

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Electric power protection automatics		Code 1010312331010311551
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
Elective path/specialty Power Networks and Electric Power System	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 3 100%
Responsible for subject / lecturer: prof. dr hab. inż. Józef Lorenc email: jozef.lorenc@put.poznan.pl tel. 61 6652279 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Has knowledge within the scope of fundamentals of electrical engineering, electrical power engineering, electrical metrology and informatics
2	Skills	Is able to carry out calculations of power network alone and to carry out basic measurements of electrical circuits using modern control-measuring apparatus
3	Social competencies	Has a consciousness of necessity to complete specialist knowledge and to carry out cooperation in group
Assumptions and objectives of the course: To acquire specialist knowledge in the range of the work of electric power protection. To acquaint with basic decision-measurement algorithms of modern devices EAZ. To acquaint with general principles of EAZ devices designing.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. 1. Has the basic knowledge about measuring systems in high voltage power substations and about making use of digital techniques in measurement signals processing and about modern devices [EAZ] constructing - [K_W05+, K_W11++]		
2. 2. Has knowledge about selecting devices and settings of protection and about computer methods of short circuits calculations and signal processing for the needs of protection - [-K_W11+, K_W22+++]		
Skills:		
1. Is able to analyze the conditions of work of electric power devices and to evaluate the risk of disruptions updating and broadening the knowledge in this range ? - [K_U09+]		
2. Is able to make use of specialized programs for computer aided calculations and making decision in the range of the work of network and electric power protection. - [K_U13 ++, K_U22 ++]		
Social competencies:		
1. Has a consciousness of social effects of proper use of electric power and negative results of it's shortage due to network and electric power system failure - [K_K02++]		
Assessment methods of study outcomes		
The evaluation of knowledge and competition proved in short written problem test, current evaluation during classes (rewarding activity and quality of perception)		
Course description		

Program substances of the module concern the knowledge in the range of automatics of electric power protection (EAZ). The role of eliminative, preventive and restitution automatics. Basic protection elements and protection systems of generators, lines, transformers and asynchronous engines. Measuring systems in electric power substations. Selectivity and sensitivity operation conditions and logic function while making a decision.

Basic bibliography:

1. Żydanowicz J. Elektroenergetyczna automatyka zabezpieczeniowa. WNT -Warszawa, tom I (1979), tom II (1985), tom III (1989)
2. Winkler W., Wiszniewski A. Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT ? Warszawa 1999
3. Lorenc J.: Admitancyjne zabezpieczenia ziemnozwarciowe. Wydawnictwo Politechniki Poznańskiej 2007 .
4. Zilouchian A., Jamshidi M.: Intelligent Control Systems Using Soft Computing Metho-dologies. CRC Press, 2001
5. Musierowicz K., Staszak B.: Technologie informatyczne w elektroenergetyce. Wydawnictwo Politechniki Poznańskiej 2010 .
6. Elaboration of report from laboratory exercises

Additional bibliography:

1. P. Kacejko, J. Machowski : Zwarcia w sieciach elektroenergetycznych, WNT, Warszawa, 2002r
2. P. Kundur : Power System Stability and Control , McGraw-Hill. Inc., 1993 .
3. Rosłowski E.: Cyfrowe przetwarzanie sygnałów w automatyce elektroenergetycznej. Akademicka Oficyna Wydawnicza EXIT, 2002

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Preparation for written test	10
3. Consultations in range of lecture	3
4. Participation in laboratory exercises	15
5. Preparation for laboratory exercises	10
6. Consultations in range of laboratory exercise	3
7. Elaboration of report from laboratory exercises	15

Student's workload

Source of workload	hours	ECTS
Total workload	71	3
Contact hours	36	2
Practical activities	53	1