STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Power electronics converters in renevable energy sources	**1010325341010328932**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**2 / 4**
Elective path/specialty: **Microprocessor Control Systems in**	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	No. of credits
Lecture: **9** Classes: **-** Laboratory: **9** Project/seminars: **9**	**3**

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	**3 100%**
Technical sciences	**3 100%**

Responsible for subject / lecturer:

dr hab. inż. Ryszard Porada, prof. nadzw.
email: ryszard.porada@put.poznan.pl
tel. 48 61 665 2360
Wydział Elektryczny
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	It has basic knowledge from mathematics, physics, the electrotechnology, the electronics and the power electronics
2	**Skills**	It knows to apply the knowledge from the range of mathematics, physics, electrical engineering, electronics and power electronics
3	**Social competencies**	There has the consciousness of the necessity of extending of her competences, a readiness to collection of the cooperation within the framework of the group

Assumptions and objectives of the course:

The introduction with the operation, with properties, with characteristicses and methods of analysis and designings of alternative energy converter and special power electronics systems.

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

Knowledge:

1. to use the knowledge on the subject constructions and operations of power electronics systems and their uses in chosen branches of industry - [K_W12+++]

2. to characterize advanced criteria of the analysis and the synthesis for simple and complex power electronics systems - [K_W12 +++ K_W18 ++]

Skills:

1. to use the knowledge within the range constructions and mechanisms of action of elements and power electronics systems - [K_U03 ++ K_U06 +++]

2. to use known methods and mathematical models and computer simulations to the analysis and the evaluation of the operation of elements and advanced power electronics systems - [K_U06++ K_U12 ++]

Social competencies:

1. Has the consciousness of the importance and the understands different aspects and results of activity of electrician engineer in this of the influence on the medium, and related to this of the responsibility for undertaken decisions - [K_K01 ++]

Assessment methods of study outcomes

Lecture

? the credit of the lecture preceded with the credit of occupations laboratory exercises and project,

Designing work and laboratory exercises:

? the test and awarding the knowledge of need-to-know to realization of placed problems

in the given area of tasks,

? verification skills on every exercises

? evaluation of the knowledge and skills related to the realization of laboratory exercise, the evaluation of the report from done exercises.

Obtaining additional points for activity during exercises, in particular way for:

? proposing to discuss additional aspects of the subject

? effective use of knowledge obtained during solving of given problem;

? comments related to improve teaching material,

? aesthetics of solved problems and reports ? within homework.

Course description

The general functional diagram of the dispersed generation system with supplied from alternative energy converter; the task of power electronics. Alternative energy converters. Energy magazines in industrial power engineering and in the dispersed energetics. Basic methods of control of network converters AC/DC and DC/AC. The cooperation of power electronics systems with different types of electromechanical energy converters. Photovoltaic systems. Systems with fuel cells. Examples of current solutions and uses.

Basic bibliography:

1. Barlik R., Nowak M., Technika tyrystorowa, Wydawnictwa Naukowo-Techniczne, Warszawa 1997.

2. Frąckowiak L., Januszewski S., Energoelektronika. Cz. 1, Półprzewodnikowe przyrządy i moduły energoelektroniczne, Wydawnictwo Politechniki Poznańskiej, Poznań 2001.

3. Mikołajuk K., Podstawy analizy obwodów energoelektronicznych, Państwowe Wydawnictwo Naukowe, Warszawa 1998.

4. Mohan N., Undeland N., Robins W., Power Electronics, Jon Wiley & Sons Inc., New York 1999.

5. Tunia H., Smirnow A., Nowak M., Barlik R., Układy energoelektroniczne. Obliczanie, modelowanie, projektowanie, Wydawnictwa Naukowo-Techniczne, Warszawa 1982.

Additional bibliography:

1. Frąckowiak L., Energoelektronika. Cz. 2, Wydawnictwo Politechniki Poznańskiej, Poznań 2000.

2. Kaźmierkowski M., Krishnan R., Blaabjerg H., Control in Power Electronics, Academic Press, Amsterdam 2002.

3. Piróg S., Energoelektronika, Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH, Kraków 1998.

4. Strzelecki R., Supronowicz H., Współczynnik mocy w systemach zasilania prądu przemiennego i metody jego poprawy, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000.

Result of average student's workload

Activity	Time (working hours)
1. participation in the lectures	30
2. participation in the laboratory exercises	15
3. participation in consultations on the lecture	10
4. participation in consultations on the laboratory exercises	10
5. preparation for the laboratory exercises	15
6. reparation for the exam	20
7. preparation for the laboratory exercises pass	10
8. participation in the exam	5

Student’s workload

Source of workload	hours	ECTS
Total workload	110	3
Contact hours	70	2
Practical activities	15	1