COURSE DESCRIPTION CARD - SYLLABUS

Course name

Selected aspects of modern chemistry

Course

Field of study

Chemical Technology

Year/Semester

I/1

Area of study (specialization)

Composites and Nanomaterials

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

30

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Faculty of Chemical Technology,

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Responsible for the course/lecturer:

Prerequisites

Student has basic knowledge of general chemistry, inorganic chemistry, organic chemistry, physical chemistry, chemical technology and chemical engineering, as well as broadly understood environmental protection. Student is able to obtain information from suggested sources. Student is able to communicate in English. Student understands the need of self-education. Student is able to study literature recommended by lecturer. Student should understand the importance of working separately and as a part of team.

Course objective

The maind goal of the subject is to give a general overview into modern chemistry considered as a hollistic matter, including advanced techniques and nanomaterials.

Course-related learning outcomes

Knowledge

K_W2 - has improved knowledge in chemistry and other related areas of science, allowing to formulate and solve complex tasks related to chemical technology

K_W6 - has improved knowledge of the latest chemical and material technologies, including advanced materials and nanomaterials technologies, knows current trends in the development of chemical industrial processes

K_W11 - has a well-established and improved knowledge of the selected specialty

K_W14 - has knowledge of selected aspects of modern chemical knowledge and aspects of copyright and industrial property

Skills

K_U1 - has the ability to obtain and critically evaluate information from literature, databases and other sources, and formulate opinions and reports on this basis

K_U3 - can use English in professional contacts

K_U9 - is able to design and conduct chemical reactions on a laboratory scale in various conditions and properly use the results of these tests to scale up

K_U17 - can critically assess the practical usefulness of using new developments in chemical technology

Social competences

K_K1 - is aware of the need for lifelong learning and professional development

K_K2 is aware of the limitations of science and technology related to chemical technology, including environmental protection

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written exam graded on the basis of a points system (0-100 points)

3	50.1 -70.0 pkt
4	70.1 -90.0 pkt
5	90.1 -100 pkt

Programme content

1. Description of the composition, structure and physical and chemical properties of substances as well as the transformations of the substances into the different phases.

2. Ionic liquids (definition, classification, synthesis, physicochemical properties and application).

3. Supercritical fluids (definition, properties, examples and application).

4. Xerogels and aerogels (classification, synthesis, physicochemical properties and application).

5. Liquid crystals (definition, classification, synthesis, physicochemical properties and application).

6. Graphene (synthesis, physicochemical properties and application).

7. Propellants (classification, characterization, synthesis, physicochemical properties and application).

8. Titanium dioxide (definition, classification, synthesis, physicochemical properties and application).

9. Nanomaterials. Nanodiamonds (definition, classification, characterization, synthesis, physicochemical properties and application). Nanodots (definition, classification, synthesis, physicochemical properties and application).

Laboratories provide an introduction to basic techniques used in experimental chemistry. Proper laboratory procedures, chemical safety rules, and environmentally safe methods of chemical disposal and waste minimization are important components of the course. Experiments are selected to provide illustration and reinforcement of course topics.

Teaching methods

Lecture: multimedia presentation

Bibliography

Basic

1. P. Wasserscheid, T. Welton (Eds.), Ionic liquids in synthesis, Wiley-VCH, 2003.

2. Y. Arai, T. Sako, Y. Takebayashi, (Eds.), Supercritical fluids : molecular interactions, physical properties, and new applications, Springer, 2002.

Additional

1. R. H. Petrucci, F. G. Herring, J. D. Madura, C. Bissonnette, General Chemistry: Principles and Modern Applications (10th Edition), Pearson Prentice Hall, 2009.

2. D. W. Oxtoby, H. Pat Gillis, A. Campion, Principles of Modern Chemistry, Cengage Learning, 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	50	1,7
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam) [1]	10	0,3

[1] delete or add other activities as appropriate