



KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez
Unię Europejską w ramach
Europejskiego Funduszu
Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY



Course title		ECTS code	
Catalysis in inorganic chemistry		13.3.1204	
Name of unit administrating study			
null			
Studies			
faculty	field of study	type	first tier studies (BA)
Faculty of Chemistry	Chemical Business	form	full-time
		specialty	all
		specialization	all
Faculty of Chemistry	Chemistry	type	first tier studies (BA)
		form	full-time
		specialty	all
Faculty of Chemistry	Environmental Protection	specialization	all
		type	first tier studies (BA)
		form	full-time
		specialty	all
		specialization	all
Teaching staff			
dr hab. Dagmara Jacewicz, profesor uczelni; dr Joanna Drzeżdżon			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		2	
Laboratory classes, Lecture		classes - 15 h	
The realization of activities		tutorial classes - 15 h	
lectures in the classroom		student's own work - 20 h	
Number of hours		TOTAL: 50 h - 2 ECTS	
Laboratory classes: 11 hours, Lecture: 4 hours			
The academic cycle			
2023/2024 summer semester			
Type of course		Language of instruction	
an elective course		english	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
<ul style="list-style-type: none"> - Lecture based on the multimedia presentation - Practical laboratory work - chemical experiments, analysis of obtained results and discussion. 		Final evaluation	
		Graded credit	
		Assessment methods	
		Lecture, Laboratory classes – short test and report from performed chemical experiments.	
		The basic criteria for evaluation	
		Lecture and Laboratory classes: positive note from an short test with 5 open questions:	
		91-100% 5.0	
		81-90% 4.5	
		71-80% 4.0	
		61-70% 3.5	
		51-60% 3.0	
		< 51% 2.0	
		a. passing short test covering the material of the Lecture and Laboratory classes	
		b. assessment criteria in accordance with the University of Gdańsk Study Regulations	

Method of verifying required learning outcomes

Business Chemistry:

The method of verifying the acquisition of knowledge: Written short test concerning the subject of catalysts in inorganic chemistry, compounds serving as catalysts and their physicochemical properties. During the laboratory experiments, the student solves problems in tests and oral discussions in the field of catalysis in inorganic chemistry and enumerates laws and theories in chemistry, physics and mathematics necessary to formulate and solve simple engineering tasks (K_BCh_W02). The method of verifying the acquisition of skills: Assessment of the student's involvement in discussions on a research and experimental problems. Assessment of the correctness of the use of chemical nomenclature during the discussion. Students identify, analyse and solve tasks in the field of catalysis (K_BCh_U01, K_BCh_U08). Assessment of the effectiveness of work individually and in a group during the planning and execution of chemical experiments (K_BCh_K02).

Chemistry:

The method of verifying the acquisition of knowledge: Written short test concerning the subject of catalysts in inorganic chemistry, compounds serving as catalysts and their physicochemical properties. During the laboratory experiments, the student solves problems in tests and oral discussions in the field of catalysis in inorganic chemistry. Problem solving is based on knowledge about the properties of chemical compounds and the methods of their preparation and analysis (K_BCh_W02). The method of verifying the acquisition of skills: Assessment of the student's involvement in discussions on a research and experimental problems. Assessment of skills is also based on the student proposing solutions to specific research problems (K_U02, K_U04, K_U09). Assessment of the performing entrusted experimental tasks with the application of occupational health and safety rules (K_K05).

Environmental Protection:

The method of verifying the acquisition of knowledge: Written short test concerning the subject of preparation and application of catalysts in inorganic chemistry and their physicochemical properties. During the laboratory experiments, the student solves problems in tests and oral discussions in the field of application of catalysts in inorganic chemistry and interpretation of the processes (K_OŚI_W04). The method of verifying the acquisition of skills: Assessment of the student's involvement in discussions on experimental problems, analysis of the results of the conducted experiments and drawing conclusions (K_OŚI_U02). Assessment of the effectiveness of work individually and in a group during the planning and execution of chemical experiments based on the identification of the level of one's own knowledge (K_OŚI_K02, K_OŚI_K05).

