GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Manufacturing Techniques, PG_00064123		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
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	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Institute Of Manufacturing And Materials Technology -> Faculty Of Mechanical Engineering And Ship Technology -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Aleksandra Świerczyńska	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	0.0	60

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	60	4.0	61.0	125

Subject objectives

The purpose of the course is for students to acquire basic knowledge of manufacturing technologies for metal components and structures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W05] has knowledge in the areas of design, manufacturing, and operation of materials, machine parts, or technical devices, with a solid understanding of design principles and technical documentation preparation	Can assess the suitability of a given manufacturing method for a selected part of a machine or piece of equipment and identify the basic necessary technical documentation for that manufacturing method.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K6_W02] has knowledge of structure, properties, and testing methods of construction materials or knowledge of materials and selected technologies in biomedical engineering	Describes basic manufacturing technologies with respect to their advantages, disadvantages, applicability for different materials.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K6_U04] is able to utilize empirical, analytical, simulation, and computer-based methods to formulate and solve engineering tasks in the field of medical and mechanical engineering	Knows analytical and experimental methods to evaluate the capabilities of a given manufacturing technology.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>Casting - Metallurgy of metals and their alloys. Metallurgy of pig iron. Metallurgy of steel. Methods of manufacturing castings. Manufacture of castings in sand molds by hand and machine. Molding compounds. Automation and mechanization of molding and core making. Special methods of making molds and cores. Special methods of casting.
Metal Forming - Fundamentals of metal forming. Plastic deformation of metals. Effect of plastic deformation on properties of metals. Classification of plastic forming processes. Rolling of metals. Rolling of billets and slabs. Rolling of sections. Pipe rolling. Forging and pressing. Forging and pressing machines. Free forging. Die forging. Classification of forgings. Characteristics of the processes of
Drawing and extrusion. Stamping of non-expandable coatings. Classification of stamping processes. Cutting of metals. Metal bending. Multi-stamping and simultaneous stamping. Construction of a typical stamping die.
Classification of welding processes. Outline of welding thermal processes, welding thermal cycle.
Phase transformations in the weld and in the heat affected zone. Definition of weldability. Primary and secondary materials for welding. Basics of development of welding technology.
Gas welding. Welding with covered electrode. Submerged arc welding under flux. TIG welding. Shielding gases. Shielded gas welding with the MIG/MAG method. Welding with powdered wires.
Pulsed arc welding. Laser, plasma and electron welding.
Electric resistance spot, line, hump, butt short-circuit and spark welding.
Basic parameters of the process. Other welding methods.
Thermal cutting methods: oxygen cutting, plasma jet cutting. Laser beam cutting. Inspection of welded joints, definitions of welding discrepancies and methods of their detection.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of physics, chemistry, materials science, electrical and mechanical engineering.</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>entrance tests at labs</td><td>56.0%</td><td>20.0%</td></tr>
<tr><td>Mid-term and final exam colloquium</td><td>56.0%</td><td>80.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Klimpel A.: Technologia spawania i cięcia metali. WNT. Warszawa 1999.
2. Walczak W. (red.): Spawalnictwo. Ćwiczenia laboratoryjne. Wydawnictwo Politechniki Gdańskiej. Gdańsk, 2000.
3. Butnicki S.: Spawalnośc i kruchość stali. Wydawnictwo WNT. Warszawa 1991.
4. Pilarczyk J., Pilarczyk J.: Spawanie i napawanie elektryczne metali. Wydawnictwo Śląsk, Katowice 1996.
5. Skoblik R., Wilczewski L.: Technologia metali. Laboratorium. 2006.
6. Murza-Mucha. K.: Techniki wytwarzania. Odlewnictwo. PWN. Warszawa 1978</td></tr>
<tr><td>Supplementary literature</td><td>1. Poradnik inżyniera - Spawalnictwo. WNT Warszawa 2003.
2. Dobrucki W.: Zarys obróbki plastycznej metali. Wyd. Śląsk 1992.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Describe the welding method.

Compare welding/casting/molding/plastic forming methods.

List the advantages and disadvantages of the manufacturing method.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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