



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Renewable Energy Sources

Course

Field of study

Year/Semester

Area of study (specialization)

Profile of study

Level of study

Course offered in
english

Form of study

Requirements

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

6

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

The student has basic knowledge In the field of mathematics, physics, thermodynamics and basic knowledge about energy production



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

Has expanded knowledge necessary to understand profile subjects and specialist knowledge about construction, methods of construction, manufacture, control of machines and equipment in the gas technology sector, knows the main processes and thermodynamic changes taking place in these machines

Has knowledge of the latest design of machinery and equipment for the transport and processing of gaseous and renewable fuels

Has knowledge of the negative impact of technology on the natural environment and also knows civilization dilemmas related to the use of energy

Skills

Is able to use his knowledge and skills to use the right methods and tools (including specialized software) to solve problems and perform tasks related to engineering activities

Is able to communicate on topics related to industrial energy with diverse audiences

Social competences

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

He is ready to initiate actions for the social interest

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, illustrated with examples on the board

Laboratory exercises: research on laboratory stands

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	150	6,0
Classes requiring direct contact with the teacher	35	1,0
Student's own work (literature studies, preparation for tests, preparing for the laboratory, preparation the laboratory reports, consultation) ¹	115	5,0

¹ delete or add other activities as appropriate