KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI
Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego
UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title	ECTS code
Laboratory of heterogeneous and homogeneous catalysis	13.3.1220

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Chemii	Biznes chemiczny	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie
Wydział Chemii	Chemia	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie
Wydział Chemii	Ochrona środowiska	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

dr hab. Dagmara Jacewicz, profesor uczelni; dr Joanna Drzeżdżon

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes

The realization of activities

classroom instruction

Number of hours

Laboratory classes: 30 hours

ECTS credits

4
classes - 30 h
tutorial classes - 30 h
student's own work - 40 h
TOTAL: 100 h - 4 ECTS

The academic cycle

2024/2025 winter semester

Type of course

an elective course

Language of instruction

English

Teaching methods

Practical laboratory work - chemical experiments, analysis of obtained results and discussion.

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

short test and report from performed chemical experiments.

The basic criteria for evaluation

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 Laboratory classes
b. assessment criteria in accordance with the University of Gdańsk Study Regulations

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements

lack

B. Prerequisites

lack

Aims of education

familiarize students with the main aspects of homogeneous and heterogeneous catalysis
- familiarize students with mechanisms of the polymerization reaction as an exemplary catalysis reaction, including homogeneous and heterogeneous catalysts
- familiarize students with the methods of synthesis of catalysts, for example post-metallocene catalysts
- familiarize students with the methods of testing the properties of chemical compounds and materials obtained with the use of homo- and heterogeneous catalysis

Course contents

The course aims to give an understanding of the relation between modern theories of catalysis and application for homogeneous and heterogeneous catalysts in oligomerization and polymerization process of olefins. The laboratory includes the catalyst synthesis (for example: the coordination complexes of chromium(III) and vanadium(IV) with organic and inorganic ligands), carrying out the processes of oligomerization and polymerization of olefin using the obtained catalysts, description of the processes involved in a catalytic cycle and interpretation of results from experimental investigations. The obtained materials will be characterized by UV-Vis spectroscopy, IR spectroscopy, Raman spectroscopy and others.

Bibliography of literature

Literature required to pass the course
L. Can, L. Yan, “Bridging Heterogeneous and Homogeneous Catalysis: Concepts, Strategies, and Applications”, WileyVCH Verlag GmbH & Co. KGaA, 2014.
Blom, R., Follestad, A., Rytter, E., Tilset, M., Ystenes, M. ,“Organometallic Catalysts and Olefin Polymerization”, Springer, 2001.
G. Odian, “Principles of Polymerization”, Wiley, 2004.
Extracurricular readings
A. A. Shaikh, “Heterogeneous Catalysis”, Gruyter, Walter de GmbH, 2020.
P. W. N. M. van Leeuwen, “Homogeneous Catalysis: Understanding the Art”, Springer, 2004.

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

Chemical Business:
K_BChII_W01
knows and understands in-depth complex physicochemical processes and is able to analyses their course in connection with other fields of science
K_BChII_W06
knows and understands tasks in the field of chemistry, environmental protection and economics that are the subject of human activity to a degree that allows independent work on a research, scientific and measurement position
K_BChII_U04
is able to independently plan and perform specific research tasks in the field or in the laboratory, interpret their results working individually or in a team, assuming various roles and functions in it
K_BChII_U08
is able to plan and perform specific research tasks in the field and/or in the laboratory, working individually and/or in a team, assuming various roles in it, including managerial ones K_BChII_K02
is willing to create and manage group work plans and take responsibility for the work of the entire team, properly assessing his/her own work and that of individual team members

Chemistry:

Knowledge

Student:
- knows homogeneous and heterogeneous catalysts
- knows the mechanisms of the polymerization reaction as an exemplary catalysis reaction, including homogeneous and heterogeneous catalysts
- understands the role of activators in catalyzed oligomerization and polymerization reactions
- knows the spectroscopic methods of analysis of catalysts and obtained products, oligomerization and polymerization

Skills

Student:
- is active in planning an experiment regarding catalytic reactions both homogeneous and heterogeneous catalysis
- is able to synthesize post-metallocene catalysts: the coordination complexes of chromium(III) and vanadium(IV) with organic and inorganic ligands
- is able to draw conclusions from the conducted experiments, e.g. calculate catalytic activity
- is able to qualify the catalyst to the appropriate group of catalysts in terms of activity
- is able to carry out the experiments in accordance with the principle of environmental protection

Social competence

Student:
- is able to work in a safe way for all participants of the class group
- engages in scientific discussions in group
- takes responsibility for the work of the entire team
- can play various roles in the group when solving research problems and performing experiments

K_W01 uses in-depth knowledge of spectroscopic methods of chemical compound analysis K_W04 applies the acquired knowledge to an in-depth description of the properties of chemical connections, methods of their synthesis and analysis K_U01 plans and implements chemical experiments of extended complexity K_U04 applies acquired knowledge of chemistry and related scientific disciplines K_K06 undertakes research tasks consciously and responsibly, understanding the social aspects of the practical application of the acquired knowledge and skills and the responsibility related to it Environmental Protection: K_OŚII_W04 chooses methods, techniques and research tools used in environmental protection K_OŚII_W09 applies safety and hygiene principles when working independently on a test or measurement stand in a laboratory or in the field K_OŚII_U01 on the basis of the acquired knowledge, proposes to solve environmental problems K_OŚII_K02 recognizes threats, creates safe work conditions and is responsible for the safety of own and other people's work	

Contact

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