COURSE DESCRIPTION CARD - SYLLABUS

Course name

Energetics of chemical processes

Course

Field of study

Chemical and process engineering

Year/Semester

1/1

Area of study (specialization)

Chemical engineering

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Prof. Andrzej Lewandowski

e-mail: andrzej.lewandowski@put.poznan.pl

tel. 061 665 23 09

Wydział Technologii Chemicznej

ul. M. Skłodowskiej-Curie 5, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Students:

have basic knowledge in thermodynamics, engineering and chemical technology obtained during the first-cycle studies.

can apply the learned mathematical apparatus and knowledge in physics to physicochemical calculations.

are aware of further development of their competences.

Course objective

To familiarise students with the methods necessary to manage energy flow in chemical processes.

Course-related learning outcomes

Knowledge

Students will have advanced knowledge of energy and its flows. K_W03, K_W04

Students will have sufficient knowledge to manage energy flows in chemical processes. K_W03, K_W04

Skills

Students will be able to obtain information from literature, databases and other sources; interpret it as well as draw conclusions and formulate and substantiate opinions. K_U01

Students will be able to formulate and solve tasks related to the flow of energy in chemical processes. K_U09

Social competences

Students will be aware of the responsibility for jointly performed tasks. They will be able to work as a team. K_K03

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: assessment based on project classes.

Projects: assessment based on a prepared and delivered project.

Programme content

Lecture and projects:

Chemical reaction energetics. Energy exchange. Supply of energy necessary for the synthesis of low-energy compounds. Photochemistry. Photosynthesis. Supplying energy in the form of work. Exothermic reaction energy - discharge and management. High temperature processes (metallurgy, ceramics, sinters, aluminum electrolysis). High-energy compounds. Fuel. Liquefaction or gasification of solid fuels. Oxidants. Energy losses when converting fuels. High and low temperature combustion. Waste heat. Co-generation of work and heat. Comparison of the efficiency of various 'energy production' processes. Heat energy accumulators, 'cold' accumulators. Accumulation of electricity.

Teaching methods

Lecture: multimedia presentation

Projects: collecting materials, preparing a project on a selected topic and delivering it.

Bibliography

Basic

1. J. Szarawara, Termodynamika chemiczna stosowana, WNT, Warszawa 2007

2. E. Grzywa, J. Molenda, Technologia podstawowych syntez chemicznych, WNT, Warszawa 2000

3. R. Dylewski, W. Gnot, M. Gonet, Elektrochemia przemysłowa, Wydawnictwo Politechniki Śląskiej 1999

Additional

1. R.S. Berry, S.A. Rice, J. Ross, Physical Chemistry, Oxford University Press, 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, project preparation) [1]	25	1,0

[1] delete or add other activities as appropriate