

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Renewable energy sources		Code 101032135101032282
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 5
Elective path/specialty -	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: 15 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 2
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 %) 2 100% 2 100%
Responsible for subject / lecturer: dr inż. Grzegorz Trzmiel email: Grzegorz.Trzmiel@put.poznan.pl tel. 616652693 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of physics, electrical engineering and mathematics (on a general level).
2	Skills	The ability to effectively self-education in a field related to the chosen field of study.
3	Social competencies	The awareness of the need to expand their competence, their willingness to cooperate within the team.
Assumptions and objectives of the course: 1. To acquaint students with the structure, principles of operation and application possibilities of renewable energy: photovoltaic, wind energy and water. 2. Reason the need to replace conventional sources for renewable, due to the depletion of the former and growing environmental pollution. 3. Presentation of new opportunities in the field of sourcing electricity.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. has ordered and theoretically founded knowledge in the field of renewable energy sources, he knows and understands the phenomena and processes that allow for the conversion of energy from RES in electricity - [K_W09+++] 2. orients itself in the current state of development of renewable energy sources and prospective trends in Poland and in the world - [K_W18++]		
Skills: 1. can obtain information from the literature, databases and other sources, analyze it and interpret, draw conclusions, justify opinions - [K_U05++] 2. can work independently and in a team, use a properly chosen methods and devices in terms of performance and electrical characteristics, interpret the results, draw conclusions - [K_U14++, K_U15++]		
Social competencies: 1. can work individually and together in a group - [K_K03++] 2. is aware of the the importance and understanding of the non-technical aspects and impact of engineering activities, including its impact on environment and associated with this responsibility for decisions - [K_K02++]		

Assessment methods of study outcomes		
<p>Lecture:</p> <ul style="list-style-type: none"> - Assess the knowledge and skills shown on the written test. <p>Laboratory:</p> <ul style="list-style-type: none"> - Test and rewarding knowledge necessary to carry out the problems in the area of laboratory tasks. - Continuous assessment for each course, rewarding the increase in the ability to use principles and methods have met. - Assess the knowledge and skills of the tasks exercises +, the evaluation report on executed exercise. <p>Get extra points for activity in the classroom and in particular for:</p> <ul style="list-style-type: none"> - Proposing to discuss additional aspects of the subject, - The effectiveness of applying knowledge when solving a given problem, - Ability to work within a team performing specific tasks in the laboratory, - Comments relating to the improvement of teaching materials, - Aesthetic diligence reports and tasks of the self-study. 		
Course description		
<p>Reason the need for renewable energy sources. Legal conditions. Characteristics of renewable energy sources. Characteristics of devices that enable the conversion of energy from RES: photovoltaics, wind energy and water. The costs of generation, transmission and distribution of electricity. RES impact on the environment. Estimating the energy yield. Application possibilities in various fields. Advantages, disadvantages, limitations of such solutions.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Jastrzębska G., Odnawialne źródła energii i pojazdy proekologiczne, WNT, Warszawa 2009. 2. Jastrzębska G., Ogniwa słoneczne. Budowa, technologia i zastosowanie, Wydawnictwa Komunikacji i Łączności, Warszawa, 2013 3. Wolańczyk F., Elektrownie wiatrowe, Wydawnictwo KaBe, Krosno, 2009. 4. Lewandowski W., Proekologiczne źródła energii odnawialnej, WNT, Warszawa 2012. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Ciok Z., Ochrona środowiska w elektroenergetyce, PWN, Warszawa 2001. 2. Zimny J., Odnawialne źródła energii w budownictwie niskoenergetycznym, Wydawnictwa Naukowo-Techniczne, Kraków-Warszawa, 2010 3. Paska J., Wytwarzanie energii elektrycznej, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005. 4. Internet - the subject literature. 		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in class lecture	15	
2. participation in laboratory classes	15	
3. consultation on the lecture	3	
4. consultation on the laboratory	4	
5. preparation to pass	6	
6. pass	2	
7. preparation for laboratory exercises and prepare reports	10	
Student's workload		
Source of workload	hours	ECTS
Total workload	55	2
Contact hours	39	1
Practical activities	29	1