COURSE DESCRIPTION CARD - SYLLABUS

Course name
Wind power plants [N1Energ1>EW]

Course

Field of study
Power Engineering

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in the field of electricity generation, knowledge of energy facilities included in the power system. Has basic knowledge at the academic level in the field of mathematics, computer science, electrical engineering and power engineering. The ability to analyze the course of electricity generation processes.

Course objective

The aim of the course is to familiarize students with: - rules for organizing electricity generation processes and the use of technologically adapted equipment to convert wind stream energy into electricity, -cognition of wind farm location selection methods, including the analysis of measurement results and data.

Course-related learning outcomes

Knowledge:
1. has systematic knowledge of renewable energy sources, including the conversion of wind energy into electricity.
2. the student knows the basic laws of wind energy and mathematical relationships.
3. knows the support systems for electricity obtained from wind energy and the applicable polish

standards and eu directives in the field of wind farms.
4. knows the methods of measurement and analysis of the results of the quantities affecting the value of electricity production.
5. knows the rules of assembly, operation and disassembly of on and off shore wind farms.

Skills:
the student is able to obtain and practically use information from the literature on the subject, databases, technical documentation, operational recommendations and other sources. can correctly apply methods of measuring wind speed, terrain roughness, air temperature and density and correctly interpret and use the obtained results. can work independently and in a team. the student is able to use the legal documentation regarding environmental requirements, including directives, standards, and laws.

Social competences:
the student is aware that the knowledge and skills in the field of renewable energy sources, including wind farms, are important in the implementation of sustainable energy development in accordance with national and eu development plans. the student understands that knowledge and skills in the field of the subject require constant improvement and updating with newer and newer technological solutions.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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The knowledge acquired during the lecture is verified at the colloquium conducted during the last lecture. The test consists of 10 test questions and 3 open-ended questions with different scores. The pass mark is 50% of the total number of points.
The skills acquired during the laboratory classes are verified on the basis of reports and grades obtained by students during individual classes through activity.

Programme content

Lecture:
HAWT and VAWT wind farm technologies. Construction and operation of wind farms. Electric and electronic systems of power plants. Installation and operation of onshore and offshore wind farms. Electricity transmission from wind farms to GPZ. Environmental requirements. The impact of wind farms on the environment, living organisms and other building objects. Investments in wind farms. The effect of wind speed distribution, ground roughness, air density, and measurement methods on estimating the value of electricity production by wind farms. Renewable energy support systems.
Lab:
- determination of the basic characteristics of a wind turbine with a horizontal axis of rotation,
- determination of the basic characteristics of a wind turbine with a vertical axis of rotation,
- analysis of the impact of terrain obstacles on the electrical parameters of a wind turbine,
- examination of the influence of the blade shape on the electrical parameters of a wind turbine.

Teaching methods

Lecture: multimedia presentation (including drawings, photos, animations, sound, films) supported by examples given on the blackboard.
Laboratory: use of the available laboratory facilities and specially prepared test stands.

Bibliography

Basic
Lubośny Z.: Elektrownie wiatrowe w systemie elektroenergetycznym. WNT, Warszawa, 2007.
Lewandowski W., Klugmann-Radziemska E.: Proekologiczne odnawialne źródła energii.Wyd. Naukowe PWN. 2017.
Zmarzły D.:Badania jakości energii w wybranej farmie wiatrowej. Politechnika Opolska. Oficyna Wyd.Politechniki Opolskiej.2014.
Jastrzębska G.: Odnawialne źródła energii i pojazdy proekologiczne. WNT, Warszawa 2009. 5.
Lubośny Z.: Farmy wiatrowe w systemie elektroenergetycznym. WNT, Warszawa 2013. 6.
Additional

Krawiec F.: Energia. Wyd. Dyfin, Warszawa 2012.
Niedziółka D.: Rynek energii w Polsce. Wyd. Dyfin, Warszawa 2010.

Breakdown of average student's workload

	Hours	ECTS
Total workload	67	2,00
Classes requiring direct contact with the teacher	28	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	39	1,00