



## Subject card

Subject name and code	Hybrid Manufacturing Processes, PG_00057859						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			English		
Semester of study	3	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Technologii Maszyn i Automatykacji 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. Mariusz Deja				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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		0.0		0.0	30
Subject objectives	Acquainting with the subject of modern manufacturing using hybrid methods						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U81] is able to communicate with ease in foreign language at B2+ level of the Common European Framework of Reference for Languages (CEFR) in everyday life, in academic and professional environments	The ability to discuss a presented technical topic			[SU2] Assessment of ability to analyse information		
	[K7_W81] has knowledge of complex grammatical structures and diverse lexical resources needed to communicate in foreign language in terms of general and specialist language related to field of study	Analysis of specialist literature in a foreign language			[SW1] Assessment of factual knowledge		
	[K7_W03] He/she knows methods, techniques and tools applied to solve engineering problems in the scope of the field of study of mechanical-medical engineering						
	[K7_U08] He/she can formulate and verify hypotheses for simple engineering problems and research						
[K7_K81] is able to cooperate in international team at her/his own university, during work placement and during study abroad							

Subject contents	<ol style="list-style-type: none"> <li>1. Classification of hybrid machining processes generating by different rules.</li> <li>2. Hybrid assisted processes.</li> <li>3. Hybrid combined processes.</li> <li>4. Application of hybrid machining processes in industry.</li> <li>5. Role of hybrid machining processes in sustainable manufacturing and Production 4.0 strategy.</li> <li>6. Modelling of hybrid machining processes.</li> <li>7. Vibration-assisted machining processes.</li> <li>8. Media-assisted machining processes.</li> <li>9. Magnetic and electric field-assisted machining processes.</li> <li>10. Thermally-assisted machining processes.</li> <li>11. Mixed hybrid processes.</li> <li>12. Hybrid processes with controlled mechanisms.</li> <li>13. Hybrid additive and subtractive processes.</li> <li>14. Economics and optimization strategies of hybrid processes</li> <li>15. Influence of process hybridization on surface integrity.</li> </ol>		
Prerequisites and co-requisites	Technical drawing, manufacturing techniques, basics of cutting technologies, Computer Aided Design CAD		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Design and descriptive task to be implemented	70.0%	40.0%
	Colloquium at the end of the semester	60.0%	30.0%
	Mid-term colloquium	60.0%	30.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Grzesik, W., &amp; Ruszaj, A. (2021). <i>Hybrid Manufacturing Processes</i>. Springer International Publishing.</li> <li>2. Hitomi, K. (2017). <i>Manufacturing Systems Engineering: A unified approach to manufacturing technology, production management, and industrial economics</i>. Routledge.</li> </ol>	
	Supplementary literature	Selected articles from online journals: <ol style="list-style-type: none"> <li>1. Mechatronics</li> <li>2. Computers in Industry</li> <li>3. Journal of Micro and Nano Manufacturing</li> <li>4. Journal of Mechanical Design</li> <li>5. Journal of Manufacturing Systems</li> </ol>	
	eResources addresses	Podstawowe <a href="https://www-1taylorfrancis-1com-1rvaluj04bc.han.bg.pg.edu.pl/books/mono/10.1201/9780203748145/manufacturing-systems-engineering-katsundo-hitomi">https://www-1taylorfrancis-1com-1rvaluj04bc.han.bg.pg.edu.pl/books/mono/10.1201/9780203748145/manufacturing-systems-engineering-katsundo-hitomi</a> - Hitomi, K. (2017). <i>Manufacturing Systems Engineering: A unified approach to manufacturing technology, production management, and industrial economics</i> . Routledge. Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Description of the selected hybrid manufacturing process</li> <li>2. Classification of hybrid production methods</li> <li>3. Selection of the technology based on hybrid manufacturing methods for the indicated mechanical component</li> <li>4. Mechatronic measuring and control elements in manufacturing systems</li> <li>5. Literature study concerning, e.g. information processing in manufacturing systems</li> </ol>		
Work placement	Not applicable		