

<b>Course title</b> Wykład monograficzny – Nowoczesne metody syntezy chemicznej / Monographic lecture – Modern methods of chemical synthesis		<b>ECTS code</b> 13.3.1235	
<b>Name of unit administrating study</b> Faculty of Chemistry			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Chemical business	Master	Full-time studies	
<b>Teaching staff</b> Dr hab. Elżbieta Jankowska, profesor UG			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>  classes 30 h tutorial classes 10 h student's own work 35 h TOTAL: 75 h - 3 ECTS	
<b>A. Forms of classes, in accordance with the UG Rector's regulations</b> lecture			
<b>B. The realization of activities</b> In-class learning			
<b>Number of hours</b> lecture 30 h			
<b>The academic cycle</b> Second year, summer semester			
<b>Type of course</b> obligatory		<b>Language of instruction</b> Polish	
<b>Teaching methods</b> <ul style="list-style-type: none"> <li>multimedia presentation combined with a discussion</li> <li>solving problem tasks (designing reaction routes)</li> </ul>		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
		<b>A. Final evaluation, in accordance with the UG study regulations</b> Course completion (with a grade)	
		<b>B. Assessment methods</b> <ul style="list-style-type: none"> <li>solving problem tasks (designing reaction routes), individually and / or in a group</li> <li>written exam with open questions</li> </ul> written test exam	
		<b>C. The basic criteria for evaluation or exam requirements</b> To get a positive grade from the course the student has to: <ul style="list-style-type: none"> <li>solve a problem task (design the synthesis route/s), either individually or in a team</li> </ul> - pass the final test	
		Assessment criteria in accordance with the University of Gdansk Studies Regulations	
<b>Required courses and introductory requirements</b>			
<b>a. Formal requirements</b> Completed course in "Organic Chemistry"			
<b>b. Prerequisites</b>  Knowledge of basic issues in organic chemistry: functional groups occurring in organic compounds, nucleophilicity, electrophilicity, factors affecting the stability of organic particles, electronic and steric effects in the course of chemical reactions			

### Aims of education

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
- the concept of retrosynthesis

Enabling students to acquire skills of designing multi-step syntheses of organic compounds

### Course contents

- basic rules of carrying a synthesis of organic compounds: preparation of reagents, monitoring the progress of the reaction, isolation and purification of reaction products, analysis of the final product, keeping lab notes
- 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: microwave synthesis, solvent-free synthesis, synthesis using phase transfer catalysis, synthesis on a solid support, multicomponent reactions (including Mannich, Ugi, Passerini reactions)
- recognition of syntons in organic molecules, designing synthetic pathways for selected organic compounds

### Bibliography of literature

A.1. Used during classes:

unpublished materials, prepared by a teacher.

A.2. Studied independently by the student:

J. Gawroński, K. Gawrońska, K. Kacprzak, M. Kvit, Contemporary organic synthesis, PWN 2004

J. Clayden, N. Greeves, S. Warren, Organic chemistry

B. Supplementary literature

J. Skarżewski - Introduction to organic synthesis, PWN 1999

G.S. Zweifel, M.H. Nantz, P. Somfai, Modern organic synthesis. An introduction, Wiley 2017

### Knowledge

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
- characterizes the advantages and disadvantages of modern techniques of the organic syntheses discussed during the lecture
- defines the terms related to a synthesis and a retrosynthesis

### Skills

The student:

- critically analyzes the possibility of using a selected chemical reaction to obtain the desired intermediate product;
- designs the optimal routes of multi-step syntheses;
- 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

**Social competence**

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