COURSE DESCRIPTION CARD - SYLLABUS

Course name
Environmental Engineering [S2EPiO1>OŚ]

Course

Field of study
Industrial and Renewable Energy Systems

Year/Semester
1/2

Area of study (specialization)
Thermal and Renewable Energy

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Student has basic knowledge of thermodynamics, mathematics and biology and knowledge about knowledge of the surrounding environment and the construction of power machines. Student should also have skills to solve engineering problems with the use of scientific methods and find relevant information in literature, on the Internet, in data bases, and in other sources.

Course objective

To acquaint students with the knowledge and analysis of the problems of environmental protection the gas fuel sector of the energy industry as well as in renewable energy industry.

Course-related learning outcomes

Knowledge:
has expanded knowledge about the development directions of energy technologies and renewable energy sources as well as new standards of environmental protection.
knows legal issues related to the design and use of energetic systems especially in field of environmental engineering technlologies.
knows the main development trends in the field of environmentally friendly energy technologies.

Skills:
is able to notice systemic and non-technical aspects, including ethical ones when formulating and solving engineering tasks in the field of industrial energy related to environment protection.
is able to critically analyze the functioning of existing technical solutions in the energy industry and evaluate these solutions in terms of environmental impact.
is able to lead a debate in the field of shaping knowledge on topics related to environmental protection.

Social competences:
is ready to recognize the importance of knowledge in solving cognitive and practical problems and to seek expert opinions in the event of difficulties in solving the problem yourself - [e2a_k1], [p7s_kk]
he is ready to fulfill social obligations, inspire and organize activities for the social environment.
he is ready to critically assess his knowledge and received content, also in terms of the impact of technology on the natural environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: Knowledge acquired during the lecture is verified during the final test carried. Each test consists of 5 questions (open). Passing threshold: 50% of points. Final issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.
Skills acquired as part of the laboratory classes will be verified basis on the final test, consisting of 10 tasks differently scored depending on their level of difficulty. Passing threshold: 50% of points.

Programme content

Lecture: Formation of toxic components and pollutants during combustion process, high efficiency and low emission combustion gas technology, alternative fuel gases, regulations on environmental protection, methods of destruction process of VOC, flameless combustion, primary and secondary methods of reduction of toxic compounds during the combustion processes, zonal volumetric combustion, emission from agriculture, local emission, preparing of environmental survey, economical and ecological impact of investment on environmental
Laboratory: analysis of fuel combustion in a kinetic and diffusion flame, calculations of equilibrium parameters of the combustion process, determination of laminar combustion speed, measurement of diffusion flame length, analysis of toxic compound distribution and temperature in a vortex flame,

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board
Laboratory: multimedia presentation and performance of tasks given by the teacher - practical exercises.

Bibliography

Basic
Molenda J. Steczko K. Ochrona środowiska w gazownictwie i użytkowaniu gazu
Józef Jarosiński: Techniki czystego spalania
Jerzy Merkisz, Ireneusz. Pielecha: Alternatywne paliwa i układy napędowe
Warych Jerzy: Oczyszczanie przemysłowych gazów odlotowych
Additional
John C. Mycock: Handbook of air pollution control engineering and technology
Hiroshi T., Gupta A.: High Temperature Air Combustion
Joachim G. Wunning: Handbook of Burner Technology for Industrial Furnaces

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	50	1,60
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,40