

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Transfer and distribution of electric energy</b>		Code <b>1010315421010313675</b>
Field of study <b>Power Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>10</b> Classes: <b>-</b> Laboratory: <b>5</b> Project/seminars: <b>-</b>		No. of credits <b>2</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>  dr hab. inż. Ryszard Frackowiak email: ryszard.frackowiak@put.poznan.pl tel. 61 665 2294 Faculty of Electrical Engineering Piotrowo 3A, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Possesses basic knowledge of the theory of electrical circuits, electromagnetic field, electrical machines, High voltage techniques, electric power engineering and electrical power generation
2	<b>Skills</b>	Has effective self-study ability in the domain of the chosen field of studies, is able to integrate the knowledge acquired at the credited courses
3	<b>Social competencies</b>	Is aware of the need to develop his knowledge and competencies, is ready to undertake the cooperation and team work
<b>Assumptions and objectives of the course:</b> Getting knowledge of the phenomena related to the electric power transmission and distribution, voltage regulation and reactive power compensation, power flow control in the electric power grid, practice in operation and use of the DAKAR program in the scope of the analysis of the power system steady operation conditions.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Has detailed knowledge of the rules of construction, modeling, designing, operation and maintenance of the electric power system elements, - [K_W04 ++] 2. Has ordered knowledge of the electric, electronic and power electronic circuits theory as well as of the signal theory and signal processing techniques - [K_W17++]		
<b>Skills:</b> 1. Can use acquired mathematical methods and models as well as the computer simulation to discuss and assess the operation of the electric power elements and systems - [K_U07 ++] 2. Can use properly chosen techniques and devices for measuring basic magnitudes describing power elements and systems - [K_U10++]		
<b>Social competencies:</b> 1. Understands the need and knows opportunities of the continuous studies (second and third cycle studies, post-diploma, courses) - improving professional skills, personal and social - [K_K01 ++]		
<b>Assessment methods of study outcomes</b>		

<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Assesment of the knowledge and skills shown at the written and oral examinations ,</li> <li>2. Continuous assessment during courses ( bonus for activity and perception quality).</li> </ol> <p>Laboratory:</p> <ol style="list-style-type: none"> <li>1. Test of the knowledge necessary to deal with problems posed in the lab tasks.</li> <li>2. Assessment of the knowledge and skills related to the lab task completion. Assessment of the task report.</li> </ol>		
<b>Course description</b>		
<p>Lectures: Voltage regulation in the transmission and distribution networks; transformers? regulation, reactive power compensation. Power flow control in the transmission and distribution networks, series compensation, phase-shifting transformers, series resonant circuits, series FACTS devices.</p> <p>Laboratory involves experiments carried out using the DAKAR program, in the scope of steady states in the transmission and distribution networks of the electric power system described during lectures</p> <p>Laboratory involves experiments concerning analysis of the phenomena which occur in the transmission and distribution networks under the normal and disturbed operating conditions using physical and digital models.</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Sz. Kujaszczyk (pod red.): Elektroenergetyczne układy przesyłowe, WNT, Warszawa 1997.</li> <li>2. J. Machowski: Regulacja i stabilność systemu elektroenergetycznego. OWPW, Warszawa 2007.</li> <li>3. Poradnik Inżyniera Elektryka . t.3. WNT, Warszawa 2005</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Z. Kremens, M. Sobierajski: Analiza systemów elektroenergetycznych. WNT, Warszawa, 1996.</li> <li>2. J.Machowski , J. Biątek , J. Bumby: Power System Dynamics: Stability and Control. IEEE Wiley, 2008.</li> </ol>		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. participation in lecture courses	10	
2. participation in labs	5	
3. participation in discussions related to lectures	5	
4. participation in discussions related to labs	5	
5. preparation to labs	10	
6. lab reports? elaboration	10	
7. preparation to examination	10	
8. taking an examination	3	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	58	2
Contact hours	28	1
Practical activities	30	1