

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Electric Power System Operation		Code 1010311361010316898
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
Elective path/specialty Electric Power Systems	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: 15 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 Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: dr inż. Ireneusz Grządzielski email: ireneusz.grzadzieski@put.poznan.pl tel. 61 665 2392 Faculty of Electrical Engineering ul. Piotrowo 3A, 60-965 Poznań		Responsible for subject / lecturer: dr inż. Bogdan Staszak email: bogdan.staszak@put.poznan.pl tel. 61 665 2635 Faculty of Electrical Engineering ul. Piotrowo 3A, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Possesses basic knowledge of the theory of electrical circuits, electrical machines, electric power engineering and electrical power generation
2	Skills	Has effective self-study ability in the domain of the chosen specialization, is able to integrate the knowledge acquired at the credited courses
3	Social competencies	Is aware of the need to develop his knowledge and competencies, is ready to undertake the cooperation and team work
Assumptions and objectives of the course: Getting knowledge of the electric power system operation under steady operating conditions, methods of simulation computations of the power flows in the HV and EHV meshed networks, market-based power flow optimization, practical use of the power flow computation program PLANS and DAKAR.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Has general knowledge of automatics and automatic control fundamentals - know the criteria and principles of selection power protection automation devices - [K_W22++] 2. Has knowledge of the electric power system fundamentals including structure and operation states of the electric power sectors: generation, transmission and distribution, knows basic rules of the operation and maintenance of the electric power system elements - [K_W24 +++] 3. Has knowledge of the electric power engineering development trends in the EU integrated electric power system as well as rules of its safe operation - [K_W25++]		
Skills: 1. Can elaborate the engineer task completion?s documentation and describe the task?s results - [K_U07++] 2. Can choose suitable technique and use measuring equipment (analog or digital) to measure the basic measurable magnitudes typical for engineering - [K_U14+] 3. Can properly use and maintain electrical devices according to the general requirements and technical docu - [K_U23+++]		
Social competencies: 1. Is aware of the weight and understands different aspects and effects of the electric engineer?s activities including those related to the environmental impact and regarding the responsibility for the undertaken decisions - [K_K02++]		

Assessment methods of study outcomes		
<p>Lectures and classes:</p> <ol style="list-style-type: none"> 1. Assessment of the knowledge and skills shown at the written and oral examinations , 2. Continuous assessment during courses (bonus for activity and perception quality). <p>Laboratory:</p> <ol style="list-style-type: none"> 1. Test of the knowledge necessary to deal with problems posed in the lab tasks. 2. Assessment of the knowledge and skills related to the lab task completion, 3. Assessment of the task report 		
Course description		
<p>Lectures and classes: Steady states in electric power system. Market-based optimization of the power system operation. Power flow calculations ? role of the node potential method. Application of the Gauss and Newton ? Raphson iteration technique to solve the non-linear node equations. Power flow optimization. Estimation of the power system conditions.</p> <p>Laboratory: involves experiments carried out using the power flow programs PLANS and DAKAR concerning topics presented in lectures.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Kremens Z. , Sobierajski M. : Analiza systemów elektroenergetycznych. WNT, Warszawa, 1996. 2. Kacejko P., Machowski J.: Zwarcia w systemach elektroenergetycznych. WNT, Warszawa, 2002 3. Poradnik Inżyniera Elektryka . t.3. WNT, Warszawa 2005 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Cegielski M.: Sieci i systemy elektroenergetyczne. PWN, Warszawa, 1979. 2. Kończykowski S., Bursztyński J.: Zwarcia w układach elektroenergetycznych. WNT, Warszawa, 1965. 		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in lecture courses and classes	30	
2. participation in labs	15	
3. participation in discussions related to lectures	10	
4. participation in discussions related to labs	10	
5. preparation to labs	7	
6. lab reports? elaboration	10	
7. preparation to examination	10	
8. taking an examination	3	
Student's workload		
Source of workload	hours	ECTS
Total workload	95	3
Contact hours	70	2
Practical activities	25	1