GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Unconventional production and advanced manufacturing processes, PG_00064721		
Field of study	Management and Production Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study 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	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Zakład Technologii Maszyn i Automatyzacji Produkcji -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Daniel Chuchała	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	0.0	45

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	45	7.0	23.0	75

Subject objectives

The aim of the course is to familiarise students with unconventional manufacturing processes used in diverse industries

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W04] demonstrates knowledge covering selected issues in the field of advanced detailed knowledge, in particular in the field of methods, techniques, tools and algorithms used in production management and control processes as well as in the design of technological processes	The student has a cross-cutting knowledge of alternative non-conventional manufacturing methods. Can define the need for specific methods to solve a manufacturing problem	[SW1] Assessment of factual knowledge
[K7_W11] interprets social, economic, legal (including industrial and intellectual property laws), and other non-technical aspects of engineering activities, and includes them into engineering practice	The student is able to select appropriate manufacturing methods according to economic and environmental assumptions	[SW1] Assessment of factual knowledge
[K7_U02] formulates and tests hypotheses related to problems occurring in stationary and non-stationary systems as well as in production and technological processes combined with simple research problems	Students will be able to select a non-conventional manufacturing method as an alternative to traditional methods.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_K11] is aware of importance of professional acting, the need for critical verification of acquired knowledge and consulting experts opinion in case of facing difficulties with individual problem solving	The student verifies the feasibility of a given product using the methods available to him/her	[SK3] Assessment of ability to organize work

<table>
<tr><td>Subject contents</td><td>LECTURE:Processes of roundwood processing. Wood flooring manufacturing processes. Densification of wood. Thermal treatment of wood. Processing of glued laminated timber using machining fluids. Milling process using dynamic machining. Ultrasonically assisted metal machining. Milling with high feed rates. Unconventional metal finishing processes - burnishing. Electrical discharge machining processes. Lapping process using 3D printed tools.

LABORATORY: wire EDM machining. EDM machining. Dynamic machining on milling machines.
Shaft burnishing process. Machining with MQL system. Face milling with high feed rates. Lapping process using 3D printed tools.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of basic manufacturing processes based on subtractive, chipless and additive techniques.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory</td><td>100.0%</td><td>30.0%</td></tr>
<tr><td>Lecture</td><td>56.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Grzesik W.: Advanced machining processes of metallic materials. Theory, modelling and applications. Elsevier, 2017.

2. Markopoulos A.P.: Finite element method in machining processes.Springer, London, 2013.

3. Przybylski W.: Low plasticity burnishing processes. Fundaments, tools and machine tools. Radom: Institute for Sustainable Technologies National Reserch Institute in Radom, 2019</td></tr>
<tr><td>Supplementary literature</td><td>Pradeep Jayappa, Santhosh Srinivasan, K. Vetrivel Murugan, C. Thangavel, M. Bala Theja, G. Phanindra Raja Varma, S. Marichamy, Ram Subbiah (2022). An overview on role of unconventional machining processes on different materials. Materials Today: Proceedings 50 (5): 1341-1345. https://doi.org/10.1016/j.matpr.2021.08.253.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>E.g. Select a dedicated milling head angle for machining with high feed speeds.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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