

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Generation of electric energy		Code 1010315341010311584
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 4
Elective path/specialty Electric Power Systems	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time,part-time) part-time	
No. of hours Lecture: 9 Classes: - Laboratory: 9 Project/seminars: 9		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: Radosław Szczerbowski email: radoslaw.szczerbowski@put.poznan.pl tel. 61 665 20 30 Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	It has a basic knowledge of the basics of energy conversion and energy machine and equipment. He knows the basics of electrical engineering and power engineering.
2	Skills	Understand the basic principles of operation of the machines and know the basic construction of conventional energy equipment.
3	Social competencies	Is aware of the need to expand their skills and readiness to work together as a team.
Assumptions and objectives of the course: Obtaining skills in the knowledge of methods of generating electricity in power plants and knowledge of the principles of the use of different types of primary energy to produce electricity.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Student knows the primary form of energy available in nature and presents the possibility of their use in the energy sector. Able to classify and evaluate the types of power plants. Able to identify and assess the impact of generation sources on the environment - [K_W05++]		
2. Student has an extended knowledge of the structure and operation of various types of power plants and their role in the power system - [K_W16+++]		
Skills:		
1. Able to use mathematical methods to energy analysis of technological systems of power plants. - [K_U06++]		
2. Can design a basic technological systems of power plant and CHP power plants, and evaluate them in terms of the efficiency of electricity and heat - [K_U19++]		
Social competencies:		
1. Understand the complexity of many aspects of electrical engineering and can present them in an understandable way - [K_K02+++]		
Assessment methods of study outcomes		

<p>Written exam - problem questions. The project is classified on the basis of self-made design task. The laboratory is classified based on the reports of laboratory exercises and current responses of students.</p>		
Course description		
<p>Lecture: Characteristic of national power plants. Influence of diurnal variation on the work load power plants. Generation of electricity in thermal power plants. Methods of improve the efficiency of steam power plants. Gas and combined gas-steam power plants. Combined heat and power. Use of nuclear energy for producing electricity. Types of nuclear reactors used in nuclear power plants. The use of water power to generate electricity. Types of hydroelectric power plants and their role in the power system. Principles for the use of wind energy. Power plants and wind farms. The use of solar energy. Photovoltaics. Methods of use of geothermal energy. Electricity generation using fuel cells. Distributed generation and its impact on power system operation. The influence of the environment and methods of its reduction. Laboratory and design: theme and design laboratory corresponds to the lectures.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> Chmielniak T., Technologie energetyczne, Wydawnictwo Politechniki Śląskiej, 2004. Nehrebecki L., Elektrownie ciepłone, WNT, 1974. Laudyn D., Pawlik M., Strzelczyk F., Elektrownie, WNT, 1990. Paska J., Wytwarzanie rozproszone energii elektrycznej i ciepła. Oficyna Wydawnicza Politechniki Warszawskiej. 2010. Marecki J.: Podstawy przemian energetycznych. WNT, Warszawa 2007 Kotowicz J., Elektrownie gazowo-parowe, Kaprint, 2008 		
Additional bibliography:		
<ol style="list-style-type: none"> Skorek J., Kalina J., Gazowe układy kogeneracyjne, WNT, 2005. Bartnik R., Elektrownie i elektrociepłownie gazowo-parowe. Efektywność energetyczna i ekonomiczna, WNT, 2009. Szargut J., Ziębik A., Skojarzone wytwarzanie ciepła i elektryczności ? elektrociepłownie, Wydawnictwo Pracowni Komputerowej Jacka Skalmierskiego, 2007. Kowalska A., Wilczyński A., Źródła rozproszone w systemie elektroenergetycznym. Kaprint. 2007. Miller A., Maszyny i urządzenia ciepłone i energetyczne. WSiP. 1994. 		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in lectures	9	
2. exam preparation	10	
3. presence on the exam	3	
4. the consultation of lectures	2	
5. participation in laboratory	9	
6. preparation to laboratory exercises	5	
7. development of laboratory reports	10	
8. the consultation of the laboratory	2	
9. participation in project activities	9	
10. participating in consultations for the design	2	
11. independent execution of the project	15	
Student's workload		
Source of workload	hours	ECTS
Total workload	76	3
Contact hours	36	1
Practical activities	52	2