



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physical, ecological and economic aspects of renewable energy sources

Course

Field of study

Year/Semester

Technical Physics

1/2

Area of study (specialization)

Profile of study

general academic

Level of study

Course offered in

Second-cycle studies

Form of study

Requirements

full-time

compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

Prof. dr hab. Danuta Wróbel

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Prerequisites

Basic knowledge of experimental physics, atomic physics, quantum mechanics, mathematical apparatus. The ability to solve problems in physics at the level of experimental physics, atomic physics, quantum mechanics, the ability to obtain information from indicated sources. Understanding the need to expand one's competences, readiness to cooperate as part of a team, understanding the need to cooperate with other students, understanding the need to make decisions for the benefit of the academic community.

Course objective

1. Introducing students to knowledge in the field of renewable energy
2. Acquainting with knowledge of the basic issues of types and characteristics of renewable energy and systems
3. To acquaint students with the techniques necessary to understand the basic physical phenomena and processes taking place in renewable systems



4. Presentation to students of physical processes taking place in renewable energy systems (RES), importance in environmental protection and economy.

5. Development and prospects

Course-related learning outcomes

Knowledge

Student:

1. can characterize the types of renewable energy: solar, geothermal, wind, thermal, hydropower, for them [K2_W12]
3. knows the current state of advancement knowledge and is aware of the latest development trends in the use of renewable energy sources,
4. knows the need to use solar energy systems for environmental protection - [K2_W13]
5. has basic knowledge necessary to understand social, economic, environmental in the field of renewable energy sources - [K2_W16]]

Skills

the student is able to:

1. define the processes that take place in molecular organic systems and their importance for nanotechnology, characterize the material properties and parameters and the way of their use in modern nanotechnologies and natural sciences (organic optoelectronics, organic photovoltaics, environmental protection) _ [K2_U02]
2. formulate simple conclusions based on the obtained results, calculations and measurements, use the understanding of the indicated sources of knowledge (list of basic literature) and obtain knowledge from other sources - [K2_U02]
3. select molecular materials with appropriate physico-chemical properties for laboratory and technological applications - [K2_U17]

Social competences

The student is able to:

1. define the processes that take place in molecular organic systems and their importance for nanotechnology, characterize the material properties and parameters and the way of their use in modern nanotechnologies and natural sciences (organic optoelectronics, organic photovoltaics, environmental protection) _ [K2_U02]
2. formulate simple conclusions based on the obtained results, calculations and measurements, use the understanding of the indicated sources of knowledge (list of basic literature) and obtain knowledge from other sources - [K2_U02]



3. select molecular materials with appropriate physico-chemical properties for laboratory and technological applications - [K2_U17]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Effect	Form of evaluation	Evaluation criteria
W01, W02, W03	Assessment of acquired knowledge - examination	50.1% -70.0% (3)
	Assessment of participation and activity in lectures	70.1% -90.0% (4)
		from 90.1% (5)

Programme content

1. Division of renewable energy sources and their characteristics
2. The sun, solar radiation energy, its resources
3. Energy of biomass, hydrogen
4. Geothermal energy, heat pumps
5. Hydropower, wind energy,
6. Photovoltaic cells, Solar collectors
7. Ecological and economic effects. Perspectives

Teaching methods

Lecture: multimedia presentation, presentation illustrated with examples given on the board

Bibliography

Basic

1. W. M. Proekologiczne źródła energii odnawialnej,
2. Bieżące artykuły naukowe w zakresie odnawialnych źródłach energii.

Additional

1. J. Mikielwicz, J. T. Cieśliński, Niekonwencjonalne urządzenia i systemy konwersji energii, Wrocław, Warszawa, Kraków, Zakład narodowy i. Ossolińskich, 1999.



Breakdown of average student's workload

	Hours	ECTS
Total workload	57	2,0
Classes requiring direct contact with the teacher	37	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹		

¹ delete or add other activities as appropriate