Faculty of Electrical Engineering									
Field of study	Electrical and Electronic Engineering							**Degree level and programme type**	bachelor's degree
Specialization / diploma path	-							**Study profile**	
Course name	Electromagnetism – Engineering Physics							**Course code**	IS-FEE-10046W
								Course type	elective
Forms and number of hours of tuition	**L**	**C**	**LC**	**P**	**SW**	**FW**	**S**	**Semester**	winter
	15	0	0	0	15	0	0	**No. of ECTS credits**	2
Entry requirements									
Course objectives	To acquaint students with chosen electromagnetic phenomena. To show students mathematical formulation of the electromagnetic field theory, inc. vector calculus.								
Course content	Lecture: Assumptions of electromagnetic field (EM) theory, Electrostatics (Coulomb's law, electrostatic field). Magnetostatics (Ampère's law, magnetostatic field). Currents and conductors: current distributions, continuity of current, static electroconductive field, power losses. Electromagnetic potentials. Interface conditions. Maxwell's macroscopic equations, the energy theorem. Electrodynamics (equation of continuity for electric chargé, displacement current, electromotive force, Faraday's law of induction). Electromagnetic field: equations, power and the Poynting vector, conditions of continuity, interactions between the EM waves and materials. Electric polarisation and displacement, electric multipole moments, magnetisation, energy. Specialization workshop: Solving selected issues related to electrostatic, magnetostatics and current flow problems. The examples are solved using some computer applications and numerical methods. Analysis of some examples. Interpretation of results (analysis of field phenomena).								
Teaching methods	understands and knows the mathematical formulation of the EM field theory								
Assessment method	lecture – final written test (at least 50% of points are necessary to pass); workshop – written reports and tests								

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	understands and knows the mathematical formulation of the EM field theory	
LO2	is able to explain some field phenomena	
LO3	understands the principles of EM field, including some practical aspects (e.g. positive and spurious effects)	
LO4	explain some principles of EM field	

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	test, evaluation of students' reports and written tests	L, SW
LO2	test, evaluation of students' reports and written tests	L, SW
LO3	test, evaluation of students' reports and written tests	L, SW
LO4	test, evaluation of students' reports and written tests	L, SW

Student workload (in hours)		**No. of hours**
Calculation	lecture attendance	15
	preparation for workshops	10
	participation in workshops	15
	work on reports from workshop classes and/or work on home	7

<table>
<tr><th colspan="4">Faculty of Electrical Engineering</th></tr>
<tr><td rowspan="4"></td><td colspan="2">assignments</td><td></td></tr>
<tr><td colspan="2">participation in student-teacher sessions related to lectures and workshops</td><td>3</td></tr>
<tr><td colspan="2">preparation for and attendance at the final test from lectures</td><td>10</td></tr>
<tr><td colspan="2">TOTAL:</td><td>60</td></tr>
<tr><td colspan="3">Quantative indicators</td><td>Hours</td><td>No. of ECTS credits</td></tr>
<tr><td colspan="3">Student workload – activities that require direct teacher participation</td><td>30</td><td>1.0</td></tr>
<tr><td colspan="3">Student workload – practical activities</td><td>32</td><td>1.5</td></tr>
<tr><td>Basic references</td><td colspan="4">1. Lehner G.: Electromagnetic field theory for engineers and physicists. Springer, New York 2010.
2. Brandao Faria J. A.: Electromagnetic foundations of electrical engineering. J. Wiley & Sons, Chichester 2008.
3. Griffiths D.: Introduction to Electrodynamics. Cambridge University Press, Cambridge 2017.
4. Guru B.S., Hiziroglu H.: Electromagnetic field theory fundamentals. Cambridge, 2009.
5. Orfanidis S. J.: Electromagnetic waves and antennas. Rudgers University, online version.</td></tr>
<tr><td>Supplementary references</td><td colspan="4">1. Morgenthaler F. R.: The power and beauty of electromagnetic fields. J. Wiley & Sons, Hoboken 2011.
2. Stratton J. A.: Electromagnetic theory. J. Wiley & Sons, New York 2007.
3. Bhag G. S., Hiziroglu H. R.: Electromagnetic field theory fundamentals.
4. Morgenthaler F.R.: The power and beauty of electromagnetic fields. J. Wiley & Sons, 2011.</td></tr>
<tr><td>Organisational unit conducting the course</td><td colspan="3">Department of Electrotechnics, Power Electronics and Power Engineering</td><td>Date of issuing the programme</td></tr>
<tr><td>Author of the programme</td><td colspan="3">Boguslaw Butrylo, D.Sc., Ph.D., Assoc. Prof.</td><td>2023-02-05</td></tr>
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