University of Gdańsk

Subject card

Subject name and code	Chemistry of polymers, PG_00082043		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group 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 Polish
Semester of study	5	ECTS credits	3.0
Learning profile	academic	Assessment form	exam
Conducting unit	Laboratory of Chemistry of Biologically Active Compounds -> Department of Molecular Biochemistry -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Piotr Rekowski	
	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

Additional information:

Lecture leader: Prof. Piotr Rekowski

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

to acquaint students with all issues mentioned in the lecture contents; to acquaint students with the nomenclature used in polymer chemistry; learning about the structure to familiarize students with the basic types of chemical reactions used in the synthesis of polymers to teach students the prediction of some physicochemical properties of polymers depending on their chemical structure and microstructure to develop the ability to critically evaluate information on the environmental harmfulness of using synthetic polymers in everyday life and industry

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	1. illustrates polymerization stages by chemical reactions, 2. characterizes the ways of describing the polymer microstructure 3. characterizes methods of radical, ionic and coordination polymerizations 4. describes the polyaddition and polycondensation	[SU4] test/exam - oral or written
[CHEML3_W03] Explains the relationship between the structure of matter and its observed properties.	1. shows the structure of the commonly used synthetic polymers 2. uses basic descriptions of polymer microstructures 3. provides for some physicochemical properties (eg glass transition temperature) of polymers depending on their chemical structure and microstructure	[SW4] test/exam - oral or written
[CHEML3_U09] Is able to learn independently.	1. defines the basic principles of polymer chemistry 2. analyzes and evaluates the influence of some polymers on the natural environment	[SU4] test/exam - oral or written
[CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.	1. uses chemical terminology to the extent necessary to present(both in oral and written form) the content presented in the course;	[SU4] test/exam - oral or written

Subject contents

Lecture topics: polymers - the concept of macromolecule, polymer and biopolymer, chemical structure description, polymer microstructure (tacticity, stereochemistry). Structure-property relationships: relation of glass transition to structure. The main synthesis methods of macromolecules; polymerisation and polycondensation; copolymerization; elementary reactions: initiation, propagation, termination; polymerization: radical, ionic (cationic and anionic) and coordination. Polymer classes: carbo- and hetero-chain polymers, polyolefins, vinyl polymers, polyesters, polyamides; phenolic and epoxy resins. Industrial methods of obtaining monomers for the synthesis of polymers. Chemical reactions of polymers: crosslinking, grafting, oxidation.. The use of polymers: in modern technologies, industry, medicine, special polymers (electrically conductive, thermally resistant), biodegradable polymers, polymers and the natural environment.

Prerequisites and co-requisites

Passed organic chemistry exam

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written exam with open questions	51.0%	100.0%

Recommended reading

Basic literature	Literature required to pass the course: Rabek J.F., Współczesna wiedza o polimerach, PWN 2008 Pieluchowski J., Puszyński A., Chemia Polimerow Wydawnictwo AGH, Kraków 1998 Walton D., Lorimer P., Polymers, Oxford University Press 2001 Stevens M.P., Polymer Chemistry, Oxford University Press, 1999 Monographic works provided by assistants leading classes
Supplementary literature	Various academic handbooks concerning polymer chemistry
eResources addresses	

Example issues/ example questions/ tasks being completed

1. In the stage of initiation of radical polymerization of poly(methyl methacrylate) with the use of peroxide di-t-butyl at 60° C, the presence of 3 different additives was found. Present reactions leading to these addukts, which one is the most abundant? 2. Present the mechanism of anionic polymerization of lactams, in which the active site is located on the monomer, and a coinitiator (activator) is necessary to initiate the reaction in addition to the initiator.

Work placement

Not applicable

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