



Subject card

Subject name and code	Manufacturing Techniques 1, PG_00042029						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2023/2024		
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	1		Language of instruction		English		
Semester of study	2		ECTS credits		3.0		
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 hab. inż. Jacek Tomków				
	Teachers		dr hab. inż. Jacek Tomków mgr inż. Karolina Chodnicka-Wszelak Balazs Varbai dr inż. Krzysztof Doerffer				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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		5.0		40.0	75
Subject objectives	<p>Presentation basic metods of the manufacturing systems, including: the mechanics of the cutting phenomena, cutting parameters, types of materials for cutting edge, design and use of tools and machine tools for turning, drilling, milling and grinding.</p> <p>Presentation basic castings techniques and metal formin processes. Students conducts practical experiments illustrating changes in the shape and properties of plastically formed materials.</p>						
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 is able to propose the appropriate production methods depending on the manufactured element. The student is able to choose the basic tools used in a given method as well as the necessary equipment.		[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 has structured knowledge of the basic methods of manufacturing mechanical components. The student knows the possibilities of making individual design features of a component using the appropriate machining method and determine the basic parameters of this machining.		[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE Basic concepts of machining. Classification of machining. Elements of the workpiece and tools. Kinematics of machining. General design of machines. Basics of the material removal processes. Physical basics of the cutting process. The geometry of the removed layer. Forces, torques and power of cutting. Geometrical and technological parameters of machining. Heat and cutting temperature. Cooling and greasing substances. Design of cutting tools. Geometry of the cutting edges in cutting tools. Modern tools materials. Consumption and durability of cutting tools. Machinability of materials. Selection principles for tools and cutting parameters. Turning. Purpose and variety of rolling. Construction and kinematics of a universal lathe. Conventional turning. Mounting tools and machined objects on the lathe. Basic lathe operations. Milling. Purpose and variety of milling. Millings conditions. Construction of vertical and horizontal milling. Millings equipment. Examples of work carried out by milling. Boring. Construction and kinematics of drills. Construction and purpose of tools for drilling, reaming and countersinking. Grinding. Materials used for abrasive tools. Characteristics of abrasive tools used for the processing of flat surfaces, shafts and holes. Examples of grinding operations.</p> <p>Metal production processes, casting processes, casting defects, methods of metal forming, ways of shaping the product, changes in the properties of metals during metal forming.</p> <p>LABORATORY EXERCISES: 1. Lathe manufacturing system: machine tools, tools and their selection, process parameters and machining possibilities. 2. Milling manufacturing system: machine tools, tools and their selection, parameters of the process and machining possibilities, construction, operation of the dividing head. 3. Work shop metrology, tools and measurement methods. 4. Finishing: machining methods, machine tools, tools and their selection, process parameters and machining possibilities. 5. Basics of computer aided in preparation of turning processes. 6. Basics of computer aided in preparation of milling process technology. 7. Gear machining: technologies, parameters, use of dividers head.</p> <p>Metal production processes, casting mold preparation, methods of metal forming, ways of shaping the product, changes in the properties of metals during metal forming.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table><tr><td>Subject passing criteria</td><td>Passing threshold</td><td>Percentage of the final grade</td></tr><tr><td>Final test</td><td>51.0%</td><td>51.0%</td></tr><tr><td>Assessment of laboratory</td><td>51.0%</td><td>49.0%</td></tr></table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Final test	51.0%	51.0%	Assessment of laboratory	51.0%	49.0%
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Recommended reading	<table><tr><td>Basic literature</td><td>1. Kalpakjian S., Schmid S.: Manufacturing Engineering and Technology. Prentice Hall; 7 edition (April 11, 2013). 2. Cichosz P.: Narzędzia skrawające. WNT, Warszawa 2006. 3. Olszak W.: Obróbka skrawaniem. WNT, Warszawa 2008. 4. Modeling of Metal Forming and Machining Processes: By Finite Element and Soft Computing Methods by Prakash M. Dixit. Springer, 2008. 5. Mechanics Modeling of Sheet Metal Forming by Sing C. Tang. SAE International, 2007</td></tr><tr><td>Supplementary literature</td><td>Thematic articles from databases of the GUT Library. TECHNOLOGIA METALI Laboratorium, Skoblik R., Wilczewski L., Politechnika Gdańska, 2006.</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie: Manufacturing Techniques 1, WL, Energy Technologies, sem. 2, letni, 2023/24 - Moodle ID: 36166 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=36166</td></tr></table>			Basic literature	1. Kalpakjian S., Schmid S.: Manufacturing Engineering and Technology. Prentice Hall; 7 edition (April 11, 2013). 2. Cichosz P.: Narzędzia skrawające. WNT, Warszawa 2006. 3. Olszak W.: Obróbka skrawaniem. WNT, Warszawa 2008. 4. Modeling of Metal Forming and Machining Processes: By Finite Element and Soft Computing Methods by Prakash M. Dixit. Springer, 2008. 5. Mechanics Modeling of Sheet Metal Forming by Sing C. Tang. SAE International, 2007	Supplementary literature	Thematic articles from databases of the GUT Library. TECHNOLOGIA METALI Laboratorium, Skoblik R., Wilczewski L., Politechnika Gdańska, 2006.	eResources addresses	Adresy na platformie eNauczanie: Manufacturing Techniques 1, WL, Energy Technologies, sem. 2, letni, 2023/24 - Moodle ID: 36166 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=36166			
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Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none">1. Built-up edge in the cutting zone.2. Cemented carbide as a tool material .3. Design of a universal lathe.4. Technology of precise hole H7.5. Metal forming processes.6. Materials properties changes after metal forming.7. Casting defects.											
Work placement	Not applicable											