COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electronics and power electronics [N2Eltech2>EiE]

Course

Field of study
Electrical Engineering

Year/Semester
1/2

Area of study (specialization)
Drive Systems in Industry and Electromobility

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
20

Laboratory classes
20

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge - Basic knowledge in the field of electrical engineering, electronics and power 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

Getting to know the construction, principle of operation and properties of power electronics converters with improved energy indicators. Getting to know the control methods of selected converter systems. Familiarization with the structures and methods of controlling converters used in renewable energy systems

Course-related learning outcomes

Knowledge:
1. The student should have knowledge of the structure, operation and properties of modern power electronics systems 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 of increasing the efficiency of electricity conversion in these systems.

Skills:
1. Student will be able to use knowledge in the field of construction and operating principles of modern power electronics systems.
2. The student will be able to propose an optimal solution for converting electricity depending on the assumed function of the target.

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

Impact of converters on the power supply network. Improving the quality of converted energy. Issues related to closed control systems.

Course topics

Rectifier systems with active PFC based on BOOST pulse systems.Transistor rectifiers with improved quality of energy conversion. Rectifier power systems with current modulation in a DC circuit. Broadband controlled power electronics controlled current and voltage sources. Transistor AC voltage regulator. Battery charging systems. Backup power supply systems. Selected structures of converter systems dedicated to renewable energy sources systems.

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.
2. Krystkowiak M., Gulczyński A., AC/DC/AC Converter with Power Electronics Current Modulator Used in DC Circuit for Renewable Energy Systems, Studies in Systems Decision and Control Volume: 75 Pages: 317-326, 2017.

Breakdown of average student's workload

	Hours	ECTS
Total workload	107	4,00
Classes requiring direct contact with the teacher	42	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	65	2,50