

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Electric power system operation		Code 1010311271010316898
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 4 / 7
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: 1 Classes: - Laboratory: - Project/seminars: 1		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: Dr inż. Ireneusz Grządzielski email: ireneusz.grzadzieski@put.poznan.pl tel. tel. 61 665 2635 (2392) Wydział Wydział Elektryczny 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, computations of the symmetrical and asymmetrical steady short-circuit conditions in the power system, practical use of the power flow computation program (PLANS) and short-circuit computation program (SCC) applied by the PSE Operator.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Has knowledge of the electric power devices - [K_W08++] 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 +++]		
Skills: 1. Can prepare and show a brief presentation concerning the electrical engineering-related task - [K_U08++] 2. Can compare different design solutions in the scope of basic problems of the electrical engineering domain regarding chosen technical and economic criterions - [K_U12+]		
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:</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: Transient states in the electric power system. 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. Calculations of the steady short-circuit conditions in the electric power system - non-symmetrical short-circuit analysis using symmetrical component method, models of the system elements for symmetrical components.</p> <p>Laboratory: involves experiments carried out using the power flow programs (PLANS) and short-circuit calculation programs (SCC) 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	15	
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	9	
6. lab reports	9	
7. preparation to examination	15	
8. taking an examination	3	
Student's workload		
Source of workload	hours	ECTS
Total workload	86	3
Contact hours	53	2
Practical activities	43	1