COURSE DESCRIPTION CARD - SYLLABUS

Course name
Renewable Energy Technology [S2EPiO1-ECiO>TEO]

Course

Field of study
Industrial and Renewable Energy Systems

Year/Semester
2/3

Area of study (specialization)
Thermal and Renewable Energy

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of thermodynamics and heat exchange. Knowledge of the theory of heat pump systems, steam turbines. Performing thermodynamic and flow calculations, using scientific methods to solve problems The student knows the limits of their own knowledge and skills; understands the need for lifelong learning

Course objective

Familiarization with technologies used in renewable energy.

Course-related learning outcomes

Knowledge:
1.student has expanded knowledge necessary to understand renewable energy technology and specialist knowledge about construction, methods of designing, manufacturing, operating, safety systems as well as impact on the economy, society and the environment in the field of renewable energy technology
2.student knows the basic processes of devices life cycles, facilities and technical systems used renewable energy technology

3.student has expanded knowledge about the development trends of renewable energy sources based technologies

Skills:
1.student is able to formulate and test hypotheses related to simple implementation problems on field of renewable energy technology
2.is able to design and conduct experiments and simulations as well as process of renewable energy and interpret their results
3.student is able to make preliminary economic assessment when formulating and solving engineering task of renewable energy technology

Social competences:
1.student is ready to fulfill social obligations as well as inspire and organize activities for the social environment
2.student is ready to initiate actions of social interest
3.student is ready to think and act in an entrepreneurial way on field of renewable energy technology

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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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.
Classes - final test and rewarding knowledge necessary for the accomplishment of the problems in the area of the subject,

Programme content

Industrial heat pump solutions, methods of selecting ground heat exchangers and their constructions, IGCC systems, ORC systems: their constructions and thermodynamic properties of working factors, control systems of wind farms and photovoltaic systems, energy storage technologies.

Course topics

Lecture:
1. Biogas production technologies
2. Biogas purification
3. Devices using biogas
4. ORC systems
5. Stirling engines
6. Wind and solar systems

Exercises:
1. Calculation of basic parameters of a biogas plant
2. Calculation of biogas conditioning systems
3. Selection of circulating fluids of the ORC system
4. Calculation of the basic parameters of the ORC system
5. Calculation of basic parameters of the Stirling engine
6. Calculation of operating parameters of the photovoltaic system

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board.
Exercises: performing theoretical calculations on the board.

Bibliography

Basic
1. Aldo Vieira da Rosa, Fundamentals of Renewable Energy Processes
2.Sibiński M., Znajdek K.: Przyrządy i instalacje fotowoltaiczne
3.Wójs K,: Odzysk i zagospodarowanie niskotemperaturowego ciepła odpadowego

4.Martin O.L. Hansen: Aerodynamics of Wind Turbines
Additional
1.Szargut J., Ziębik A.; Podstawy energetyki cieplnej. Wydawnictwo Naukowe PWN

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,20
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	0,80