

Adam Mickiewicz University in Poznań

Faculty of Chemistry

HighChem - interdyscyplinarne i międzynarodowe studia doktoranckie z elementami wsparcia współpracy międzysektorowej

Heterogeneous catalysis – a pillar of the green chemistry and sustainable development

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Courses in chemistry or related disciplines

Field of science	chemistry and environment protection
Teaching method	lecture
Language	English
ECTS credits	1
Numbers of hours	15 h
Aims of the course	This course aims at developing students' ability to think critically and discuss constructively the impact of chemical processes on the ecosystem
Course contents	Chapters: 1. Sustainability for the twenty-first century: challenges; dematerialization versus transmaterialisation; sustainability in chemistry. 2. Introduction in green chemistry: principles, evaluating the greenness of a chemical reaction (metrics, radial pentagon). 3. Introduction in green solvents: water as reaction solvent; ionic liquids, supercritical fluids, fluoruous solvents. 4. Renewable resources - from refinery to bio-refinery: shifting to renewable, chemicals from the biorefinery. 5. Heterogeneous catalysis in the context of green chemistry and sustainability. Case studies: catalysis in fine chemicals (vitamin E and menthol) and pharmaceutical (ibuprofen) synthesis. Design of solid catalysts for the conversion of cellulose to biochemicals.
Prerequisites and co-requisites	There are no prerequisites.

Learning outcomes

On completion of the course PhD candidates will be able to:	Assessment mode
The graduate is expected to know and understand (to a degree enabling their revision) the world knowledge in the area of chemistry or environment protection, including theoretical background, general issues and selected detail issues and the practical use of recent scientific achievements.	PhD candidates will receive a chemical synthesis that they will have to critically evaluate in terms of the principles of green
The graduate is expected to know and understand main developmental trends in the discipline of chemistry or environment protection, including the practical use of recent achievements.	
The graduate knows and understands methodology of research work	

used in the area of chemistry and selected related disciplines	chemistry. Based on this analysis they will have to propose an alternative that would improve the original synthesis.
The graduate is able to initiate a debate and participate in a scientific discourse,	
The graduate has command of a foreign language to a degree allowing participation in international scientific circles, in particular is able to make contacts for exchange of experience and ideas (at conferences, seminars and other professional meetings),	
The graduate is prepared for critical evaluation of knowledge in the discipline of chemistry or environmental protection and own contribution to the knowledge in the area of specialization	
The graduate is prepared to recognize the significance of knowledge in solving different problems	
The course provides a fund of fundamental and practical knowledge on: - assessing the impact of chemical processes on the ecosystem; - modern and sustainable methods for achieving green chemical syntheses as alternatives to polluting and waste-generating chemical syntheses; - chemical transformation of renewable resources into value-added products on the consumer market	
The course is designed and structured to allow the student, through the knowledge gained, to conduct research in any field of chemistry at a high quality level, in accordance with the fundamental concept of the 21st century - sustainable development.	
Literature	<ol style="list-style-type: none"> 1. Green Chemistry: An introductory text, Mike Lancaster (Ed.), The Royal Society of Chemistry, 2002. 2. Handbook of Green Chemistry P.T Anastas (Ed.), Vol. 2: Green catalysis, R.H. Crabtree (Vol. Ed.), Wiley -VCH, 2009 3. Chemistry In Alternative Reaction Media, D. J. Adams, P. J. Dyson, S. J. Tavener (Eds), John Wiley & Sons Ltd, 2004
Additional information	<p>Date of course sessions 18/02, 25/02, 04/03/2021, from 9.00 am. Classes implemented by the zoom platform.</p> <p>Contact : simona.coman@chimie.unibuc.ro</p>