Required courses and introductory requirements

A. Formal requirements

lack

B. Prerequisites

lack

Aims of education

- familiarize students with the main aspects of mechanisms of action of catalysts in inorganic chemistry
- familiarize students with the application of catalysts in inorganic chemistry in practice
- presenting the homogeneous and heterogeneous catalysts
- familiarize students with the methods of synthesis of homogeneous and heterogeneous catalysts in inorganic chemistry

Course contents

The aim of the course is to understand of the mechanisms of action of catalysts in inorganic chemistry, as well as to learn their application in practice. Laboratory exercises include learning and synthesis of homogeneous and heterogeneous catalysts in inorganic chemistry, conducting catalytic reactions with the participation of selected catalysts and inhibitors, and also evaluation of their operation under the influence of changing reaction conditions.

Bibliography of literature

- Literature required to pass the course
- D. Astruc, „Organometallic Chemistry and Catalysis”, Springer, 2007.
- R. van Eldik, C. Hubbard, “Advances in Inorganic Chemistry” vol. 65, Elsevier, 2013.
- C. Housecroft, “Inorganic Chemistry”, Pearson, 2018.
- Extracurricular readings
- M. A. Vannice “Kinetics of Catalytic Reaction”, Springer, 2005.

The learning outcomes (for the field of study and specialization)

Chemical Business:
K_BCh_W02
enumerates laws and theories in chemistry, physics and mathematics necessary to formulate and solve simple engineering tasks
K_BCh_U01
on the basis of the acquired knowledge, identifies, analyses and solves engineering tasks and problems in broadly

Knowledge

- Student:
- knows chemical laws relating to chemical compounds (catalytic control chemical transformations)
 - knows the chemical nomenclature used to describe chemical compounds (homogeneous and heterogeneous catalysis)
 - understands the role of activation energy in catalytic chemical reactions
 - knows the methods of testing the effectiveness of catalysts (turnover frequency and turnover number)

<p>understood chemistry K_BCh_U08 uses the chemical nomenclature and engineering terminology properly K_BCh_K02 works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it</p> <p>Chemistry: K_W02 describes in an advanced level the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis K_U02 performs analyses using experimental methods and draws conclusions based on them K_U04 plans and performs chemical experiments and analyses the results obtained K_U09 is able to learn independently K_K05 observes established procedures in laboratory work and is responsible for the safety of her/his and others' work</p> <p>Environmental Protection: K_OŚI_W04 explains at an advanced level the meaning and indispensability of empirical data in the description and interpretation of natural phenomena and processes (occurring in the environment) K_OŚI_U02 plans, selects appropriate research and measuring equipment and devices, performs physicochemical measurements and experiments; analyses the results and draws conclusions based on them K_OŚI_K02 works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it K_OŚI_K05 identifies the level of her/his knowledge and skills, demonstrates the need to update knowledge about the environment and its protection, demonstrates the need for continuous professional training and personal development</p>	<ul style="list-style-type: none"> - knows the methods of catalysts preparation and methods of their physicochemical analysis - understands the need to conduct an experiment in order to obtain empirical data to explain the processes taking place <p>Skills</p> <p>Student:</p> <ul style="list-style-type: none"> - is active in planning an experiment regarding catalytic reactions - is able to synthesize catalysts and inhibitors for the needs of inorganic chemistry reactions - is able to draw conclusions from the conducted experiments, e.g. calculate turnover frequency and turnover number of catalysts - is able to synthesize catalysts on inorganic carriers - is able to carry out reactions with the participation of a catalyst and an inhibitor as well as to optimize process conditions <p>Social competence</p> <p>Student:</p> <ul style="list-style-type: none"> - engages in scientific discussions in group - is active in extending knowledge and understands the need for continuous increasing the level of knowledge and qualifications - is able to work in a safe way for all participants of the class group - can play various roles in the group when solving research problems and performing experiments
<p>Contact</p> <p>dagmara.jacewicz@ug.edu.pl</p>	