COURSE DESCRIPTION CARD - SYLLABUS

Course name

Modern technologies for improving the quality of power supply

Course

Field of study

Energetics

Year/Semester

2/3

Area of study (specialization)

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Dr inż. Michał Krystkowiak

mail: Michal.Krystkowiak@put.poznan.pl

tel.: 616652388

Faculty of Automatic Control, Robotics and
Electrical Engineering

ul. Piotrowo 3a, 60-965 Poznańń

Responsible for the course/lecturer:

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

Understanding the theoretical properties of advanced power electronics systems and their application in electrical power engineering, with particular emphasis on systems with improved quality indicators of transformed energy.

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 operating principles of power electronic systems used in power engineering.

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

Lecture:

General characteristics of power quality issues - goals and tasks. Selected issues of compatibility of electricity receivers. Traditional methods to improve power quality. Active and hybrid parallel and serial compensation. Methods for identifying compensated current and voltage components. Controllers of active compensation systems. Integrated UPFC power transmission controllers. Inter-system power transmission controllers IPFC. Systems of intelligent electricity supply systems. Rectifier power systems with a current modulator in a DC circuit. Uninterruptible power supplies UPS with the possibility of reactive power compensation and deformation.

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. Dmowski A.: Regulacja napięć przemiennych. Układy wybrane. WNT, Warszawa 1983.

3. Dmowski A.: Energoelektroniczne układy zasilania prądem stałym. WNT, Warszawa 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	40	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	20	1,0

[1] delete or add other activities as appropriate