

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Unconventional energy sources		Code 1010325341010335680
Field of study Power Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 4
Elective path/specialty Ecological Sources of Electric Energy	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: 16 Classes: - Laboratory: 12 Project/seminars: 8		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 Technical sciences		ECTS distribution (number and %) 5 100% 5 100%
Responsible for subject / lecturer: Dr hab. inż. Grażyna Jastrzębska, Prof. nadzw. email: grazyna.jastrzebska@put.poznan.pl tel. 616652382 Elektryczny ul. Piotrowo 3a, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of renewable and unconventional sources.
2	Skills	Ability to effective self education related to the chosen field of study.
3	Social competencies	Is aware of the need to expand own competences. Willingness to work in a team.
Assumptions and objectives of the course: 1. Enlargement of the knowledge concerning the construction, technology and possible of application of renewable energy and unconventional sources. 2. Presentation of new possibilities in the field of going and storage of electrical energy 3. Introducing students to selected practical solutions of unconventional sources of energy in locality Poznań. 4. Enlargement of students teoretical and practical skills to solve problems in the field unconventional sources of energy projects.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Has an ordered and theoretically founded knowledge of renewable and non-conventional energy sources, both in the description and analysis of components and systems, phenomena taking place in these; mathematical and chemical description . - [K_W04+] 2. Has an ordered and theoretically founded knowledge, concerning unconventional energy sources and versed in the current state of review energy development and prospective trends in Poland and around the world. - [K_W18++]		
Skills: 1. Can use the known methods and mathematical models, modifying them if necessary, for the analysis and design of systems. - [K_U07+] 2. Can choose the method of calculation, use or implement the appropriate software to solve a specific problem concerning the new technological advancements. - [K_U08+]		
Social competencies: 1. Is able to think and act in a creative and entrepreneurial way, understands the need for public information and consultation on non-conventional energy sources. - [K_K01+]		

Assessment methods of study outcomes		
<p>Exam:</p> <ul style="list-style-type: none"> ? Evaluate the listed knowledge and skills on the written exam. ? Continuous evaluation (rewarding the activity and the quality perception during classes). <p>Lab. classes:</p> <ul style="list-style-type: none"> ? Test and rewarding of the knowledge necessary to carry out the fundamental problems in the area of laboratory tasks. ? Continuous evaluation (during each classe) rewarding the skills gained to use newly learned principles and methods. ? Evaluation of the knowledge and skills related to the laboratory task. Evaluation of the report of performed task. <p>Additional points for the activity, during classes, especially by:</p> <ul style="list-style-type: none"> ? promoting discussion on the additional aspects of the subject. ? effective use of the knowledge gained during solving the given task. ? willingness to work in a team to solve the lab tasks. ? comments/suggestions related to the improvement of the teaching materials. ? esthetic accuracy of the reports and tasks-as a part of own study. 		
Course description		
<p>1. Development and supplement of knowledge of renewable energy sources (course III/6) and unconventional energy sources (course IV/7), concerning the description and the analysis of elements of systems and phenomena present and mathematical and chemical formulation.</p> <p>2. Practical aspects of studied subjects for example of unconventional of energy sources, new solution of BIPV autonomously and hybrid systems in architecture and vehicles, energy saving solutions in architekture with unconventional of energy sources, connected of generation of electrical energy and heating found in Poznań and sanoundings e.g. BIPV, authonomous systems.</p> <p>3. Economical aspects, assembly and recycling.</p> <p>4. Multi-faceted design issues on the example of hybrid power supply for the detached house.</p>		
Basic bibliography:		
<p>1. Jastrzębska G. "Odnawialne źródła energii i pojazdy proekologiczne", WNT, 2007, 2009</p> <p>2. Lewandowski W. "Proekologiczne źródła energii odnawialnej", WNT 2005, 2010</p>		
Additional bibliography:		
<p>1. Chwieduk D. "Energetyka w budynku", Wydawnictwo Arkady, 2011</p> <p>2. Ciok Z. "Ochrona środowiska w elektroenergetyce", Wydawnictwo PWN 2001</p> <p>3. Duran S.C. "Ekologiczny dom", Wydawnictwo Arkady 2011</p> <p>4. Paska J. "Wytwarzanie energii elektrycznej", Oficyna Wydawnicza Politechniki Warszawskiej 2005</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in lectures	16	
2. participation in laboratory classes	12	
3. participation in projects	8	
4. participation in consulting (lectures)	8	
5. participation in consulting (project)	8	
6. participation in consulting (laboratory)	8	
7. preparation to test/exam	28	
8. test/exam	2	
9. preparation for the classes and preparation of the report	25	
10. preparation for the project	15	
Student's workload		
Source of workload	hours	ECTS
Total workload	130	5
Contact hours	62	2
Practical activities	76	3

