

Subject card

Subject name and code	Hybrid and additive manufacturing processes, PG_00064860							
Field of study	Mechanical Engineering							
Date of commencement of studies	February 2025		Academic year of realisation of subject			2025/2026		
Education level	second-cycle studies		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		English			
Semester of study	2		ECTS credits		2.0			
Learning profile	general academic profile		Assessme	ent form		assessment		
Conducting unit	Division of Manufacturing and Production Engineering -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej							
Name and surname	Subject supervisor		dr inż. Dawid Zieliński					
of lecturer (lecturers)	Teachers							
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project		Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0		0.0	30
	E-learning hours included: 0.0							
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41796						6	
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	Introduction to the topics of hybrid and additive manufacturing methods along with reverse engineering applied to the manufacture of mechanical engineering parts and the development trends of modern manufacturing.							

Data wygenerowania: 17.07.2025 12:38 Strona 1 z 3

Learning outcomes	Course outcome	Subject outcome	Method of verification		
	[K7_U15] evaluates the feasibility of advanced methods and tools for solving complex engineering tasks of a practical nature, characteristic of the field of study, and selects and applies appropriate methods and tools for this purpose	The student demonstrates knowledge and ability to work in a computer environment in the field of hybrid and additive manufacturing methods. He is able to develop a complex process for manufacturing selected parts of mechanical engineering, taking into account the selection of appropriate technology, type of material and process parameters. In addition, he properly evaluates the obtained results from the point of view of selected technological and economic aspects of the process.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K7_U11] communicates and justifies opinions on specialized topics in a manner understandable to diverse audiences, including the use of modern techniques, including information technology	The student uses modern computer methods of hybrid and additive manufacturing technologies when solving engineering tasks. He can properly present and justify the selection of a manufacturing method for unconventional materials and specific features of the designed part.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K7_W12] identifies and interprets the main developmental trends and significant new achievements in the field of engineering and technical sciences and disciplines relevant to the course of study	Communication and data analysis skills for presenting the designed manufacturing technology for mechanical components used in mechanical engineering using hybrid and additive manufacturing methods.	[SW2] Assessment of knowledge contained in presentation		
	[K7_W04] demonstrates knowledge covering selected topics of advanced specific knowledge, in particular methods, techniques, tools specific to Mechanics and Mechanical Engineering processes, systems and equipment	The student has a deep knowledge of unconventional and hybrid manufacturing methods, especially additive technologies and special materials. He also has the knowledge necessary to develop manufacturing processes for selected mechanical engineering parts, taking into account the proper selection of the manufacturing method and process parameters.	[SW1] Assessment of factual knowledge		
Subject contents	Lectures: Basics of additive technologies and hybrid manufacturing; principles and characteristics of the development of the 3D printing process of mechanical engineering parts; characteristics of additive methods taking into account powder technologies, resin technologies and methods based on extrusion of materials; characteristics of systems for 3D printing and hybrid manufacturing; application of hybrid and additive manufacturing methods in mechanical engineering.				
	Project classes: basics and characteristics of CAD/CAM software used in hybrid and additive method development of the process of making selected parts of mechanical engineering with subtractive using CAM software; development of the process of rapid prototyping of selected parts of mechanical engineering with 3D printing technology using dedicated slicers; multi-criteria comparative evaluation processes of making selected parts of mechanical engineering with the use of CNC cavity tech 3D printing, taking into account technological and economic aspects; basics of incremental tech principle of operation and construction of 3D printers, preparation of the device for operation, and process flow, postprocessing.				
Prerequisites and co-requisites	Knowledge of technical drawing, the basics of machine technology and cutting, as well as CAD/CAM computer-aided manufacturing systems.				
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade		
	Project	60.0%	40.0%		
	Colloquium at the end of the semester	60.0%	60.0%		

2 Gelshardt, A. (2012). Understanding additive manufacturing. Munich: Carl Hariser Verlag. 3. Slaminski, P., & Budzik, G. (2015). Technikis przyrostowe: druk dnikarki 3D. Wisrasw. Poland. Oficyna Wydawnicza Politichniki Warszwańskie. 4. Katapana S. Manufacturing Engineering and Technology Pearson Education Inc. Upper Sadde River, New Jersey 2006. 5. Przemysław Kochan. EdgeCAM. Wieloosiowe frezowanie CNC. Wydawnictwo Helion. Gilwice 2014. Supplementary literature 1. Deja. M., Dobrzyński, M., Flaszyński, P., Haras, J., & Zieliński, D. (2018). Application of Rapid Prototyping technology in the manufacturing of turbine blades with small diameter holes. Polish Maintime Research, 25(4), 116+123. 2. Deja. M., & Zieliński, D. (2020). Application of 3D printing metal poweier technology in the manufacture of components with complex geometries. Mechanic 22-25. 3. Zieliński, D. (2020). Podstawy technologii selektywnego spiekania laserowego proszków polimerowychSLS. Tworzywa Sztuczne w Przemysle, 81-83. 4. Zieliński, D. (2020). Podstawy technologii selektywnego spiekania laserowego proszków polimerowychSLS. Tworzywa Sztuczne w Przemysle, 81-83. 4. Zieliński, D. (2021). Drukowanie trwałych elementów z tworzyw tempopiastycznych w technologii FDMFFF. Tworzywa Sztuczne w Przemysle, 103-106. eResources addresses Example issues/ example questions/ tasks being completed 1. Basiac of 3a printing technology (definition, division into main areas a papilization, etc.) Division of 3d radios desease printing technology in Characteristics, so, tec.) 3. Comparison of subtractive (machining) processes and additive (incrementa) technology. 4. Advartages and disadvartages, pulmatabaros 30 d printing technology 5. Characteristics of 3p printing technology in process of selected mechanic, materials, application area 6. Characteristics of 3p printing technology: DV LCD/mSLA (principle of operation, schematic, materials, application of the different stages of the rapid prototyping process of selected mechanical parts. 10. Indicatio	Recommended reading	Basic literature	1.Redwood, B., Schffer, F., & Garret, B. (2017). The 3D printing handbook: technologies, design and applications. 3D Hubs.		
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	Work placement				

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