

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Electrical installations</b>		Code <b>1010311371010311941</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 7</b>
Elective path/specialty <b>Distribution Devices and Electrical</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</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>15</b> Project/seminars: <b>15</b>		No. of credits <b>5</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art		ECTS distribution (number and %)
<b>Responsible for subject / lecturer:</b>		
prof. dr hab. Aniela Kamińska-Benmechernene, prof. nadzw. email: anIELa.kaminska@put.poznan.pl tel. 61 665 26 67 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge on electrical engineering, mathematics, physics, electrical metrology, electrical devices and its safety using, ergonomics.
2	<b>Skills</b>	Able to perform mathematical analysis of simple electrical circuits and read electrical wiring schemes.
3	<b>Social competencies</b>	A sense of the need to broaden the competence and willingness to work together in a team.
<b>Assumptions and objectives of the course:</b>		
Knowledge of electrical installation operation, rules of designing and realization. Purchase of skills to design electrical installation: calculation, feeder selection and protection, protection of humane beings, overvoltage and overcurrent protection, protection coordination, drawing installation schemes. Experiment planning, selection of measurement instrument, realization of test set-up, researches performing and results analyzing.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Knows the rules of operation and realization of electrical installation and the phenomena occurring in these installations. - [K_W04 +++, K_W08 +++, K_W19+++] 2. Knows the rules of feeder selection and protection, protection of humane beings, overvoltage and overcurrent protection, protection coordination. - [K_W04 +++, K_W08 +++]		
<b>Skills:</b>		
1. Able to perform the drawing of electrical installation schemes and calculation for feeder selection and protection and selection of apparatuses. - [K_U17+++ , K_U11 +++] 2. Able to perform estimation of hazard assessment occurring in electrical installation and select the methods and measures of their elimination. - [K_U11+++ , K_U21 +++] 3. Able to plan experiment, measurement instrument select, test set-up realize, perform researches and analyze results. - [K_U02+++ , K_U14+++ , K_U15+++]		
<b>Social competencies:</b>		
1. A sense of need for consultation between specialists of various industries realizing buildings, in which the electrical installations are the part of building. - [K_K03+++] 2. Able to work in team developing complex electrical installation. - [K_K02 +++, K_K03 +++]		

<b>Assessment methods of study outcomes</b>	
<p>Lecture:                      Assessment of:                      - analyze the phenomena and processes occurring in electrical devices and installation,                      - knowledge and understanding of electrical schemes, rules and conditions for selection of installation apparatus.</p> <p>Design exercises:                      Skills assessment of:                      - installation schemes developing,                      - calculation performing and apparatus selection.                      - estimation of dangers in electrical installation and select the methods and measures of their elimination.</p> <p>Laboratory exercises:                      Skills assessment of:                      - experiment planning,                      - experimental set-up and devices selection,                      - experiment carry out and the analyzing of results using modern methods and software,                      - measurement accuracy analysis.</p> <p>Getting extra points for the activity during seminar, and in particular for:                      - design of installation in which the specific conditions occur,                      - implementation of the extended experiment,                      - use of modern methods to describe measurement results.</p>	
<b>Course description</b>	
<p>Types of electrical installations in building. Installation systems in building: TN-C, TN-S, TT, IT. Installed power loads characteristics. Calculation of load current. Power loading of an installation. Distribution switchboard schemes. Distribution conductors in building. Calculation of short-circuit current. Switching of short-circuit current by Modular Circuit Breakers (MCB) and fuses, let-through energy. Feeder selection due to load current, voltage drop, heating by short-circuit current (let-through energy) and condition of automatic disconnection of the supply. Protection selection and coordination. Selective breaker ? principle of functioning, voltage and current waveforms during circuits switching. Overvoltage protection.</p> <p>Update 2017: electrical installation design procedure</p> <p>Applied methods of education: lectures with multimedia presentation, interactive lecture with questions to student group and initiation of discussion</p>	
<p><b>Basic bibliography:</b></p> <ol style="list-style-type: none"> <li>1. H. Markiewicz, Instalacje elektryczne, Wydawnictwo Naukowo-Techniczne, Warszawa 2012</li> <li>2. A. Kamińska A, L. Muszyński, Z. Boruta, R. Radajewski, Nowoczesne techniki w projektowaniu energooszczędnych instalacji budynkowych w systemie KNX, POIG.02.02.00-00-018/08-00, Warszawa 2011 (przekazywane studentom nieodpłatnie)</li> <li>3. J. Wiatr, M. Orzechowski, Poradnik projektanta elektryka wydanie V rozszerzone, Dom wydawniczy Medium, Warszawa 2012</li> <li>4. Technical Guide ABB, Electrical Installation Handbook, Protection, control and electrical devices, 6th edition 2010</li> <li>5. Poradnik inżyniera elektryka według norm międzynarodowych IEC Schneider Electric, 2016 <a href="http://www.schneider-electric.pl/documents/poradnik_inzyniera_elektryka.pdf">www.schneider-electric.pl/documents/poradnik_inzyniera_elektryka.pdf</a></li> </ol>	
<p><b>Additional bibliography:</b></p> <ol style="list-style-type: none"> <li>1. PN-HD 60364-4-414. Instalacje elektryczne niskiego napięcia</li> <li>2. IEC 60364 Electrical Installations for Buildings</li> </ol>	
<b>Result of average student's workload</b>	
Activity	Time (working hours)

1. participation in the class lecture	9	
2. participation in the project activities	9	
3. participation in the laboratory exercises	9	
4. participation in the consulting on the lecture, the project and laboratory exercises	3	
5. preparation of installation design in selected building	20	
6. preparation to the laboratory exercises	4	
7. preparation of practical exercises report	16	
8. preparation to the written exam	18	
9. participation in the exam	2	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	90	3
Contact hours	32	1
Practical activities	34	2