COURSE DESCRIPTION CARD - SYLLABUS

Course name
Renewable energy

Course

Field of study
Industrial and Renewable Energy
Area of study (specialization)

Level of study
Second-cycle studies
Form of study
full-time

Year/Semester
2/2
Profile of study
general academic
Course offered in
english
Requirements
compulsory

Number of hours

Lecture
30
Laboratory classes
15
Other (e.g. online)

Tutorials
Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

KNOWLEDGE: In the field of mathematics, physics, thermodynamics and basic knowledge about energy production

SKILLS: Can use the scientific method to solve problems, experiment and draw conclusions.

SOCIAL COMPETENCIES: The student knows the limits of their own knowledge and skills; understands the need for lifelong learning.

Course objective

To familiarize students with the basic issues in the field of renewable energy, including renewable energy sources (sun, wind, tides, geothermal energy, water), restrictions and dependencies between sources. In addition, the presentation of equipment for the production of energy from renewable sources along with the principle of operation and construction.

Course-related learning outcomes

Knowledge

Knows the main directions of development of the energy industry, taking into account economic and environmental requirements in the field of renewable energy

Has expanded knowledge about the development directions of technologies based on renewable energy sources

Knows the basic principles of creating and developing various forms of entrepreneurship

Skills

Is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks in the field of renewable energy

Is able to use the experience gained in the environment of professionally engaged in engineering activities related to the maintenance of equipment, facilities and systems of renewable energy

Can interact with other people as part of team work and take a leading role in teams

Social competences

Is ready to recognize the importance of knowledge in solving cognitive and practical problems in the field of renewable energy sources

Is ready to fulfill social obligations, inspire and organize activities for the social environment

Is ready to think and act in an entrepreneurial manner

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written exam, the exact form will be given in the first lecture, minimum to pass – 51% of all available points

Laboratory classes - reports based on laboratories

Programme content

Basic knowledge about aerodynamics, aerodynamic forces, characteristics of the boundary layer in the atmosphere, wind energy, principles of operation of vertical and horizontal wind turbines, construction of a wind turbine, innovative concepts of wind turbines, solar energy, solar radiation, black body, solar energy conversion, photovoltaic processes, characteristics of photovoltaic materials, basics of geology, energy storage efficiency, heat flow in geological structures and groundwater, soil temperature profiles, COP efficiency, natural gas diversification policy, sharing natural gas and geothermal energy in heating processes, reliability and profitability of using geothermal energy

Teaching methods

Lecture - multimedia presentation

Laboratory - experiments done by students

Bibliography

Basic

1. David JC MacKay, Sustainable Energy ? without hot air, UIT Cambridge, 2009 (https://www.withouthotair.com/)

2. Aldo Vieira da Rosa, Fundamentals of Renewable Energy Processes, Elsevier, 2013

3. Burkhard Sanner, Frank Kabus , Peter Seibt and Jörn Bartels: Underground Thermal Energy Storage for the German Parliament in Berlin, System Concept and Operational Experiences, Proceedings World Geothermal Congress 2005, Antalya, Turkey, 24-29 April 2005

Additional

1. Manfred Reuss: Shallow Geothermal ? a Technique with Several Aspects, Geothermal Energy in Bavaria, 2011

2. Mizerski, W., 2006. Geologia dynamiczna. Wydawnictwa Naukowe PWN

3. Plewa M. Geologia inżynierska w inżynierii środowiska. Podręcznik dla studentów wyższych szkół technicznych 1999

4. Martin O.L. Hansen: Aerodynamics of Wind Turbines, 2008

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	52	2,0
Student's own work (literature studies, preparation for tests, preparing for the laboratory, preparation the laboratory reports, consultation) [1]	38	1,0

[1] delete or add other activities as appropriate