COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fuels and raw materials of the 21st Century [N1TCh2>PiSXXIw]

Course

Field of study
Chemical Technology

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

dr hab. inż. Magdalena Regel-Rosocka prof. PP
magdalena.regel-rosocka@put.poznan.pl

Lecturers

Prerequisites

1. A student has a basic, structured, theoretically based knowledge in the field of general and inorganic and organic chemistry and chemical technology, including key issues about natural and synthetic raw materials, products and processes used in organic and inorganic chemical technology. 2. A student has basic knowledge of chemistry to understand chemical phenomena and processes. 3. A student has basic knowledge of products and processes used in chemical technology. 4. A student understands the need for training and improving her/his professional and personal competences, is able to cooperate and work in a group, is able to think and act in a creative and entrepreneurial way.

Course objective

Expanding knowledge in the field of chemical technology focused on issues related to contemporary trends in the acquisition and/or production of fuels and raw materials for the chemical industry, especially hydrogen, renewable diesel, methanol, platform chemicals. The presented issues are to enable students to link the impact of the climatic and geopolitical situation, as well as legal regulations with the development of technological processes, with particular emphasis on the growing share of fuels and raw materials other than crude oil.

Course-related learning outcomes

Knowledge:
1. A student has knowledge in the field of technology and chemical engineering. [K_W13]
2. A student has the necessary knowledge about both natural and synthetic raw materials, products and processes used in chemical technology, as well as about the directions of development of local and global chemical industry. [K_W09]

Skills:
1. A student can obtain necessary information from literature, databases and other sources concerning chemical sciences, interprets them properly, draws conclusions, formulates and justifies opinions. [K_U01]
2. A student has the ability to self-educate. [K_U05]
3. A student on the basis of general knowledge and acquired during the course, explains the basic phenomena and trends related to important processes in chemical technology. [K_U16]
4. A student uses the principles of saving raw materials and energy, and through the modernization of equipment and processes, obtains favorable economic indicators and reduces the burden on the environment. [K_U31]

Social competences:
1. A student understands the need for training and improving professional, personal and social competences. [K_K01]
2. A student is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including their impact on the environment and the related responsibility for decisions [K_K02]
3. A student is aware of the social role of a graduate of a technical university, and in particular understands the need to formulate and communicate to the public, in particular through the mass media, information and opinions on the achievements of science and other aspects of engineering activity; endeavors to provide such information and opinions in a generally understandable way. [K_K07]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Full-time credit - the knowledge acquired within the course will be verified in the form of a written credit after the end of the lectures.
In the case of mandatory online teaching the course will be available in eKursy platform and analogous methods for veryfing learning outcomes and assesment criteria will be applied.Remote credit - knowledge acquired within the course will be verified in the form of a written credit after the lectures via the eKursy platform.
Evaluation criteria: 3 - 50.1%-60.0%; 3.5 - 60.1%-70%; 4 - 70.1%-80.0%; 4.5 - 80.1%-90%; 5 - from 90.1%.

Programme content

Issues related to fuels and raw materials of the 21st Century

Course topics

The course covers issues related to current trends in the acquisition and/or production of fuels and raw materials alternative to crude oil for the needs of the chemical industry in the future (21st century). The thematic scope of the lectures includes the following topics:
- The role of crude oil as an energy and chemical raw material.
- Trends in the market of fuels and raw materials for the chemical industry in the 21st century.
- Hydrogen - the fuel of the future?
- Renewable hydrocarbon fuels ("green" or "drop-in biofuels") - raw materials and production.
- Biogas, LNG, SNG as energy and chemical raw materials.
- The Power-to-Liquid concept - the use of CO2 in the production of liquid fuels and chemical raw materials.
- Platform chemicals as chemical raw materials, biorefinery concepts.
- New process solutions, modifications of existing technologies - challenges and threats.

Teaching methods

Lecture, discussion, multimedia. In special cases, the online form of the lecture is allowed.

Bibliography

Basic:
1. B. Burczyk, Biomasa - surowiec do syntez chemicznych i produkcji paliw, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2019.
2. W. M. Lewandowski, E. Klugmann-Radziemska, Proekologiczne odnawialne źródła energii: kompendium, PWN, Warszawa 2017.
3. J. Surygała, Wodór jako paliwo, WNT, Warszawa 2008. (ebook dostępny ze strony Biblioteki PP, ibuk libra)

Additional:
e-zasoby Biblioteki PP, baza e-booków Knovel:
1. M. F. Hordeski, Alternative Fuels - The Future of Hydrogen, River Publishers 2013.
2. R. Carriveau, D. S-K. Ting, Methane and Hydrogen for Energy Storage, Institution of Engineering and Technology, London 2016.

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	10	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50