



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Environmental Engineering

Course

Field of study

Industrial and Renewable Energy

Area of study (specialization)

Gas technology and renewable ene

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

18

Tutorials

Laboratory classes

9

Projects/seminars

Other (e.g. online)

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Rafał Ślefarski

email: rafa.slefarski@put.poznan.pl

tel. 616652218

Faculty of Transport Engineering

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

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 technologies.

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:

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	2,0
Classes requiring direct contact with the teacher	35	1,2
Student's own work (literature studies, preparation for laboratories, development of laboratories, preparation for passing and exam, participation in consultations) ¹	25	0,8

¹ delete or add other activities as appropriate