COURSE DESCRIPTION CARD - SYLLABUS

Course name

Power electronics converters in renevable energy sources

Course

Field of study

Electrical Engineering

Year/Semester

2/3

Area of study (specialization)

Microprocessor Control Systems in Electrical Engineering

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

It has basic knowledge from mathematics, physics, the electrotechnology, the electronics and the power electronics

Course objective

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

Course-related learning outcomes

Knowledge

1. To use the knowledge on the subject constructions and operations of power electronics systems and their uses in chosen branches of industry

2. to characterize advanced criteria of the analysis and the synthesis for simple and complex power electronics systems

Skills

1. to use the knowledge within the range constructions and mechanisms of action of elements and power electronics systems

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

Social competences

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

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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.

Programme content

General functional diagram of a distributed generation system powered by alternative energy converters, the role of power electronics. Alternative energy converters. Energy storage in industrial power engineering and distributed energy. Basic methods of controlling AC / DC and DC / AC power converters. Cooperation of converter systems with various types of electromechanical energy

converters. Photovoltaic systems. Fuel cell systems. Non-optional systems based on PMSG generators with magnetic flux modulation. Examples of current solutions and applications.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board.

2. Laboratory exercises: multimedia presentation illustrated with examples given on the board and performance of tasks given by the teacher - practical exercises

Bibliography

Basic

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

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.

5. Gwóźdź M., Krystkowiak M., Szeląg W., Jedryczka C., Energy conversion system for wind and water turbines, 25th Symposium on Electromagnetic Phenomena in Nonlinear Circuits, Arras, France - June 26 - 29, 2018

6. Jedryczka C., Szelag W., Gwozdz M., Krystkowiak M., Analysis of electromagnetic phenomena in modulated flux synchronous generator, COMPEL - The international journal for computation and mathematics in electrical and electronic engineering, 2018, https://doi.org/10.1108/COMPEL-01-2018-0017.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	45	1,5

[1] delete or add other activities as appropriate