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	Odnawialne Źródła Energii Elektrycznej
Name of the course in English	Renewable Sources of Electrical Energy
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	Tomasz Węgiel, *doctor habilitatus* in Engineering, prof. of CUT tomasz.wegiel@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	9	0	0	0	0	6

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

Course objectives

Code	Objective description
Objective 1	Introduction to the problems of construction, operation and performance characteristics of renewable energy sources (RES) used to generate electricity.
Objective 2	Presentation of methods of implementation of electricity generation in distributed systems using RES.

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 theoretical foundations related to the functioning of RES.	E_W01 E_W02	Attendance in class, written test
EUW2	The doctoral student knows and understands the operation of electricity generation systems using RES and the problems of energy storage.	E_W01 E_W02	Attendance in class, written test
OUTCOMES RELATED TO SKILLS			

EUU1	The doctoral student is able to propose the most beneficial solutions based on RES and to evaluate the problems of interaction between RES and existing classical solutions.	E_U01	Successful completion of the seminar
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The doctoral student is prepared to critically evaluate the RES presented in the literature and is aware of the importance of scientific research concerning new developments for RES.	E_K01 E_K03	Discussion

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Variable speed generation systems for turbines and generators	EUW1, EUW2	3
W2	Photovoltaic systems and energy storage	EUW1, EUW2	3
W3	Small Hydroelectric Power Plants	EUW1, EUW2	3
SEMINAR			
S1	Papers and discussions supplementing lecture content	EUW1, EUW2, EUU1, EUK1	6

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
Course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF THE ACADEMIC TEACHER	
Independent study of the course contents	6
Preparation of a paper, report, project, presentation, discussion	6
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	Knowledge of the fundamentals of electrical power engineering.

Course credit assignment conditions / method of the final grade calculation

No.	Description

COURSE CREDIT ASSIGNMENT CONDITIONS	
1	Attendance in class, passing the test on knowledge covered in the lecture, preparation of a paper for the seminar
METHOD OF THE FINAL GRADE CALCULATION	
The final grade is a weighted average of the grade on the test of knowledge covered in the lecture (weight 2) and the final grade in the seminar (weight 1)	

Additional information

None

The course reading list

1	Lewandowski W — Proekologiczne odnawialne źródła energii, Warszawa, 2007, WNT
2	Gumuła S. et al. — Odnawialne i niekonwencjonalne źródła energii, Warszawa, 2008, Tarbonus
3	Lubośny Z. — Elektrownie wiatrowe w systemie elektroenergetycznym, Warszawa, 2007, WNT