



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Renewable energy sources [S2TOZ1-TSO>OŻE]

Course

Field of study

Circular System Technologies

Year/Semester

1/1

Area of study (specialization)

Renewable raw material technologies

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

0

Projects/seminars

0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

Knows the basic methods, techniques, tools and materials used in solving simple engineering tasks. Knows the principles of environmental protection related to chemical production. Has knowledge of raw materials, products and processes used in the industry.

Course objective

Gain knowledge of environmentally friendly renewable energy sources.

Course-related learning outcomes

Knowledge:

Has in-depth and theoretically underpinned knowledge of modern environmentally friendly technologies [K_W05].

Uses basic legal, economic and ethical acts of environmental protection and closed-loop economy efforts [K-W09].

Has in-depth knowledge of material recycling methods, raw material and energy recovery from waste materials necessary to design, optimize and implement innovative technological processes [K_W12].

Skills:

Possesses ease of verbal communication with specialists in the area of the circular economy and related fields [K_U01].

Is able to independently plan and implement his/her own lifelong learning to improve personal professional competence [K_U05].

Is skilled in the qualification of selected waste materials and the application of appropriate recycling and recovery techniques, in accordance with applicable laws [K_U11].

Social competences:

Is aware of personal responsibility resulting from his/her professional role and the emergence of moral and ethical issues in the context of professional activities [K_K01].

Understands the need to popularize the knowledge of sustainable production and technological solutions in a closed loop economy [K_K02].

Critically evaluates his/her knowledge, understands the need for further education and improvement of his/her professional, personal and social competencies [K_K03].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired in lecture verified by a written final course credit consisting of several open-ended questions and/or a dozen test questions. Passing threshold: 51% of the maximum total score.

In the case of online classes, the credit will be in the form of a test consisting of a dozen test questions and/or a few open-ended questions.

Programme content

Water, wind, solar, geothermal energy. Biomass and biogas as sources of renewable energy. Hydrogen as an energy carrier.

Course topics

Classification and characteristics of renewable energy sources and their discussion.

Sustainability of renewable energy sources.

Nuclear power: conventional energy or unconventional energy?

Types of hydroelectric power plants.

Fundamentals of thermodynamics and methods of converting solar energy to work.

Passive systems of solar energy utilization.

Solar collectors.

Photovoltaic cells.

Wind energy.

Recycling of power sources as a method of their renewal.

Overview and characteristics of advanced materials used in renewable energy sources.

The essence of a hybrid energy system.

Teaching methods

Lecture, discussion, video.

Bibliography

Basic:

W. M. Lewandowski, E. Klugmann-Radziemska „Proekologiczne odnawialne źródła energii”, PWN, 2017.

T. Chmielniak „Technologie energetyczne”, PWN, 2018.

Additional:

K. Znajdek, M. Sibiński „Postępy w fotowoltaice”, PWN, 2021.

N. Jelley "Energetyka odnawialna" PWN 2022.

T. Chmielniak, T. Chmielniak " Energetyka wodorowa", PWN 2020.

J. Taubman "Węgiel i alternatywne źródła energii", PWN 2013

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