



Subject card

Subject name and code	Manufacturing techniques, PG_00055883						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2022/2023		
Education level	first-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	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Daniel Chuchała					
	Teachers	dr inż. Daniel Chuchała mgr inż. Adrian Wolski dr inż. Jacek Haras dr inż. Sławomir Szymański prof. dr hab. inż. Kazimierz Orłowski dr hab. inż. Jacek Tomków					
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						
	Techniki Wytwarzania ; Energetyka; I stopień, 3 semestr (PG_00055883): Zima 2022/2023 - Moodle ID: 17507 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=17507						
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	6.0	49.0	100		
Subject objectives	Introduction to basic manufacturing techniques, particularly the dominant manufacturing technique in the world's manufacturing processes, which is the machining process. However, introduction also to the basics of non-removal techniques and welding.						
Learning outcomes	Course outcome	Subject outcome		Method of verification			
	[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems	The student will be able to estimate the energy requirements of a cutting process taking into account different machining methods, cutting tool geometries or different workpiece and tool materials.		[SU3] Assessment of ability to use knowledge gained from the subject			
	[K6_W05] has structured knowledge in the field of electrical engineering and electronics, necessary to understand the basics of operation and selection of electrical machines, electricity transmission systems and power electronic devices	The student is able to determine whether a given main drive unit is sufficient to carry out selected machining processes. The student knows the ways of controlling movements and positions of cutting tools (mechanical and electronic) applied on conventional and numerical machine tools.		[SW1] Assessment of factual knowledge			

Subject contents	<p>LECTURE: Geometric and kinematic parameters of machining. Movements of the tool and the workpiece. Geometry of the blades in the tool arrangement and work arrangement, geometry of the cutting layer. The phenomenon of chip formation and types of chips. Heat and temperature in the cutting zone. Cooling and lubricating agents. Wear of cutting tools. Strength and cutting power. Vibrations in the cutting process. Toolmaterials and rules for their selection. The basic methods of machining: cutting, turning, boring, milling, planing, machining of gears e.t.c.</p> <p>Special methods of making molds and cores. Special casting methods. Plastic Working - Basics of plastic working. Plastic deformation of metals. The influence of plastic deformation on the properties of metals. Classification of plastic working processes. Metal rolling. Forging and pressing. Pulling and extrusion. Technology for pulling bars, wires and pipes. Technology of extrusion processes. Punching of non-unfolding coatings. Metal cutting. Metal bending. Multiple and simultaneous pressing. Welding. LABORATORY: Sawing materials and sawing machines. Machining on lathes. Machining on drills. Machining on milling machines. Machining on planers and slotting machines. Machining of gears. Preparation of the production of castings. Plastic bending of sheets, profiles and pipes. Welding process.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 909 794 943">Subject passing criteria</th> <th data-bbox="798 909 1136 943">Passing threshold</th> <th data-bbox="1139 909 1479 943">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 947 794 981">Lecture</td> <td data-bbox="798 947 1136 981">56.0%</td> <td data-bbox="1139 947 1479 981">70.0%</td> </tr> <tr> <td data-bbox="456 985 794 1010">Laboratory</td> <td data-bbox="798 985 1136 1010">100.0%</td> <td data-bbox="1139 985 1479 1010">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture	56.0%	70.0%	Laboratory	100.0%	30.0%
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Lecture	56.0%	70.0%										
Laboratory	100.0%	30.0%										
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Cichosz P.: Narzędzia skrawające. WNT, Warszawa 2006. 2. Olszak W.: Obróbka skrawaniem. WNT, Warszawa 2008. 3. Grzesik W. Podstawy skrawania materiałów konstrukcyjnych(Wydanie 3), PWN 2018. 4. Storch B. Podstawy obróbki skrawaniem. Politechnika Koszalińska2001. 5. Poradnik obróbki skrawaniem (Toczenie - frezowanie - wiercenie - wytaczanie - systemy narzędziowe). Sandvik - Coromant, 2010. 6. Szweycer M., Nadolska D.: Metalurgia i odlewnictwo. Poznań: Wyd. Politechniki Poznańskiej7. Kosowski A.: Zarys odlewnictwa. Wyd. AGH Kraków8. Skoblik R., Wilczewski L.: Technologia Metali. Laboratorium. 										

	Supplementary literature	<p>1. Jemielniak K.: Obróbka skrawaniem. Oficyna Wyd. Politechniki Warszawskiej, Warszawa 1998.</p> <p>2. Kalpakjian Serope, Schmid Steven. Manufacturing Engineering & Technology (7th Edition), Published by Pearson, 2014.</p> <p>3. Murza-Mucha K.: Techniki wytwarzania. Odlewnictwo. PWN Warszawa4. Dobrucki W.: Zarys obróbki plastycznej metali. Śląsk</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	The final test contains many questions relating to the topics throughout the subject.	
Work placement	Not applicable	