COURSE DESCRIPTION CARD - SYLLABUS

Course name
Power Electronics [S1AiR1>PO3-Enel1]

Course

Field of study
Automatic Control and Robotics

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Dariusz Janiszewski
dariusz.janiszewski@put.poznan.pl

Lecturers

Prerequisites

Course objective

Understanding the basics of electronic components and systems with power electronics. Acquiring the ability to analyze complex and design simple electronic circuits.

Course-related learning outcomes

Knowledge
The student has a basic knowledge of the principles of measuring electrical quantities, knows and understands the methods of measuring electrical quantities, knows the calculation methods and IT tools necessary to analyze the results of the experiment. - [K1_W11 (P6S_WG)]
Skills
1. Student is able to use properly selected methods and measuring instruments and measure appropriate signals and on their basis determine the characteristics of electrical systems and obtain information about their essential properties. - [K1_U15 (P6S_UW)]
2. The student is able to develop the documentation and present a presentation of the results regarding the

implementation of the laboratory task. - [K1_U03 (P6S_UK)]
3. The student is able to work individually and in a team; he / she can estimate the time needed to complete the assigned task. - [K1_U02 (P6S_UO)]
Social competences
1. Student understands the non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions. - [K_K02 (P6S_KR)]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Final test, ongoing control of reports and activities during laboratory sessions.

Programme content

Introduction to transforming power using electronic circuits.
Power electronic elements, power electronics key theory.
Network chargers.
A simple controlled rectifier.
DC / DC voltage conversion:
- voltage converters,
- voltage boosters,
- reduction / boosting converters,
- complex multi-stage DC converters.
The idea of converting DC voltage into alternating voltage wave theory.
Single and multi-phase AC voltage converters.
Theory of modulation.
Applications of power electronics
- DC power supplies, including energy ones,
- industrial inverters.

Teaching methods

Lectures: multimedia presentations, blackboard examples
Laboratory: investigation on real and simulated setups

Bibliography

Basic
1. Ned Mohan, Tore M. Undeland, William P. Robins, POWER ELECTRONICS, Converters, Applications and Design, 3-rd edition, Wiley, 2003, 802 pp.
2. Adrian Ioinovici, Power Electronics and Energy Conversion Systems, Volume 1 Fundamentals and Hard-switching Converters, Wiley, 2013
3. M. P. Kazmierkowski, R. Krishnan and F. Blaabjerg (Eds), Control in Power Electronics , Academic Press - USA, 2002, (in English), Author of 4 Chapters 250 pages.
Additional
1. Leszek Frąckowiak, Energoelektronika, cz.2, wyd.5, WPP, Poznań 2003, 354s.
2. S. Januszewski, A. Pytlak, M. Rosnowska-Nowaczyk, H. Świątek, Energoelektronika, WSiP, Warszawa 2004, 296s.
3. Leszek Frąckowiak, Stefan Januszewski, Energoelektronika, cz. 1 ? Półprzewodnikowe przyrządy i moduły energoelektroniczne, WPP, Poznań2001, 166s.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00