COURSE DESCRIPTION CARD - SYLLABUS

Course name
Power electronics and microprocessor technique

Course

Field of study
Energetics

Year/Semester
3/5

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	15	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Faculty of Automatic Control, Robotics and Electrical Engineering

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Responsible for the course/lecturer:
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Faculty of Automatic Control, Robotics and Electrical Engineering

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Prerequisites

Knowledge - Basic knowledge of electrical engineering and electronics.

Skills - The ability to effectively self-study in a field related to the chosen field of study; ability to make the right decisions when solving simple tasks and formulating problems in the field of widely understood electrical engineering.

Competences - The student is aware of expanding their competences, shows readiness to work

in a team, the ability to comply with the rules in force during lecture and laboratory classes.

Course objective

Understanding the properties and basic power electronic characteristics of semiconductor devices. Getting to know the construction, principle of operation and properties of power electronics converters used. Learning selected power theories.

Course-related learning outcomes

Knowledge

1. The student should have knowledge of the structure, operation and properties of power electronics used in selected industries.

2. The student should have knowledge about the impact of converter systems on the power grid and be familiar with selected methods to increase the efficiency of electricity conversion in these systems.

Skills

1. The student will be able to use knowledge in the field of construction and principles of operation of elements and basic power electronics systems.

2. The student will be able to propose an optimal solution for converting electricity depending on the assumed purpose function.

Social competences

1. The student understands the importance of knowledge in solving problems and raising professional, personal and social competences

2. The student is aware that in technology knowledge and skills quickly become obsolete

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated in the problem-solved written test,

- continuous assessment, rewarding activity and substantive content of the statement.

Programme content

Lecture:

Understanding the properties and basic power electronic characteristics of semiconductor devices. Familiarization with the construction, principle of operation and properties of: diode and thyristor rectifier systems, thyristor alternating voltage regulators, DC / DC pulse systems type BUCK and BOOST, independent voltage inverters, controlled power electronics controlled voltage and current sources, transistor rectifiers, power supplies with PFC function , active parallel compensation systems. Analysis of issues related to the impact of power electronic converters on the power supply network.

Teaching methods

Lectures - presentation of issues using multimedia, illustrated with examples given on the board, discussion of problem issues.

Bibliography

Basic

1. Frąckowiak L., Energoelektronika. Cz. 2, Wydawnictwo Politechniki Poznańskiej, Poznań 20002.

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

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

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

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

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

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

Additional

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	30	1,0

[1] delete or add other activities as appropriate