

Course title:	Chemistry of modern polymeric materials
Institute/Specialty:	FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY / Chair of Biotechnology and Physical Chemistry
Number of contact hours:	30 hours (lectures)
Course duration:	1 semester
ETCS credits:	2
Course description:	The course allows the students to understand basic laws in polymer chemistry and physics as well as the effect of chemical structure of polymers and used additives on the materials properties. A general introduction to polymers, basic terminology and definitions, their classification and applications will be presented. In the second part of course various types of modern polymeric materials will be presented and basic structure-property relationships will be discussed including explanation of the reasons of specific characteristics of analysed materials. Technology and processing of polymers will be discussed in the context of their special applications.
Lectures content:	Types of polymers and polymerization reactions: Step and chain polymerization. Polyaddition and polycondensation. Polymer structure. Chain polymerization: initiation methods, initiators. Propagation and termination of polymerization reactions. Copolymerization – Q-e scheme. Kinetics of polymerization reactions: equations, decomposition, propagation and termination rate constants. Cationic and anionic polymerizations: mechanism, catalysts, and conditions. Coordination polymerization: catalysts and kinetics. Stereoregularity of polymerization. Natural polymers. Starch – structure, properties and reactivity: amylose and amylopectin. Modification of starch – applications. Cellulose - structure, properties and reactivity. Modification of lignin. Cellulose – regenerating processes. Natural fibers – type, characteristic and comparison with synthetic fibers. Carbon fibers from natural and synthetic polymers. Biodegradable polymers – application in pharmacy, medicine, and tissue engineering. Evaluation methods and properties.
Literature:	[1]] Florjańczyk Z. — <i>Chemia polimerów, tom I,II,III</i> , Warszawa, 2002, Oficyna W Wydawnicza Politechniki Warszawskiej [2] Sionkowska A., Lewandowka K., <i>Biopolimery</i> , Toruń, 2016, Wydawnictwo UMK Toruń. [3] Sikorski Z., Drozdowski B., — <i>Chemia żywności, tom 1 i 2</i> , Warszawa, 2007, Wydawnictwa NaukowoTechniczne
Assessment method:	Final test
Prerequisites:	Student should have basic knowledge of organic chemistry
Primary target group:	all specialties students (Chemical Engineering / Chemical Technology)
Lecturer:	Prof. Dariusz Bogdał
Contact person:	Prof. Dariusz Bogdał (dariusz.bogdal@pk.edu.pl)
Deadline for application:	15th of January for students applying for spring semester
Remarks:	The course is selectable