University of Gdańsk

Subject card

Subject name and code	Monographic lecture - Modern methods of chemical synthesis, PG_00082498						
Field of study	Chemical Business						
Date of commencement of studies	February 2025		Academic year of realisation of subject	2025/2026			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study Optional subject group			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	3		ECTS credits	3.0			
Learning profile	academic		Assessment form	credit			
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Elżbieta Jankowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours	Self-study	SUM	
	Number of study hours	30		5.0	40.0	75	
Subject objectives	Familiarizing students with: - basic rules of carrying organic synthesis - modern methods of organic synthesis, allowing the formation of new carbon-carbon and carbon-heteroatom bonds - modern techniques of organic synthesis, including asymmetric catalysis and multi-component reactions (for instance Mannich, Ugi, and Passerini reactions) - the concept of retrosynthesis Enabling students to acquire skills of designing multi-step syntheses of organic compounds						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BCHMU2_U01] Is able to, on the basis of her/his knowledge, propose a solution to problems in chemistry, taking into account the economic aspect by using advanced measurement techniques.	The student: - critically analyzes the possibility of using a selected chemical reaction to obtain the desired product; - predicts the structure of products, based on the structure of substrates and the applied reaction conditions; - predicts the side reactions that may obstacle obtaining the right product from the given substrates; - proposes methods to solve common problems encountered during the synthesis, purification and analysis of organic compounds - assesses the risks associated with a given type of a reaction and suggests precautions that will enable to safely carry out the desired chemical conversions	[SU5] implementation of a problem task
[BCHMU2_W01] Knows and understands complex physicochemical processes and is able to analyse their course in connection with other fields of science.	The student: - characterizes the advantages and disadvantages of modern techniques of the organic syntheses discussed during the lecture	[SW1] oral statement/ conversation/discussion
[BCHMU2_U02] Is able to define her/his interests, develop them within the chosen direction and in connection with the subject of her/ his master's thesis by implementing the process of self-education and planning her/his professional career.	The student: - designs the optimal routes of multi-step syntheses	[SU5] implementation of a problem task
[BCHMU2_W05] Knows and understands the main trends in the development of chemistry combined with economics as two interpenetrating scientific disciplines.	The student: - describes the structure of substrates and catalysts needed to carry out the reactions discussed during the lectures - describes the conditions that must be secured for the reaction to proceed effectively - explains the general mechanism as well as the regio- and stereoselectivity of the discussed reactions - defines the terms related to a synthesis and a retrosynthesis	[SW4] test/exam - oral or written
[BCHMU2_K04] Is willing to properly assess the acquired knowledge, respect and disseminate it in order to solve specific cognitive and practical issues.	The student: - gets involved in a team work in solving project-type tasks; - discusses in a group the methods of solving synthetic problems; - presents the group's proposed solutions of synthetic problems	[SK1] oral statement/conversation/ discussion

Subject contents

- creation of new carbon-carbon bonds using, inter alia, Heck reaction, Suzuki reaction, olefin metathesis, Michael reaction, Robinson annulation
- creation of new carbon-heteroatom bonds using, inter alia, Sharpless, Jacobsen, Mitsunobu and Buchwald-Hartwig reactions
- modern techniques of organic synthesis, including: asymmetric catalysis, multicomponent reactions (for instance Mannich, Ugi and Passerini reactions)
- recognition of syntons in organic molecules, designing synthetic pathways for selected organic compounds

Prerequisites and co-requisites

Completed course in "Organic Chemistry"

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
problem tasks	51.0%	100.0%

Recommended reading

Basic literature	J. Clayden, N. Greeves, S. Warren, Organic chemistry
Supplementary literature	G.S. Zweifel, M.H. Nantz, P. Somfai, Modern organic synthesis. An introduction. Wiley 2017
eResources addresses	

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable

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