COURSE DESCRIPTION CARD - SYLLABUS

Course name
Environmental engineering [S2ZE1E>OŚ]

Course

Field of study
Green Energy

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

Student has basic knowledge of thermodynamics, electrical engineering, 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 in energy industry as well as in renewable energy industry.

Course-related learning outcomes

Knowledge:
Knows the main directions of development of the energy industry, taking into account environmental norms and binding standards of emission of toxic compounds, and electric and magnetic fields.
The student is familiar with the negative impact of energy technologies, energy and electric power networks on the environment and knows methods of mitigating these effects.
The student knows main development trends in the field of environmentally friendly energy and electric

power technologies

Skills:
Is able to notice systemic and non-technical aspects, including ethical ones when formulating and solving engineering tasks in the field of electric power engineering, industrial and renewable 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.
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 - the written examination. The evaluation of student knowledge will be held based on an answers on 5 questions from the material presented during the lectures.

Programme content

Natural electric and magnetic field on Earth. Sources of artificial electric and magnetic field. The impact of electric and magnetic fields on people. Allowable value of electric and magnetic field. Methods of measuring electric and magnetic fields. Methods of reduction of electric and magnetic field.
The greenhouse effect and its consequences
Toxic emissions from the energy industry
Risks to the environment through the use of fossil fuels

Course topics

Geoelectric field, geomagnetic field, impulse field, cosmic radiation, division criteria, examples of field source devices, research methods, thermal effect, non-thermal effect, various ways of regulating limit values in the world, limit values in Poland, limit values in the world, power lines , distribution stations, mobile telephone relays, the use of multi-circuit and multi-voltage lines, appropriate phase configuration, the use of grounded conductors, the use of multi-phase and coaxial lines, the maximum reduction of the spacing between phase conductors, placing phase conductors high, the use of DC voltage lines instead of AC voltage, use of grounded items.
Atmospheric CO2 balance, main sources of greenhouse gas emissions, GHG indicators, methods of reducing the greenhouse effect,
Mechanisms of formation of toxic compounds such as nitrogen oxides, carbon oxides, higher hydrocarbons in machinery and energy equipment, primary and secondary technologies for the reduction of gaseous pollutants, environmental and human impacts of pollutants
Industrial and domestic sources of VOCs and methods of reducing them, characterisation of the main components of VOCs and their impact on human health.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board.

Bibliography

Basic:
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

Additional:

Synthesis gas combustion. Fundamentals and applications. Tim Lieuwen, Vigor Yang, Richard Yetter, CRC Press, 20096.R.S. Benson, N.D. Whitehouse: Internal Combustion Engines. Pergamon Press, 1979

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50