GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Laboratory of the Organic Chemistry, PG_00054718		
Field of study	Biotechnology		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Organic Chemistry -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Monika Gensicka-Kowalewska	
	Teachers	dr inż. Monika Gensicka-Kowalewska dr hab. inż. Grzegorz Cholewiński dr hab. inż. Sebastian Demkowicz Mikołaj Walter Alicja Trocka dr hab. inż. Teresa Olszewska dr inż. Jan Alfuth dr inż. Karol Biernacki dr hab. Magdalena Śliwka-Kaszyńska	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	75.0	0.0	0.0	75
	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	75	10.0	40.0	125

Subject objectives	Student should know, understand and use the basic methods and techniques used during the synthesis, isolation and purification of organic compounds

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W03	The student has basic knowledge in the field of organic chemistry, allowing to discuss the structure of organic compounds (taking into account their spatial structure) and their physical and chemical properties, explaining the mechanisms of basic reactions. Knows methods of synthesis and identification of organic compounds. He has acquired basic skills in interpreting IR, 1H NMR, and 13C NMR spectra. Is able to compare and interpret data and apply known solutions to new situations in the field of synthesis and analysis of organic compounds. K_W02, K_W04, K_W05, K_U03	[SW1] Assessment of factual knowledge
K6_K06	The student has knowledge of occupational health and safety, and in particular knows the principles of safe use of chemicals and the selection and disposal of chemical waste, as well as the ability to apply this knowledge in laboratory work; The student is able to work in a group and independently.	[SK3] Assessment of ability to organize work
K6_U03	The student is able to perform a synthesis based on a literature recipe and isolate a natural compound from an organic material. The student understands the meaning of performing and knows the theoretical basis of unit operations and also distinguishes and knows the structure and operation of sets equipment used in the preparation of organic compounds. Has knowledge and skills in range of techniques used for synthesis, purification and identification organic compounds. Student has mastered manual skills necessary for laboratory work; learned planning (synthesis multi-stage) and observing experiments, drawing conclusions from them and developing the results in a form written.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Carrying out synthesis (one step or several steps) of selected organics belonging to different classes of compounds

Prerequisites and co-requisites

Student must pass the classes and lectures in Organic Chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Collecting a sufficient amount of points (preparations, oral answers and laboratory introductory test).	60.0%	100.0%

Recommended reading

Basic literature	1) K. Dzierzbicka, J. Rachoń, D. Witt - Preparatyka związków organicznych. Ćwiczenia laboratoryjne. 2) A. Vogel - Practical Organic Chemistry A. Vogel - Preparatyka organiczna. 3) March's Advanced Organic Chemistry. Reactions, mechanisms, and structure.
Supplementary literature	1) J. Wróbel - Preparatyka i elementy syntezy organicznej. 2) M. Mąkosza - Synteza Organiczna. 3) B. Bochwic - Preparatyka Organiczna. 4) "Metabolic Basis of Detoxication. Metabolism of Functional Groups", Ed. W. B. Jakoby, AP, NY 1982.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Calculate how many milliliters of water and concentrated hydrochloric acid (d = 1.0 g/ml) you will use to obtain: a. 50 ml of 3 M HCl b. 18 ml of 12% HCl 2. A mixture of 93 g benzyl alcohol and 62 g benzoic acid was heated to reflux in toluene. After 2 hours, 2.7 ml of water was collected in the Dean-Stark azeotropic apparatus. Draw the apparatus and calculate the yield of the reaction product assuming that the alcohol contained 6 mole% water and the acid purity was 90%. 3. Draw the apparatus and give its application: a) reflux condenser with a spiral coil b) funnel with a pressure-equalising tube c) mercury manometer showing the pressure of 15 mm Hg d) Vigreux fractionating column with a swan-neck distillation adapter 4. Describe in detail (giving the reaction schemes) the procedure of separation by extraction of a mixture consisting of 1,1-dimethoxyhexane, 2-aminophenol, phenylacetic aldehyde, N-methylbenzylamine and 2-nitrobenzoic acid into pure components (we start the process by dissolving equimolar amounts of the substance in ether and washing the organic phase with water. 5. What color will the universal indicator paper color in the 0.1M aqueous solution (write the equation for the reaction): (a) boron tribromide (b) ammonium chloride (c) sodium acetate (d) n-butanol 6. Draw a full steam distillation kit with a steam generator located on the left side of the kit. a) what melting point, volatility and solubility should the distilled substance have? b) what will be the consequences of clogging the condenser during distillation? c) calculate how many milliliters of water you will use to completely distill 10 g of xylene with steam? (temperature dependence on vapor pressure for xylene: t [oC] = 33.3 +0.51 p [mm Hg]) 7. Describe four main stages of crystallization from ethanol using activated carbon. Why is activated carbon ineffective when crystallized from hexane? 8. Explain the terms: (a) equilibrium distillation, (b) pyrophoric substance, (c) positive azeotrope, (d) manostat, (e) Wood's alloy 9. What funnel (slit-sieve or glass) is used to filter crystals after crystallization? Give at least three reasons for this choice 10. Suggest a useful reagent for chemical neutralization of the following poisons. Write the equation of the reaction taking place. a) KCN b) NaN_3 c) $HgCl_2$

	1. Write the mechanism of the reaction of $(CH^3)^3CCH^2Mg$ with 2,2,4-trimethylpentan-3-one leading to two C-8 products. 2. Explain the term Schlenk equilibrium. How can we shift Schlenk equilibrium position? 3. What is the purpose of adding saturated ammonium chloride when processing crude 1,1-diphenylethanol?
Work placement	Not applicable