



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Energy management and renewable sources of energy [S1IChIP1>GEiOŻE]

### Course

Field of study

Chemical and Process Engineering

Year/Semester

4/7

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

dr hab. Małgorzata Osińska

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dr inż. Paweł Jeżowski

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### Lecturers

### Prerequisites

The basic knowledge within mathematics and physical chemistry Student understands the need for continuous training and improve his professional and personal competences

### Course objective

Gaining knowledge in term of conventional energy and environmentally friendly renewable energy sources.

### Course-related learning outcomes

Knowledge:

student knows the principles of environmental engineering related to chemical production and waste management [k\_w08].

Skills:

able to use the principle of saving raw materials and energy, and by modernizing equipment and

processes is achieved favorable economic indicators and reduce the environmental burden [k\_u14].

Social competences:

understands the need for continuous training and improve his professional and personal competences - [k\_k01].

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified by a written test consisting of 10 to 30 test questions and/or several open questions. Passing threshold: 50% of the maximum number of points.

### Programme content

none

### Course topics

1. Conventional energy and methods of reduce the risks associated with this type of energy
2. Water, wind, solar and geothermal energy
3. Biomass and biogas as a renewable energy sources
4. Hydrogen as an energy carrier
5. Electrochemical energy

### Teaching methods

Lecture

### Bibliography

Basic

1. W.M. Lewandowski, Proekologiczne odnawialne źródła energii, WNT, W-wa 2013
2. A. Czerwiński, Ogniwa, akumulatory, baterie, Wydawnictwa Komunikacji i Łączności, W-wa 2012.

Additional

R. Arnowski, W.M. Lewandowski, Technologie ochrony środowiska w przemyśle i energetyce, WNT, W-wa 2020.

K. Znajdek, M. Sibiński, Postępy w fotowoltaice, PWN, W-wa 2021

T. Chmielniak, T. Chmielniak, Energetyka wodorowa, PWN, W-wa 2020

### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	3,00
Classes requiring direct contact with the teacher	35	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	3,00