

Subject card

Subject name and code	Chemistry of polymers, PG_00082043						
Field of study	Chemistry						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2028/2029		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Optional subject group 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		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						
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- <i>t</i> -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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