

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	Badania przebiegów okresowych nieliniowych urządzeń elektromagnetycznych
Name of the course in English	Research on periodic waveforms of nonlinear electromagnetic devices
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	Prof. Volodymyr Samoty, <i>doctor habilitatus</i> in Engineering vsamoty@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	6	0	0

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

Course objectives

Code	Objective description
Objective 1	Introduction to the problems related to the identification of nonlinear electromagnetic devices, rectifiers, voltage multipliers, inverters.
Objective 2	Presentation of the method of calculating the initial conditions for the research on periodic waveforms of nonlinear electromagnetic devices.

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 of the identification of nonlinear electromagnetic devices, rectifiers, voltage multipliers, inverters.	E_W01 E_W02	Attendance in class, written test
EUW2	The doctoral student knows and understands the methods of calculating the initial conditions for research on periodic waveforms of nonlinear electromagnetic devices.	E_W01 E_W02	Attendance in class, written test

OUTCOMES RELATED TO SKILLS			
EUU1	The doctoral student is able to take into account nonlinear phenomena in the identification of nonlinear electromagnetic devices.	E_U01	A computer laboratory report
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The doctoral student is prepared to critically evaluate the ways of taking into account nonlinear phenomena presented in subject-related literature and is ready to emphasise the significance of knowledge in scientific research.	E_K01 E_K03	Discussion

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Identification of nonlinear electromagnetic devices.	EUW1	3
W2	Identification of rectifiers, voltage multipliers, inverters.	EUW1	3
W3	The methods of calculating the initial conditions for research on periodic waveforms of nonlinear electromagnetic devices.	EUW2	3
COMPUTER LABORATORY			
Lk1	Transient modelling of nonlinear electromagnetic devices.	EUW1, EUU1, EUK1	2
Lk2	Transient modelling of rectifiers, voltage multipliers, inverters.	EUW1, EUU1, EUK1	2
Lk3	Research on periodic waveforms of nonlinear electromagnetic devices.	EUW2, EUU1, EUK1	2

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 fundamental laws related to the identification of nonlinear electromagnetic devices
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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, successful completion of the computer laboratory class
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 computer laboratory class (weight 1)	

Additional information

None

The course reading list

1	Bartman J., <i>Analiza napięć, prądów i mocy w układach z przebiegami odkształconymi okresowymi</i> , Wydawnictwo Uniwersytetu Rzeszowskiego, Rzeszów 2019
2	Wei, C., <i>Computational methods for electromagnetic phenomena: electrostatics in solvation, scattering, and electron transport</i> , Cambridge: <u>Cambridge Univ. Press</u> , 2013
3	Costa F., <i>Electromagnetic compatibility in power electronics</i> , Hoboken ; London: <u>ISTE: John Wiley & Sons</u> , 2014
4	Samoty V., <i>Modelowanie matematyczne wybranych nieliniowych urządzeń elektromagnetycznych oraz układów energoelektronicznych</i> , (pdf file)
5	Samoty V., <i>Modelowanie matematyczne wybranych nieliniowych urządzeń elektromagnetycznych oraz układów energoelektronicznych</i> , Czasopismo Techniczne, 1-E/2010, pp. 67-77