GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00066150		
Field of study	Nanotechnology		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mateusz Cieślik	
	Teachers	dr inż. Mateusz Cieślik	

Lesson types and methods of instruction

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	3.0	42.0	75

Subject objectives

The subject "Introduction to additive technologies" aims to familiarize students with the basics and techniques of reverse engineering, as well as the process of designing and manufacturing objects using various 3D printing methods and other additive technologies. The classes are practical - students take part in creating composites enriched with various nanomaterials and then analyze their functional properties.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W06	The student is able to analyze the relationships between the structure of materials (crystalline and amorphous) and their mechanical, thermal and electrical properties. Understands the impact of structural defects on the performance parameters of materials and is able to interpret the phenomena of transport and network vibrations in the context of the practical application of engineering materials.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
K6_U06	The student has basic knowledge of the structure, production processes and characteristics of nanomaterials, especially those used in additive technologies. Understands the principles of conducting selected material tests, is able to analyze the results and create technical documentation.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
K6_K05	The student is able to plan and implement tasks related to the use of selected additive technologies, based on basic knowledge in this field. He can also prepare a factual report summarizing the activities performed.	[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills [SK2] Assessment of progress of work

Subject contents	The course begins with an introduction to the basics of additive technologies, their history and classification. Subsequent lectures discuss in detail individual techniques, such as FDM, SLA, SLS, as well as spray and hybrid technologies, along with their principles of operation, materials and practical applications. There is a strong focus on design for 3D printing, topological optimization and CAD tools, as well as materials used in additive processes - from polymers and metals to functional and intelligent materials. Students learn quality control methods, certification standards, and challenges related to accuracy and repeatability of processes. An important element of the course are industrial applications (aviation, medicine, automotive) and innovations such as bioprinting, 4D printing or integration with Industry 4.0. Lectures also discuss issues of ecology and sustainable development, including recycling and waste minimization. The whole thing ends with a summary, a question session and an exam or project presentation.
Prerequisites and co-requisites	3D prototyping skills in any CAD program.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	50.0%	40.0%
Lecture	50.0%	60.0%

Recommended reading

Basic literature	Nick Kloski, Druk 3D. Praktyczny przewodnik po sprzęcie, oprogramowaniu i usługach, Helion, 2022
Supplementary literature	Anna Kaziunas France, Świat druku 3D Przewodnik, Helion
eResources addresses	Adresy na platformie eNauczanie: Wprowadzenie do technologii addytywnych - Moodle ID: 43533 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43533

Example issues/ example questions/ tasks being completed	1. Describe the difference between the FDM method and the SLA method in 3D printing. What are their advantages and disadvantages? Compare both methods in the context of prototype production. 2. Explain what G-code is and how it is used in 3D printing. Describe what the basic G-code commands are and how they affect the printing process.] 3. Discuss the different types of materials used in 3D printing. Compare thermoplastics and thermosets in terms of their applications and properties. Provide examples of products that can be printed with these materials.
Work placement	Not applicable

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