

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Power Engineering in European Union and Energy Security</b>		Code <b>1010324371010314793</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>-</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>part-time</b>	
No. of hours Lecture: <b>8</b> Classes: <b>8</b> Laboratory: <b>-</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 <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>2 100%</b> <b>2 100%</b>
<b>Responsible for subject / lecturer:</b> Jerzy Andruszkiewicz email: jerzy.andruszkiewicz@put.poznan.pl tel. 61 665 2674 Electric Engineering Piotrowo 3A, 60-965 Poznań		<b>Responsible for subject / lecturer:</b> dr inż. Krzysztof Sroka email: krzysztof.sroka@put.poznan.pl tel. 61 665 22 75 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge of electricity, power systems, telecommunications and information technology, automation and economics
2	<b>Skills</b>	Knows the basic characteristics of the various types of energy sources and energy transmission technology to customers. Able to perform basic calculations concerning power flow in the circuits and networks.
3	<b>Social competencies</b>	Is aware of the need to expand his competences, presents willingness to work together as a team and aspires to improve the efficiency and safety of production processes and energy transmission.
<b>Assumptions and objectives of the course:</b> Understanding the European Union's strategy for energy supply, use of the environment, promotion of renewable energy and energy efficiency and the resulting actions taken in Poland. Knowledge about the measures undertaken to implement this strategy. Understanding the principles of development of the European energy market and existing energy supply security threats and possible countermeasures.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Is able to describe the new directions of development in the area of efficient and safe production and transmission/distribution of energy to consumers and the development of market relations in this area. - [K_W09++, K_W24+++] 2. Present EU energy strategy and its implementation at the national level in the aim to achieve sustainable development of the energy sector. - [K_W25+++]		
<b>Skills:</b>		
1. Is able to evaluate the applied technology of electricity and heat generation concerning the cost of production, market situation and environment conditions. - [K_U12++, K_U20+++] 2. Can investigate and propose the modifications of current approach for the development of energy sources and market systems for energy offering that meet the guidelines of the European Union - [K_U22++]		
<b>Social competencies:</b>		
1. Student can see the relationships in the areas of energy and the environment, and is aware of the importance of the effects of compliance with the common assumptions in the implementation of energy policy development in order to achieve the objectives of the Community. - [K_K02 ++, K_K03+]		

<b>Assessment methods of study outcomes</b>		
<p>Lectures:</p> <ul style="list-style-type: none"> <li>- evaluation of the knowledge and skills demonstrated in written tests concerning issues presented,</li> <li>- evaluation of the activity and quality of perception.</li> </ul> <p>Classes:</p> <ul style="list-style-type: none"> <li>- results of test favoring the utilization of the acquired knowledge to solve problems in the area of the subject.</li> </ul>		
<b>Course description</b>		
<p>Fuel resources and modern energy generation and transmission technologies. The costs of generating electricity and heat, taking into account the impact on the environment (CO<sub>2</sub>, SO<sub>2</sub>). EU sustainable energy policy to reduce emissions, promote renewable energy and energy efficiency. Diversification of energy sources including different generation technologies. Regulations on the energy markets. Risks for security of energy supply characteristic for different energy sources and the methods for the evaluation and limitation of their values. Power system failures as a feature of large complex systems. The basic principles for the defence and reconstruction of energy supply from power systems during states of emergency and disaster. Methods for granting the local security of energy supply by stand by power resources. Subject of classroom exercises consistent with the lectures.</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. M. Kaczmarski, Bezpieczeństwo energetyczne Unii Europejskiej. Wydawnictwo Akademickie i Profesjonalne. 2010.</li> <li>2. G.Bartodziej, M.Tomaszewski, Polityka energetyczna i bezpieczeństwo energetyczne, Wydawnictwo Federacji Stowarzyszeń Naukowo-Technicznych Energetyka i Środowisko, Warszawa, 2009.</li> <li>3. Jednolity rynek energii elektrycznej w Unii Europejskiej w kontekście bezpieczeństwa energetycznego Polski. Agnieszka Pach-Gurgul, Difin 2012, ISBN: 978-83-7641-717-2</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Praca zbiorowa :Safety of the Polish Power System. Demence and Restoration Plans, Electrical Engineering Issue 57, Published by Poznan University of Technology, Poznań, 2008.</li> <li>2. J.Machowski: Regulacja i stabilność systemu elektroenergetycznego, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2007.</li> <li>3. J. Paska : Ekonomika w elektroenergetyce, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2007.</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in courses and classes	16	
2. Preparation for examination	21	
3. Consultations concerning lectures and classes	3	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	40	2
Contact hours	19	1
Practical activities	0	0