



Subject card

Subject name and code	Engineering Polymers For Special Applications, PG_00064344						
Field of study	Chemical Technology						
Date of commencement of studies	February 2027		Academic year of realisation of subject		2027/2028		
Education level	second-cycle studies		Subject group		Optional subject group Specialty 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	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Polymer Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Justyna Kucińska-Lipka				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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		15.0	50
Subject objectives	The aim of the course is to familiarize students with the types, preparation and characteristics of selected special-purpose engineering polymers.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K03] can interact and work in a group, taking on a variety of roles		is able to work in a group (taking on various roles) while carrying out practical tasks related to the preparation and characterization of polymeric materials. The student collaborates with other class participants to complete assigned activities and prepare a final report.		[SK2] Assessment of progress of work [SK1] Assessment of group work skills [SK3] Assessment of ability to organize work		
	[K7_W02] selects appropriate apparatus and materials for the manufacture and processing of consumer goods		is able to list special-purpose engineering polymers and discuss the methods of their preparation, properties and applications		[SW1] Assessment of factual knowledge		
	[K7_K02] understands the non-technical aspects and implications of graduate activity, including the impact on the environment		understands the social importance of special-purpose engineering polymers and their impact on the development of civilization.		[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work		
	[K7_U06] applies computer, statistical and specialised database methods to solve scientific and technological problems in technology and related fields		can use specialized chemical and research equipment necessary to obtain and characterize the properties of special-purpose engineering polymers. Students can use specialized databases to characterize the properties and operating conditions of special-purpose polymer materials.		[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	Course content – lecture <ul style="list-style-type: none">• Introduction to special-purpose materials• Modern self-healing materials• Shape memory polymers• Conductive polymers• Liquid crystal polymers• Polymer composites• Organic-inorganic polymer nanocomposites• Carbon polymer nanocomposites• Modern polymer resins• Heat-resistant polymers• Polymers in the automotive industry• Geotextiles and geomembranes• Flame retardation of polymer materials• Natural plant polymers• Modern eco-friendly materials		
	Course content – laboratory <ul style="list-style-type: none">• Preparation of polymer nanocomposites• Analysis of the mechanical properties of nanocomposites• Study of the thermal characteristics of the obtained materials• Analysis of the thermomechanical properties of nanocomposites• Characterization of the thermal stability of the obtained materials• Evaluation and comparison of the obtained materials		
Prerequisites and co-requisites	Basic knowledge of polymer chemistry and technology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture: test	50.0%	50.0%
	laboratory: work during classes, reports	50.0%	50.0%
Recommended reading	Basic literature	<ul style="list-style-type: none">• The latest publications related to special purpose polymers.• I. Gruin: Materiały polimerowe, PWN, Warszawa 2003.• Z.K. Brzozowski, W. Szlezyngier: Polimery specjalne i inżynieryjne. Tworzywa sztuczne. Tom 2, Wydawnictwo Oświatowe FOSZE, 2012.• E. Baer: High Performance Polymers: Structure, Properties, Composites, Fibers, Hanser Publishers, 1991.	
	Supplementary literature	<ul style="list-style-type: none">• S. Maiti, S.K. De: Specialty Polymers: Materials and Applications, Springer, 2017• M. Gilbert (Ed.): Brydson's Plastics Materials, Butterworth-Heinemann, 2017	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none">• Characterize carbon nanofillers and their effect on the polymer matrix.• Describe the three main mechanisms of action of self-healing polymers.• Present the most important research methods for observing the morphology of nanocomposites.• What mesophases can liquid crystalline polymers form?• Describe the structure and properties of thermotropic polymers.		
Practical activities within the subject	Not applicable		

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