



Subject card

Subject name and code	STEREOCHEMICAL CONTROL IN ORGANIC SYNTHESIS, PG_00066112						
Field of study	Chemistry						
Date of commencement of studies	February 2027		Academic year of realisation of subject		2026/2027		
Education level	second-cycle studies		Subject group		Specialty subject group		
Mode of study	Full-time studies		Mode of delivery		blended-learning		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Organic Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Maria Milewska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	30.0	45
	E-learning hours included: 15.0						
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	45		5.0		25.0	75
Subject objectives	Broadening of knowledge on mechanism of reactions used in organic synthesis, especially concerning relationship between structures of reagents/substrates and stability of transition product						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K01] is aware of the problems related to the profession of a chemist, is able to assess the effects of the activity performed		TThe student is able to work individually and in a team; can assess the time-consuming task and manage a small team in a way that ensures the implementation of a task in the field of controlled chemical synthesis		[SK3] Assessment of ability to organize work		
	[K7_U04] develops and transmits technical information in the form of text documents, spreadsheets, graphs, technological diagrams and multimedia presentations, and prepares a speech including a multimedia presentation		The student is able to prepare a multimedia presentation based on the latest scientific articles, concerning the organic synthetic chemistry in a broad aspect, with particular emphasis on stereochemical aspects.		[SU5] Assessment of ability to present the results of task		
	[K7_W02] identifies analytical techniques appropriate for solving specific analytical tasks – also in the production plant		The student has knowledge related to modern organic chemistry, including the synthesis of organic chemical compounds, necessary to perform syntheses and solve technical problems, taking into account the relationship structure of the compound and its reactivity		[SW1] Assessment of factual knowledge		

Subject contents	Course content – lecture 1. Stereoselective syntheses: diastereoselective, enantioselective and doubly differentiating reactions 2. Diastereoselective syntheses of achiral compounds 3. Diastereoselective syntheses: strategies of control ('molecular walls', reactions of ring formation, metal coordination, pi-pi interactions, chiral and achiral supporting factors) nucleophilic addition - control of diastereoselectivity during addition on nucleophiles to the carbonyl group electrophilic reactions of alkenes reactions of aldol condensation pericyclic reactions: selected examples of cycloaddition and sigmatropic rearrangements hydrogenolysis in the presence of heterogenic and soluble catalysts 4. Enantioselective syntheses employing chiral, nonracemic reagents (hydroboration with chiral borates, reduction with chiral hydrides, chiral organometallic complexes) employing chiral, nonracemic catalysts (epoxidation, cyclopropanation, hydrogenolysis, catalysis with chiral bases or Lewis acids) 5. Doubly differentiating reactions interactions between chiral reagents control of stereoselectivity by reagent		
Prerequisites and co-requisites	Knowledge of basic principles of organic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Preparation and presentation of two reports on given subject	50.0%	50.0%
	Written examination	50.0%	50.0%
Recommended reading	Basic literature	1. J. Gawroński, K. Gawrońska, K. Kacprzak, M. Kwit WSPÓŁCZESNA SYNTETA ORGANICZNA, PWN Warszawa 2004 2. J. March CHEMIA ORGANICZNA. REAKCJE, MECHANIZMY, BUDOWA, WNT Warszawa 1975 3. E. L. Eliel, S. H. Wilen, L. N. Mander STEREOCHEMISTRY OF ORGANIC COMPOUNDS, J. Wiley&Sons, Inc., 1994 4. M. J. Milewska, Wykłady, http://www.pg.gda.pl/chem/Katedry/Organa/dydaktyka.htm	
	Supplementary literature	1. C. H. Wong, G. M. Whitesides ENZYMES IN SYNTHETIC ORGANIC CHEMISTRY, Pergamon 1995 2. Scientific papers related to the subjects realised at seminar	

	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Starting with cyclohexene and using any other needed reagents, outline a synthesis of 7,7-dibromobicyclo[4.1.0]heptane 2. Treating cyclohexene with 1,1-diiodoethane and zinc-copper leads to two isomeric products. What are their structure?	
Practical activities within the subject	Not applicable	

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