STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Renewable energy sources	**1010321251010322822**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**3 / 5**
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: **1** Classes: **-** Laboratory: **1** 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:

Dr hab. inż. Grażyna Jastrzębska, prof. nzw.
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Elektryczny
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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of Physicsand 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. has an ordered and theoretically founded knowledge, concerning renewable energy sources as well as, the devices inplementing these energy changes - [K_W09+++]
2. knows and understands the phenomena and processes allowing the conversion of energy from RES into electricity - [K_W18++]

Skills:

1. is abble to aquire information from literature, databases and other sources, analyse it and interpret, chaw conclusions, justify opinions - [K_U05++]
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_U14++, K_U15++]

Social competencies:

1. is aware of the importance and understands the beyond-technical aspects and effects of engineering activities including its impact on the environment and consequently the responsibility for these decisions - [K_K02++]
2. is able to work alone and in a team - [K_K03++]

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).

Laboratory 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

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

Basic bibliography:

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

Additional bibliography:

1. Ciok Z.: "Ochrona środowiska w elektroenergetyce", PWN, Warszawa 2001.
2. Paska J.: "Wytwarzanie energii elektrycznej", Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 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 in lectures	3
4. participation in consulting in laboratory classes	4
5. preparation to test/exam	6
6. test/exam	2
7. preparation for the classes and preparation of the report	10

Student's workload

Source of workload	hours	ECTS
Total workload	55	2
Contact hours	39	1
Practical activities	29	1