GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Hybrid and additive manufacturing processes, PG_00057409		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
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. Stefan Dzionk	
	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

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	4.0	16.0	50

Subject objectives

Unconventional and aggregate methods of machine parts manufacturing including incremental methods and reverse engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U07] is able to perform a preliminary economic analysis of the undertaken engineering actions within the range of design, production and operation of machines and technical devices	The student is aware of the costs of unconventional processes and their cost-effectiveness in relation to the obtained results.	[SU2] Assessment of ability to analyse information
[K7_W06] possesses organized, profound knowledge necessary for designing and optimization of complex technological processes, modelling and calculations using numerical methods, knows modern manufacturing methods and tools for designing manufacturing processes of machines, devices, their elements and components	The student has a thorough knowledge of unconventional processing methods, in particular special materials. The student has knowledge necessary to design unconventional manufacturing processes as well as parameters used in them.	[SW1] Assessment of factual knowledge
[K7_U06] when solving engineering problems on design, technology and operation of machines is able to assess and classify typical methods and tools, define systemic and ex-technical aspects using modern calculating methods and design tools or modifying the current ones	The student applies modern calculation and design methods when solving engineering tasks. The student selects a processing method for unconventional materials and specific features of the designed part.	[SU1] Assessment of task fulfilment

Subject contents

Lecture Introduction, systematics of modern manufacturing technologies. Incremental technologies, HSC/ HSM machining. Characteristics of HSC/HSM, dry machining. Precision and ultra-precision machining. Machining centres, structure, principles of creation, equipment, changeable machining canters. Chemical machining, milling, etching. Electrochemical machining, electrochemical grinding, electro-discharge machining, wire electro-discharge machining. Laser and electron beam machining, surface treatment. Water jet machining, water jet and abrasive machining, abrasive blasting. Micromachining. Laboratory Exercises Incremental technologies, general knowledge, programming of devices on the example of Stereolithography, principles of designing supporting elements, postprocessing data format and model resolution, reverse engineering and object analysis, parameterization of typical structural elements.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Taking a course in Basic Manufacturing Techniques and Metrology.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Project</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Katapian S. Manufacturing Engineering and Technology Pearson Education Inc. Upper Saddle River, New Jersey 2006.
2. Oczoś k. E.: Kształtowanie materiałów skoncentrowanymi strumieniami energii. Wyd. Pol. Rzeszowskiej, Rzeszów 1988.
3. Schmid D.: Mechatronika. Rea, Warszawa 2002.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Zaborski St.: Obróbka elekrochemiczno-ścierna podstawy i zastosowania, Politechnika Wrocławska 2007,
2. Beer P. Niekonwencjonalne narzędzia do obróbki drewna, nóż ultradzwiękowy, promień świetlny, struga wody, Wydawnictwo Akademii Rolniczej, Poznań 2007,
3. Artykuły naukowe w czasopismach technicznych.</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3"></td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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