Cracow University of Technology

Course syllabus

binding for the doctoral students of the CUT Doctoral School commencing their studies in the academic year 2022/2023

Information on the course

Name of the course in Polish	Jakość energii elektrycznej
Name of the course in English	Power Quality
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Elective
Field of education	Engineering and Technology
Discipline of education	Automatic Control, Electronics and Electrical Engineering
Person responsible for the course Contact	Andrzej Szromba, *doctor habilitatus* in Engineering, prof. of CUT andrzej.szromba@pk.edu.pl

Type of course, number of hours in the study programme curriculum

Semester	Credit type (G / NG)*	Lecture	Practical class	Laboratory	Computer laboratory	Project class	Seminar
2, 3, 4, 5	G	15	0	0	0	0	0

*G – graded credit, NG – non-graded credit

Course objectives

Code	Objective description
Objective 1	Introducing the doctoral students to the concepts of power theory as they relate to power quality, the causes of its degradation, and methods of maintaining or improving it.

Learning outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUT DS	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			
EUW1	The doctoral student knows and understands the concepts of circuit theory as they relate to power quality.	E_W01 E_W02	Involvement in class activities, final test
EUW2	The doctoral student knows and understands methods of maintaining or improving the quality of electricity.	E_W01 E_W02	Involvement in class activities, final test
OUTCOMES RELATED TO SKILLS			
EUU1	The doctoral student is able to justify the applicability of available methods for maintaining or improving power quality.	E_U01	Involvement in class activities, final test

OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The doctoral student is prepared to critically evaluate the means and methods of improving power quality presented in subject-related literature and is ready to emphasize the significance of knowledge in scientific research.	E_K01 E_K03	Discussion, involvement in class activities

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Non-sinusoidal and inactive waveforms in electrical circuits supplied by DC and single-phase AC sources, and their effect on power quality. Methods of compensating for inactive waveforms in power circuits.	EUW1, EUW2	5
W2	Non-sinusoidal and inactive waveforms in electrical circuits supplied by three-phase sources, and their effect on power quality. Methods of compensating for inactive waveforms in power circuits.	EUW1, EUW2	5
W3	A power electronic converter as a local power distribution centre.	EUW1, EUW2	4
W4	Final test.		1

The ECTS points statement

WORKING HOURS SETTLEMENT	
Type of activity	Average number of hours (45 min.) dedicated to the completion of an activity type
SCHEDULED CONTACT HOURS WITH THE ACADEMIC TEACHER	
Hours allotted in the syllabus	15
Consultations	1
Examination / course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF THE ACADEMIC TEACHER	
Independent study of the course contents	8
Preparation of a paper, report, project, presentation, discussion	4
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	Knowledge of the circuit theory course at the level of a Master’s degree in electrical engineering.

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	Successful completion of the final test or significant, substantive contribution in class.
METHOD OF THE FINAL GRADE CALCULATION	
The grade obtained on the oral or written final test or significant, substantive contribution in class.	

Additional information

None

The course reading list

1	Akagi H., Watanabe E., Aredes M., Instantaneous Power Theory and Applications to Power Conditioning, IEEE Press 2017
2	Piróg S., Współczynnik mocy w liniach zasilających trójfazowe nieliniowe odbiorniki asymetryczne i sposoby poprawy jego wartości, Wyd. AGH, Kraków 2021
3	Szromba A., Energoelektroniczny kompensator aktywny sterowany sygnałem konduktancyjnym, Wydawnictwo PK, Kraków 2016
4	Szromba A., The Unified Power Quality Conditioner control method based on the equivalent conductance signals of the compensated load, Energies vol. 13(23), 2020