



Subject card

Subject name and code	Additive Technologies - 3D Printing, PG_00064343						
Field of study	TECHNOLOGIE ADDYTYWNE - DRUK 3D						
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		2.0		18.0	50
Subject objectives	The aim of the course is to develop the ability to select appropriate 3D printing methods for specific polymer groups and to explain the relationships between process conditions and the physicochemical and mechanical properties of materials. The course enables students to acquire knowledge about additive technologies used for manufacturing plastic products and enhances skills in identifying 3D printing methods based on the obtained components. The goal of the program is also to prepare students to recognize typical defects and flaws characteristic of polymer 3D printing and to perform practical analysis of these issues. The course fosters teamwork skills in laboratory settings and raises awareness of the environmental impact of engineering activities, supporting decision-making to minimize technological and ecological consequences.						
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: select an appropriate 3D printing method for a specific polymer group; explain the necessity of applying specific process conditions and time in relation to the physicochemical and mechanical properties of polymers.		[SU4] Ocena umiejętności korzystania z metod i narzędzi [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU1] Ocena realizacji zadania		
	[K7_K04] is aware of his/her responsibility for making decisions, respecting and developing principles of professional ethics and taking action to uphold these principles		The students can collaborate and work collaboratively in laboratory settings. They are aware of the impact of engineering activities on the environment and are able to make decisions that minimize negative technological and ecological impacts.		[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce [SK3] Ocena umiejętności organizacji pracy [SK1] Ocena umiejętności pracy w grupie		
	[K7_W03] selects methods of data analysis, including statistical and modelling, useful for solving scientific and technological problems		The student is able to list and describe the types of additive technologies for plastics, is able to identify the 3D printing method used to obtain a given plastic product, is able to identify typical flaws and defects associated with 3D printing of plastics		[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym [SW1] Ocena wiedzy faktograficznej		

Subject contents	Course content – lecture - History of 3D Printing 3D Printing Methods 3D Printing of Thermoplastic Materials: FDM and SLS 3D Printing of Photocurable Materials: SLA - Bioprinting of Hydrogel Materials 3D Printing of Special Materials - The Latest Trends in Additive Technologies 4D and 5D Printing - Ethical Issues in the widespread use of 3D Printing		
	Course content – laboratory 3D Modeling - Preparing 3D Models for Printing - Preparing Thermoplastic Materials for 3D Printing - Processing Properties of Thermoplastic Materials Important in 3D Printing 3D Printing of Thermoplastic Materials: FDM Technologies 3D Printing of Thermoplastic Materials: SLS Technology 3D Printing of Photocurable Resins: SLA/DLP Technology		
Prerequisites and co-requisites	Basic knowledge about plastics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory: attendance, reports	85.0%	40.0%
	lecture: written test	60.0%	60.0%
Recommended reading	Basic literature	- Kloski Liza Wallach, Kloski Nick, Druk 3D. Praktyczny przewodnik po sprzęcie, oprogramowaniu i usługach, Wydawnictwo Helion, 2022 - Brian Evans, Practical 3D Printers The Science and Art of 3D Printing, Apress, 2012 - Ben Redwood, Filemon Schöffner, Brian Garret, The 3D Printing Handbook: Technologies, Design and Applications, 3D Hubs B.V., 2017	
	Supplementary literature	- Helena Dodziuk, Druk 3D/AM : zastosowania oraz skutki społeczne i gospodarcze, PWN, 2012 - Deepak M. Kalaskar, 3D Printing in Medicine, Woodhead Publishing, 2022	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Theoretical (lecture) topics: - Present a brief historical overview of the development of 3D printing technology and discuss its importance for industry. - List and characterize the basic 3D printing methods, pointing out the differences between them. - Explain the operating principle of FDM technology and discuss its advantages and limitations in relation to thermoplastic materials. - Describe SLS technology, indicating its applications and typical materials used in this process. - Explain the differences between SLA photocurable printing and DLP printing. - Describe the basics of bioprinting using hydrogel materials and provide examples of its potential applications. - Present the essence and examples of 4D and 5D printing applications in the context of the latest trends in additive technologies. - Discuss the potential ethical issues related to the widespread use of 3D printing in everyday life and industry. Practical (laboratory) topics: - Describe step-by-step the process of preparing a 3D model for FDM printing. - What printing parameters (e.g., temperature, speed, layer thickness) have a key impact on the quality of a product using FDM technology? - Explain the differences in material preparation for printing in FDM and SLS technologies. - How can you recognize common defects in FDM 3D prints (e.g., underfilling, stringing, deformation) and how can you prevent them? - Distinguish the differences in the structure and properties of products obtained using FDM and SLS. What are the safety rules when working with photocurable resins in SLA/DLP technology? - What is the process of curing layers in SLA technology, and how important is the exposure time? - Describe how to prepare and calibrate a 3D printer before starting an FDM print.		
Practical activities within the subject	Not applicable		

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