

Course code	CC3							
Type and description	CC - Core Course							
ECTS credits	2							
Course name	Advanced Molecular and Macromolecular Materials Science							
Course name in Polish	Zaawansowana Inżynieria Materiałów Molekularnych i Makromolekularnych							
Language of instruction	English							
Course level	8 PRK							
Course coordinator	prof. dr hab. Krzysztof Matyjaszewski, dr hab.inż. Joanna Pietrasik							
Course instructors	prof. dr hab. Krzysztof Matyjaszewski, dr hab. inż. Joanna Pietrasik, prof. Wojciech Pisula, dr hab.inż. Beata Łuszczyńska							
Delivery methods and course duration		Lecture	Tutorials	Laboratory	Project	Seminar	Other	Total of teaching hours during semester
	Contact hours	15	0	0	0	0	0	15
	E-learning	No	No	No	No	No	No	
	Assessment criteria (weightage)	1.0	0.00	0.00	0.00	0.00	0.00	
Course objective	The aim of the course is to enable students to acquire knowledge in the field of the relationship between the chemical and macromolecular structure and the properties of polymer materials. Problems of macromolecular engineering will be discussed from the point of view of materials applications. Students get acquainted with advanced methods of synthesis and processing of functional materials, such as, for example, reversible deactivation radical polymerizations, self-assembly, etc.							
Learning outcomes	A PhD student after completing the course can: 1. characterize the relationship between structure and material properties - effects W1, W3 2. describe the theoretical basis defining the properties of materials - effects W1, W3 3. choose appropriate methods of synthesis and material processing - effects – U3, K2							
Assessment methods	Verification methods of learning outcomes effects W1, W3, U3, K2 – written project/essay The final grade consists of: Result from the project/essay evaluation – 100%							
Prerequisites	none							
Course content with delivery methods	LECTURE Introduction to the macromolecular engineering; living and controlled polymerization The basic elements of controlled ion polymerization Basics of controlled radical polymerization Atom Transfer Radical Polymerization (ATRP)) ATRP - synthesis (catalysts and initiators) Architectural control of macromolecules - topology (branched, comb-branched macromolecules) Architecture control of macromolecules - composition of copolymers (statistical, block, gradient copolymers) Architecture control of macromolecules - functionalization Hybrid polymers with inorganic and biological elements Applications and industrial products obtained by controlled polymerization methods							
Basic reference materials	1. Tutor's materials. 2. A.H.E. Mueller, K. Matyjaszewski; eds.: Controlled and Living Polymerizations: From Mechanisms to Materials, Wiley-VCH, Weinheim, 2009. 3. T.P. Davis, K. Matyjaszewski eds.: Handbook of Radical Polymerization, Willey, 2002. 4. K. Matyjaszewski, Y. Gnanou, L. Leibler eds.: Macromolecular Engineering: Precise Synthesis, Materials Properties, Applications - Volume 1-4, Willey-VCH, 2007. 5. B. Łuszczyńska, K. Matyjaszewski, J. Ulański eds.: Solution processable components for organic electronics, Wiley VCH, 2019.							
Other reference materials	current scientific articles, given by the lecturer							
Average student workload outside classroom	20 hrs							
Comments	-							
Last update	2022-01-25							