STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Renewable Energy Sources	**1010311441010326133**

Field of study	Profile of study (general academic, practical)	Year /Semester
Power Engineering	**(brak)**	**2 / 4**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **15** Classes: **-** Laboratory: **15** Project/seminars: **-**	**2**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**2 100%**
Technical sciences	**2 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of Physics and Mathematics.
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. Introduce students to the construction principles of operation and possible application of renewables.
2. Justification of the need of replacing the conventional energy sources with the renewables ones due to the depletion of the former and increasing environmental pollution.
3. Presenting of new possibilities of gaining the electric energy.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Ma podstawową wiedzę z zakresu odnawialnych źródeł energii, w tym energii wiatru, wody, Słońca, biomasy i geotermalnej. Zna i rozumie zjawiska, procesy i urządzenia pozwalające na konwersję energii ze źródeł odnawialnych w energię elektryczną i ciepło. - [K_W09+++]
2. Versed in the current state of review energy developmentand prospective trends in Poland and around the world. - [K_W20++]

Skills:

1. Is abble to aquire information from literature, databases and other sources, analyse it and interpret, chaw conclusions, justify opinions. - [K_U01++]
2. Is able to work alone and in a team, use a properly chosen methods and devices for electrical parameters and characteristics, interpret the results, draw conclusions. - [K_U02++, K_U10++]

Social competencies:

1. Is aware of the importance and understands the impact of non-technical aspects of engineer - [K_K02 ++]
2. Is aware of responsibility for the own work and ready to comply with the principles of teamwork and accountability of collaborative tasks. - [K_K04 ++]

Assessment methods of study outcomes

Lecture:
- Evaluate the listed knowledge and skills on the writtten exam.
- Continous evaluation (rewarding the activity and the quality perception during classes).

Lab. classes:
- Test and rewarding of the knowledge necessary to carry out the fundamental problems in the area of laboratory tasks.
- Continous 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.

Additional points for the activity, during classes, especially by:
-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

1. Justification of the need for the use of renewable energy sources.
2. Renewable energy sources characteristic.
3. Characteristic of the devices enabling the energy conversion - from renewable energy sources into electric energy.
4. Possible application in various fields.
5. Adventages, disadventages and limitations of presented solutions.
6. Global trends, potentates, main investments, economical aspects and "external" costs.
7. Advencement and possibilities in Poland.

Basic bibliography:

1. Jastrzębska G. "Odnawialne źródła energii i pojazdy proekologiczne", WNT, 2007, 2009
2. Lewandowski W. "Proekologiczne źródła energii odnawialnej", WNT 2005, 2010

Additional bibliography:

1. Ciok Z. "Ochrona środowiska w elektroenergetyce", PWN 2001
2. Paska J. "Wytwarzanie energii elektrycznej", Oficyna Wydawnicza Politechniki Warszawskiej 2005

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	15
2. participation in laboratory classes	15
3. participation in consulting (lecture)	3
4. participation in consulting (laboratory)	4
5. preparation to test/exam	10
6. test/exam	2
7. preparation for the classes and preparation of the report	6

Student's workload

Source of workload	hours	ECTS
Total workload	55	2
Contact hours	39	1
Practical activities	25	1