

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Electromagnetic compatibility</b>		Code <b>1010311471010322623</b>
Field of study <b>Power Engineering</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>4 / 7</b>
Elective path/specialty <b>Sustainable Development of Power</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>elective</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>-</b> Laboratory: <b>-</b> Project/seminars: <b>15</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Karol Bednarek email: karol.bednarek@put.poznan.pl tel. 616652659 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge of physics, electrical engineering, electronics and electromagnetism.
2	<b>Skills</b>	Knowledge of laws and physical and electrical phenomena. Linking physical phenomena with the principles of functioning of electrical devices and their technical parameters.
3	<b>Social competencies</b>	Ability to work in a team, care for raising their own competencies. Awareness of the importance and need for proper use of electrical, electronic and IT components and devices in the work of an engineer.
<b>Assumptions and objectives of the course:</b> Mastering knowledge related to the fundamental problems of electromagnetic compatibility and methods of elimination of electromagnetic interference.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. It has a structured knowledge of the theory of electrical, electronic and power electronics circuits and in the theory of signals and their processing methods. - [K_W17+]		
2. It has a structured, theoretically developed knowledge of programming techniques and simulation of phenomena in energy systems. - [K_W10+]		
3. He has basic knowledge in the field of energy equipment diagnostics, security techniques, knows and understands methods of measuring basic values characterizing electrical and mechanical devices and systems of different types, knows the calculation methods and IT tools needed to analyze the results of experiments. - [K_W19+]		
<b>Skills:</b>		
1. He can develop documentation for the engineering task and prepare a text that discusses the results of this task. - [K_U03+]		
2. He can use known mathematical methods and models, as well as computer simulations to analyze and evaluate the behavior of energy components and systems. - [K_U07+]		
3. He applies the principles of occupational safety and health, can assess the impact of energy on the environment - [K_U17+]		
<b>Social competencies:</b>		
1. Understand the need and know the possibilities of continuing education (second and third degree studies, postgraduate studies, courses) - raising professional, personal and social competences. - [K_K01++]		

<b>Assessment methods of study outcomes</b>		
Assessment of knowledge and skills demonstrated during the problematic, written or oral assessment; evaluation of the project.		
<b>Course description</b>		
<p>General electromagnetic compatibility (EMC) issues, basic definitions and units. Basic concepts of electromagnetism and signal analysis. Mechanisms of spreading disorders and their effects on devices and systems. Sources, classification and parameters of electromagnetic disturbances. Identification and methods of reducing the impact of disturbances. Impact of electromagnetic field on technical and biological environment.</p> <p>Update 2017:</p> <p>Applied methods of education:</p> <p>lecture - lecture with multimedia presentation (including: drawings, photographs, animations, sound, films) supplemented with examples given on the board; Presenting a new topic preceded by a reminder of related content, known to students from other subjects; taking into account various aspects of the issues presented, including: economic, environmental, legal, social, etc. ;</p> <p>project - analysis / discussion of various aspects of solving problems, including: economic, ecological, legal, social, etc.</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>Charoy A., Zakłócenia w urządzeniach elektronicznych. Zasady i porady instalacyjne, cz. 1-4, z serii: Kompatybilność elektromagnetyczna, WNT, Warszawa 1999-2000</li> <li>Machczyński W., Wprowadzenie do kompatybilności elektromagnetycznej, Wydawnictwo Politechniki Poznańskiej, Poznań 2010</li> <li>Clayton R. P., Introduction to electromagnetic compatibility, Wiley - Interscience, John Wiley &amp; Sons Inc., New Jersey, 2006</li> <li>Alfa-Weka: Praktyczny poradnik. Certyfikat CE w zakresie kompatybilności elektromagnetycznej. Normy i zasady bezpieczeństwa w elektrotechnice. Tom 1-3, Alfa-Weka, Warszawa 1998-2001</li> <li>Więckowski T. W., Pomiary emisyjności urządzeń elektrycznych i elektronicznych, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 1997</li> <li>Kurdziel R., Podstawy elektrotechniki, WNT, Warszawa 1973</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>Krakowski M., Elektrotechnika teoretyczna, tom 1, Teoria obwodów, Tom 2, Pole elektromagnetyczne, PWN, Warszawa 1999</li> <li>Wiatr J., Miegoń M., Zasilacze UPS oraz baterie akumulatorów w układach zasilania gwarantowanego, seria Zeszyty dla elektryków - nr 4, DW MEDIUM, W-wa, 2008</li> <li>Markiewicz H., Bezpieczeństwo w elektroenergetyce, WNT, Warszawa 1999</li> <li>Bednarek K., Elektromagnetyczne oddziaływania i bilans energetyczny w sieci zasilającej w budynku banku, Przegląd Elektrotechniczny, 90 (2014), nr 12, 188-191</li> <li>Bednarek K., Kasprzyk L., Kształtowanie jakości energii i niezawodności w systemach zasilania elektrycznego, Przegląd Elektrotechniczny, 92 (2016), nr 12, 9-12</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. participation in class lectures	15	
2. participate in the consultations on the lecture	4	
3. preparation for the colloquium lecture falling under	10	
4. participate in project activities	15	
5. participate in the consultations on the project	4	
6. project realization and preparation for its deduction	21	
7. participation in project evaluation	4	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	73	3
Contact hours	42	2
Practical activities	40	1