart at a distance h.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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