GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	CHEMISTRY AND TECHNOLOGY OF POLYMERS, PG_00036531		
Field of study	Chemistry		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	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	general academic profile	Assessment form	assessment
Conducting unit	Department of Polymer Technology -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Justyna Kucińska-Lipka	
	Teachers	dr hab. inż. Justyna Kucińska-Lipka dr inż. Krzysztof Formela dr hab. inż. Michał Strankowski dr inż. Paulina Parcheta-Szwindowska dr inż. Maciej Sienkiewicz dr inż. Marcin Włoch prof. dr hab. inż. Janusz Datta dr inż. Ewa Głowińska mgr inż. Przemysław Gnatowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	0.0	45

E-learning hours included: 0.0

eNauczanie source addresses:
Moodle ID: 1449 Chemia i Technologia Polimerów 2025 - WYKŁAD / LABORATORIUM
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1449

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

The aim of this course is to familiarize students with issues related to polymer chemistry and technology. The chemical section will discuss types of polymers, such as thermoplastics, thermosets, and elastomers, as well as addition and condensation polymerization methods. The technological section will cover the processing of these types of polymers.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] knows how to get information from literature, databases and other sources, can integrate the information obtained, interpret and critically evaluate it, and draw conclusions, and to formulate and justify the opinions	Students can use and obtain information from the literature on polymer chemistry and technology, preparing written reports and summaries of completed tasks. Students can critically analyze collected data and draw conclusions regarding polymer chemistry and technology.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[K6_W07] has knowledge about basic polireactions making possible the production of various macromolecular compounds, including the idea of creating blends and polymer composites for specific applications	Students will be familiar with the methods of polymer synthesis and will be able to discuss the various types of addition polymerization (free radical and ionic) and condensation polymerization. Students will be able to classify polymers into thermoplastics, thermosets, and elastomers, and characterize each group, providing examples of polymers within it.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_U06] can analyze the functioning of equipment, apparatus and technology lines used in laboratories and chemical industry, and can recognize and propose methods to solve the simple engineering tasks which he can meet as an Engineer and select and use routine methods, chemical apparatus and tools to solve practical engineering tasks, including also technological processes; can himself/herself read and make technical drawings using CAD software	The student knows polymer processing methods, including injection molding and extrusion, and is able to identify technological devices and machines for processing thermoplastics, thermosets and elastomers.	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information

Subject contents

LECTURE:

- Introduction to polymer chemistry and technology
- Polymers and plastics. Functional additives to polymers
- Free-radical polymerization. Radical polymerization methods
- Ionic polymerizations: anionic and cationic polymerization
- Condensation polymerization
- Chemistry and technology of rubber
- Chemistry and technology of polyurethanes
- Chemistry and technology of chemo- and thermosetting resins
- Polymer processing by injection molding
- Polymer processing by extrusion
- Functional polymers
- Engineering and special purpose polymers
- Plastics and rubber recycling

LABORATORY:

- Radical Polymerization of Methyl Methacrylate: Bulk and Suspension Polymerization
- Polycondensation: Synthesis of polyamides in bulk and at the interface
- Polyaddition: Synthesis of cast and porous polyurethanes
- Chemical modification of polymers: Synthesis of poly(vinyl alcohol) from poly(vinyl acetate)
- Thermoplastic processing: injection molding and extrusion

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
laboratory: attendance and work in classes, reports	100.0%	40.0%
lecture: written test	60.0%	60.0%

Recommended reading

Basic literature	• J. Pielichowski, A. Puszyński: *Chemia Polimerów*, Wydawnictwo FOSZE, Rzeszów 2012 • Z. Floriańczyk, S. Penczek: *Chemia Polimerów. Tom I: Makrocząsteczki i metody ich otrzymywania*, Wydawnictwo PW, Warszawa 2001 • Z. Floriańczyk, S. Penczek: *Chemia Polimerów. Tom II: Podstawowe polimery syntetyczne*, Wydawnictwo PW, Warszawa 2002
Supplementary literature	• J. Rabek: *Współczesna wiedza o polimerach. Tom I: Budowa strukturalna polimerów i metody badawcze*, PWN, Warszawa 2017 • J. Rabek: *Współczesna wiedza o polimerach. Tom II: Polimery naturalne i syntetyczne, otrzymywanie i zastosowania*, PWN, Warszawa 2017
eResources addresses	

Example issues/ example questions/ tasks being completed	• List the polymers obtained by free-radical polymerization. • Describe the mechanism of free-radical polymerization of a selected unsaturated monomer. • List the industrial methods for free-radical polymerization. • List the polymers obtained by hetero- and homopolycondensation. • List the basic raw materials necessary for the synthesis of polyurethanes. • List the methods for processing thermoplastics. • Give examples of synthetic rubbers. • List the components of rubber mixtures
Work placement	Not applicable

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