GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00052097		
Field of study	Mikro- i nanotechnologie elementów konstrukcyjnych		
Date of commencement of studies	October 2022	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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Stefan Dzionk	
	Teachers	dr hab. inż. Stefan Dzionk mgr inż. Karolina Chodnicka-Wszelak dr inż. Piotr Sender	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	15.0	45

E-learning hours included: 0.0

eNauczanie source addresses:
Moodle ID: 1419 Mikro- i nanotechnologie elementów konstrukcyjnych
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1419

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	45	5.0	50.0	100

Subject objectives

The objective of the course is to acquaint students with unconventional manufacturing technologies that enable the production of highly precise components and are applied in the fabrication of elements at the micro- and nanoscale.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U04	The student practically verifies the machining results using various techniques and parameters. The student is able to assess the quality of the surface using appropriate parameters.	[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu
K6_K05	The student prepares studies on the selected machining method, presenting the relationships between the machining results and the parameters used.	[SK4] Ocena umiejętności komunikacji, w tym poprawności językowej
K6_W06	The student knows advanced manufacturing methods, including for elements in the micro and nano scale. Student defines the basic parameters of the geometrical structure of the surface.	[SW1] Ocena wiedzy faktograficznej
K6_U02	The student finds data in the literature on advanced machining methods, including micro and nano scales. The student presents the results of his work on technological processes in the nanoscale and explains the details of the issue during the group discussion.	[SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania

Subject contents

LECTURES: Geometric surface structure, aspects of accuracy in manufacturing, basic of advanced machining methods, basic of planning of technological process and computer aided manufacturing including reverse engineering, methods of processing polymer materials, including methods of producing micro-elements. The scope of micro and nano scale processing. tools and processes used in micro and nano-technologies. Additive manufacturing methods including micro and nano-aspect of process. Creation of surface structures on the micro and nano scale.

LABORATORY: Bassis of measurement with accuracy to micrometers, basic manufacturing systems, geometric structure of surface, its parameters and properties, planning of machining accuracy for processing systems, additive method of manufacturing, methods erosion machining, reverse engineering, processing of polymer materials.

SEMINAR: Student presentations on selected micro- and nanotechnologies, accompanied by structured group discussions.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Raports	60.0%	30.0%
Coloquium	60.0%	30.0%
Presentation	60.0%	40.0%

Recommended reading

Basic literature

1. S. Kalpakjian, S. R. Schmid: *Manufacturing Engineering and Technology*, Pearson Prentience Hall, 2022, ISBN: 978-1292422244.
2. M. P. Groover: *Fundamentals of modern Manufacturing*, JOHN WILEY&SONS, INC, 2020, ISBN: 978-1-119-72201-4.
3. Y. Qin: Micromanufacturing Engineering and Technology, Elsevier, 2015, ISBN: 978-1292422244.
4. Dragica Vasileska: *Cutting Edge Nanotechnology*, Publisher: InTech, 2011, ISBN 978-953-7619-93-0.
5. Yoshitake Masuda: *Nanofabrication*, Publisher: InTech, 2011, ISBN 978-953-307-912-7
6. E. Oczoś, A. Kawalec: Kształtowanie metali lekkich, PWN 2012
7. Feld M.: *Podstawy projektowania procesów technologicznych typowych części maszyn,* WNT, Warszawa, 2000.

Supplementary literature

1. Micro and Nano Engineering- open access journal
2. Beilstein Journal of Nanotechnology - open access journal
3. Precision Engineering - journal online

eResources addresses

Example issues/ example questions/ tasks being completed	1. Parameters characterize the geometric structure of the surface, 2. Measurement length and evaluation length, 3. The relationship between class of the accuracy of the components and the structure of the surface, 4. Characterize the additive method of manufacturing, 5. The method of manufacture of micro plastics components, 6. Describe *.stl format and its applications, 7. Characterize additive methods for manufacture micro and nano-elements.
Practical activites within the subject	Not applicable

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