

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Generation of electric energy		Code 1010311361010311584
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: 30 Classes: 15 Laboratory: 15 Project/seminars: 15		No. of credits 5
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 %) 5 100%
Responsible for subject / lecturer: dr inż. Robert Wróblewski email: robert.wróblewski@put.poznan.pl tel. 61 665 2523 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	It has the basic knowledge of technical thermodynamics, the fundamentals of energetic transformations and the construction and operation of machinery and energy equipment. He knows the basics of electrical engineering and electrical engineering
2	Skills	Ability to effectively self-study in a field related to a chosen field of study
3	Social competencies	He is aware of the need to expand his competencies, readiness to cooperate within the team
Assumptions and objectives of the course: - recognition of electricity generation technologies in different types of power plants - recognition of the construction of basic equipment of electricity production systems in various types of power plants		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. He has basic knowledge of renewable energy sources, including wind energy, water, solar, biomass and geothermal energy. He has a basic knowledge of the phenomena and processes involved in the conversion of renewable energy into electricity and the equipment that implements these transformations. - [K_W09 +++] 2. He has basic knowledge about electromagnetic transformations occurring in electrical engineering - [K_W16 ++]		
Skills: 1. He can plan and carry out measurements of the basic characteristics of power machinery; He can present the results in numerical and graphical form, interpret them and draw proper conclusions - [K_U02 ++] 2. He is able to analyze the operation of simple electrical systems and devices using appropriate methods and tools - [K_U11 ++]		
Social competencies: 1. He is aware of the importance and understanding of the various aspects and effects of the electrical engineer's business, including the environmental impact and the resulting responsibility for the decisions made - [K_K02 ++]		
Assessment methods of study outcomes		

<p>Lecture: - assessment of knowledge and skills demonstrated on a problem-oriented written exam, Continuous assessment of each activity (rewarding activity and quality of perception). Design: - is calculated on the basis of the self-assessment of the design task Laboratory exercises: - checking and rewarding the knowledge needed to solve problems in a given area of ??laboratory tasks, - assessment of knowledge and skills related to the exercise task, assessment of the exercise report.</p> <p>Obtaining extra points for activity during classes, especially for: - proposing to discuss additional aspects of the issue; - the effectiveness of the use of acquired knowledge when solving a given problem; - ability to cooperate within a team practically performing a detailed task in a laboratory; - comments related to the improvement of didactic materials; - the aesthetic diligence of the reports and tasks developed? within the framework of self-study.</p>	
Course description	
<p>Characteristics of electric power generation in Poland, European Union and in the world. Construction and principle of operation of the basic equipment of the steam power plant: boiler, turbine, carburizing system, condenser, heat exchangers, degasser, pumps, fans. Hydroelectric power plants. Steam, gas and steam and gas power stations. Distributed power sources. Topics of the classes and laboratory classes correspond to the contents of the lectures. Zastosowane metody kształcenia: wykład z prezentacją multimedialną (w tym: rysunki, zdjęcia, filmy) uzupełniany przykładami podawanymi na tablicy, wykład prowadzony w sposób interaktywny z formułowaniem pytań do grupy studentów lub do wskazywanych konkretnych studentów, laboratorium ? praca w zespołach, szczegółowe recenzowanie sprawozdań przez prowadzącego laboratoria i dyskusje nad komentarzami</p>	
<p>Basic bibliography: 1. Elektrownie, M. Pawlik, F. Strzelczyk, WNT W-wa 2016 2. Proekologiczne odnawialne źródła energii Kompendium, Ewa Klugmann-Radziemska, Lewandowski Witold M. Wydawnictwo Naukowe PWN 2017 3. Gazowe układy kogeneracyjne, J. Skorek, J. Kalina, WNT, 2005 4. Technologie energetyczne, T. J.Chmielniak, WNT, 2015</p>	
<p>Additional bibliography: 1. Maszyny i urządzenia energetyczne, W. Szuman, WSiP W-wa 1985 2. Układy i urządzenia potrzeb własnych, M. Pawlik, J. Skierski, WNT W-wa 1986 3. Kotły parowe. Konstrukcja i obliczenia, P. Orłowski, W. Dobrzański, E. Szwarz, WNT W-wa 1979 4. Turbiny cieplne. Zagadnienia termodynamiczne i przepływowe, E. Tuliszka WNT W-wa 1973. 5. Wytwarzanie rozproszone energii elektrycznej i ciepła, J. Paska, Oficyna Wydawnicza Politechniki Warszawskiej. 2010 6. Turbiny cieplne. Podstawy teoretyczne, T. J. Chmielniak, Wydawnictwo Politechniki Śląskiej, 1998 7. Wytwarzanie i użytkowanie energii w przemyśle, J. Górzyński, K. Urbaniec, Oficyna Wydawnicza Politechniki Warszawskiej, 2000</p>	
Result of average student's workload	
Activity	Time (working hours)
1. lecture	30
2. preparation for the exam	20
3. exam	2
4. attend lectures	10
5. laboratories	15
6. preparation for laboratory exercises	15
7. preparation of laboratory reports	4
8. Participate in laboratory consultations	5
9. participate in the exercise classes	15
10. participate in exercise consultations	5
11. preparation to pass the exercises	10
Student's workload	

Source of workload	hours	ECTS
Total workload	131	5
Contact hours	82	2
Practical activities	54	3