GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Engineering Polymers For Special Applications, PG_00064344		
Field of study	POLIMERY INŻYNIERSKIE SPECJALNEGO PRZEZNACZENIA		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
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_K02] understands the non-technical aspects and implications of graduate activity, including the impact on the environment	The student understands the social importance of special-purpose engineering polymers and their impact on the development of civilization.	[SK2] Ocena postępów pracy [SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce
[K7_U06] applies computer, statistical and specialised database methods to solve scientific and technological problems in technology and related fields	Students 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.	[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU4] Ocena umiejętności korzystania z metod i narzędzi [SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania
[K7_W02] selects appropriate apparatus and materials for the manufacture and processing of consumer goods	The student is able to list special-purpose engineering polymers and discuss the methods of their preparation, properties and applications	[SW1] Ocena wiedzy faktograficznej
[K7_K03] can interact and work in a group, taking on a variety of roles	The student 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.	[SK3] Ocena umiejętności organizacji pracy [SK1] Ocena umiejętności pracy w grupie [SK2] Ocena postępów pracy

<table>
<tr><td>Subject contents</td><td>Course content – lecture
• 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
• 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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of polymer chemistry and technology</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>lecture: test</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>laboratory: attendance and work during classes, reports</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>• 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.</td></tr>
<tr><td>Supplementary literature</td><td>• S. Maiti, S.K. De: Specialty Polymers: Materials and Applications, Springer, 2017
• M. Gilbert (Ed.): Brydson's Plastics Materials, Butterworth-Heinemann, 2017</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>• 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.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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