GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00052093		
Field of study	Nanotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Optional 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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Chmielewski	
	Teachers	dr inż. Marek Chmielewski dr inż. Mateusz Cieślik	

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

eNauczanie source addresses:

Moodle ID: 4822 Nowoczesne techniki wytwarzania elementów urządzeń technologicznych https://enauczanie.pg.edu.pl/2025/course/view.php?id=4822

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 the practical application of 3D prototyping systems used for practical solutions to engineering problems and issues. This process will be carried out from the initial stage of determining design requirements, defining material requirements, including the process of modifying them, to the issue of creating a finished design, preparing it for printing, and printing it. The opportunity to work on modern FDM and SLA printing systems.

Translated with DeepL.com (free version)

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K04	Working in laboratory groups of no more than two people. Cooperating to achieve the desired results. Planning and dividing functions and roles in the process of operating 3D prototyping equipment and in the processes of preparing the final product.	[SK1] Assessment of group work skills
K6_W09	Students will learn about the operation and construction of measuring and testing devices used in additive prototyping and in preparatory processes dedicated to raw materials for 3D printing.	[SW3] Assessment of knowledge contained in written work and projects
K6_W07	Students learn about techniques used in measurement processes in nanotechnology, and learn about the possibilities and limitations of nanotechnology and nanotechnology products. They are able to identify the scope and application of nanotechnology techniques in the creation of materials for 3D printing.	[SW1] Assessment of factual knowledge
K6_U04	When performing tasks related to laboratory topics, student learns the correct method of conducting experiments. He performs and understands the need for multi-faceted analysis of the results obtained. He correctly performs calibration procedures and effectively uses their results to determine the parameters of unknown elements under investigation.	[SU1] Assessment of task fulfilment
K6_U02	Students learn about the possibilities of various measurement techniques, independently discover and identify opportunities for their effective application in fields other than those covered in the laboratory. They are able to verify the assumed properties of prototyped components manufactured during laboratory work.	[SU1] Assessment of task fulfilment

Subject contents

Course content – lecture

The course aims to provide students with comprehensive knowledge of prototyping techniques based on 3D printing technologies or to refresh their knowledge in this area. The course will present software used for the rapid creation of simple and advanced 3D models. The possibilities of 3D prototyping in the laboratory designated for the course will be presented and described. Learning how to configure and set 3D printing parameters.

Course content – laboratory

During the laboratory, students will learn how to effectively and purposefully modify 3D printing parameters in order to achieve the desired properties of the model being created. The task of modifying print parameters will be carried out in order to achieve: airtightness, resistance to wetting, obtaining the desired wettability parameter, desired mechanical resistance parameters, including the achievement of the assumed functional effectors. The tribological effect of multi-material prints will be investigated. A process of dedicated modification of the composition of materials intended for 3D prototyping with nanomaterials will be carried out in order to control electrical, thermal, and optical properties.

Prerequisites and co-requisites

none

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	60.0%	40.0%
	100.0%	60.0%

Recommended reading

Basic literature

[1] I. Gibson, D. W. Rosen, and B. Stucker, Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 3rd ed. Cham: Springer, 2021.

[5] Vigneshwaran Shanmugam, Rajkumar Velu 3D Printing of Nanocomposites 2022 Smart 3D Nanoprinting Fundamentals, Materials, and Applications.

	Supplementary literature	none
	eResources addresses	
Example issues/ example questions/ tasks being completed	3D scanner, extrapolation, texture creation Materials for 3D printing. FDM printing technology	
Practical activites within the subject	Not applicable	

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