



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Renewable Energy Technology

### Course

Field of study

Industrial and Renewable Energy

Area of study (specialization)

Thermal and Renewable Energy

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr inż. Michał Gołębiewski

Responsible for the course/lecturer:

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Faculty of Environmental Engineering and Energeticul. Piotrowo 3 60-965 Poznań

### 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:

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.

### 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    | 2,0  |
| Classes requiring direct contact with the teacher   | 30    | 1,2  |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup> | 20    | 0,8  |

<sup>1</sup> delete or add other activities as appropriate