

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	Antropogeniczne emisje do atmosfery i ich środowiskowe efekty
Name of the course in English	Anthropogenic emissions to the atmosphere and their environmental effects
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Elective
Field of education	Engineering and Technology
Discipline of education	Chemical Engineering
Person responsible for the course Contact	Prof. Witold Żukowski, <i>doctus hab.</i> , DSc witold.zukowski@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
5	G	15	0	0	0	0	0

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

Course objectives

Code	Objective description
Objective 1	<p>The aim of the course is to acquaint doctoral students with the issue of human influence on the functioning of the natural environment, particularly on the condition of the atmosphere.</p> <p>The aim of the course is to acquaint doctoral students with selected solutions that can be implemented in order to reduce the anthropogenic emissions into the atmosphere; in particular, it concerns the possibility of reducing greenhouse gases emissions through individually undertaken actions based on the use of renewable energy sources.</p>
Objective 2	<p>The aim of the course is to acquaint doctoral students with selected measurement techniques for the quantitative determination of concentrations of chosen chemical compounds in gaseous mixtures that may be emitted into the atmosphere.</p>

Learning outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUT SD	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			

EUW1	The doctoral student knows the relationships between the way the atmosphere functions and its composition and understands the impact of anthropogenic emissions on environmental changes.	E_W01, E_W02, E_W03	A test
EUW2	The doctoral student knows the principles of operation of measuring devices for determining the concentrations of chemical substances that may be emitted into the atmosphere as a result of human activities, particularly those constituting a group of greenhouse gases.	E_W01, E_W02, E_W03	A test
OUTCOMES RELATED TO SKILLS			
EUU1	The doctoral student is able to apply the selected countermeasures and technical solutions to reduce the anthropogenic emission into the atmosphere, in particular that of greenhouse gases.	E_U01, E_U02	A test
EUU2	The doctoral student is able to apply advanced measurement techniques to determine the concentrations of chemical substances that may be emitted into the atmosphere as a result of human activities.	E_U01, E_U02	A test
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The doctoral student is prepared to recognise the importance of knowledge concerning the physical and chemical effects of chemical substances emitted into the atmosphere.	E_K01	A test

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Basic definitions. Emission and immission	EUW1, EUU1, EUK1	2
W2	Greenhouse gas emissions, carbon budget, possibilities of counteracting greenhouse gas emissions. Emissions from commercial power generation.	EUW1, EUU1, EUK1	2
W3	Low-emission energy sources. Photovoltaics	EUW1, EUU1, EUK1	2
W4	Customised solutions and emission reduction. Selection of installation; heating; transport.	EUW1, EUU1, EUK1	2
W5	Measuring systems used to determine the emissions of chemical substances into the atmosphere; measurements of volumetric gas flow rates.	EUW2, EUU2	2
W6	Measurement methods used to determine the chemical composition of gases emitted into the atmosphere.	EUW2, EUU2	2
W7	Measurement methods used to determine the chemical composition of gases emitted into the atmosphere.	EUW2, EUU2	2
W8	Measurement methods used to determine the chemical composition of gases emitted into the atmosphere	EUW2, EUU2	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	12
Preparation of a paper, report, project, presentation, discussion	0
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	None

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	A satisfactory test result.
METHOD OF THE FINAL GRADE CALCULATION	
A test result.	

Additional information

None

The course reading list

1	<i>Changing Climate, Changing Worlds</i> , Brian J. Burke, Anne Sourdri, Springer Nature Switzerland AG, 2021
2	<i>Air Pollution and Greenhouse Gases</i> , Ashrafizadeh, Seyed Ali; Tan, Zhongchao, Springer-Verlag GmbH, 2014