GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	BIOMATERIALS AND GREEN POLYMERS IN A SUSTAINABLE ECONOMY, PG_00064311		
Field of study	BIOMATERIAŁY I ZIELONE POLIMERY W ZRÓWNOWAŻONEJ GOSPODARCE		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2025/2026
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	1	ECTS credits	4.0
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	30.0	0.0	30.0	0.0	0.0	60

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	60	5.0	35.0	100

Subject objectives

The aim of the course is to familiarize students with the types and applications of biomedical polymers and biopolymers

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U02] carries out experiments using properly selected techniques and apparatus, taking advantage of new developments in technology and related fields	The student is able to conduct syntheses of compounds using the principles of green technology	[SU4] Ocena umiejętności korzystania z metod i narzędzi [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU2] Ocena umiejętności analizy informacji
[K7_K03] can interact and work in a group, taking on a variety of roles	the student is able to solve the problem of normative acts in force in the legislation on material groups	[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce [SK1] Ocena umiejętności pracy w grupie
[K7_K01] critically evaluates the content of cognitive and practical problems	The student is able to define the difference between biomedical polymers and biopolymers	[SK4] Ocena umiejętności komunikacji, w tym poprawności językowej [SK2] Ocena postępów pracy

Subject contents	Course content – lecture Nomenclature and definitions on polymeric biomaterials issues. Medical devices, classification and evaluation of conformity. compatibility. Groups of polymers, polymer micro and nanocomposites most commonly used in medicine, dentistry and pharmacy. Requirements for polymeric materials used in the above-mentioned applications. Testing-Pharmacopeia Poland. Manufacturing/processing of plastics for medical purposes. Sterilization of polymeric biomaterials. Methods to increase the biocompatibility of synthetic polymers with tissues, blood and other biological environments. Properties of polymeric biomaterials for specific applications. Advances in the chemistry and engineering of polymeric biomaterials using selected examples of their applications - contact lenses - lightweight gypsum - polymeric biomaterials in tissue reconstruction and cosmetic surgery - Polymeric biomaterials in cardiac surgery. Chemistry and development of artificial heart design. - Current and future directions of biomedical applications of polymer composites in surgery Bone and soft tissue - Polymeric biomaterials used in dialyzers and other medical equipment - Smart polymer biomaterials in surgery and medical therapy. - Polymer hydrogels. - Controlled drug delivery systems using polymeric carriers - modern polymeric dressings - polymeric antimicrobial coatings - dentures, implants and polymeric plastic compounds in dentistry Biopolymers in the economy of sustainable development: definition, application legal acts normalizing their classification. Biomonomers for organic synthesis (bioglycols, carboxylic bioacids, bioalcohols, biopolyols, polyols from biomass and lignin, etc.), biopolyurethanes. Polymers derived from renewable sources starch, cellulose, chitosan. Recent trends in the application of biopolymers in various industries.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture	60.0%	60.0%
laboratory	60.0%	40.0%

Recommended reading

Basic literature	M. Bassas-Galia, M. Zinn, Bioresorbable Polymers for Biomedical Applications , 2017 A. Aravamudhan, D.M Ramos, A.A Nada., S.G Kumbar, Natural Polymers,Polysaccharides and Their Derivatives for Biomedical Applications, Natural and SyntheticBiomedical Polymers, Elsevier, 2014 F. Martello, I. Gerges, A. Tocchio, Bringing bioresorbable polymers to market,Bioresorbable Polymers for Biomedical Applications, Woodhead PublishingEditors: Perale& Hilborn, 2016
Supplementary literature	M. Bassas-Galia, M. Zinn, Bioresorbable Polymers for Biomedical Applications , 2017 A. Aravamudhan, D.M Ramos, A.A Nada., S.G Kumbar, Natural Polymers,Polysaccharides and Their Derivatives for Biomedical Applications, Natural and SyntheticBiomedical Polymers, Elsevier, 2014 F. Martello, I. Gerges, A. Tocchio, Bringing bioresorbable polymers to market,Bioresorbable Polymers for Biomedical Applications, Woodhead PublishingEditors: Perale& Hilborn, 2016
eResources addresses	

Example issues/ example questions/ tasks being completed	What are biopolymers What are medical polymers Principles of green chemistry Principles of sustainable development Modern polymeric materials in the economy
Practical activites within the subject	Not applicable

Document generated electronically. Does not require a seal or signature.