



MODULE DESCRIPTION

Module code	full-time studies:	Z-ZIP1-E-308
	part-time studies:	Z-ZIPN1-E-308
Module name	Manufacturing Techniques	
Module name in Polish	Techniki Wytwarzania	
Valid from academic year	2023/2024	

MODULE PLACEMENT IN THE SYLLABUS

Field of study	MANAGEMENT AND PRODUCTION ENGINEERING
Level of education	1st degree
Studies profile	General
Form and method of conducting classes	Full-time and Part-time
Specialisation	All
Unit conducting the module	Department of Production Engineering
Module co-ordinator	Wacław Gierulski, PhD, DSc
Approved by:	Dariusz Bojczuk, PhD, DSc

MODULE OVERVIEW

Type of subject / group of subjects	Major
Module status	Compulsory
Language of conducting classes	English
Module placement in the syllabus - semester	Semester III
Initial requirements	Materials Science
Examination (YES/NO)	NO
Number of ECTS credit points	2

Method of conducting classes		Lecture	Classes	Laboratory	Project	Other
Per semester	full-time studies:	30				
	part-time studies:	18				

TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Category	Symbol	Learning outcomes	Assignations to the directional learning outcomes
Knowledge	W01	A student has an advanced knowledge of the production processes of metal forming on various machines, making products by casting methods, various welding methods and construction of welding devices, and also has knowledge of manufacturing techniques by means of machining and abrasive machining, as well as technological possibilities and the application of machine tools.	ZIP1_W09
	W02	A student knowledge of the possibility of using various materials in the production processes of products.	ZIP1_W07
	W03	A student has an advanced knowledge explaining the phenomena occurring in plastic working, casting, welding and machining and is able to assess their impact on the quality of manufactured products.	ZIP1_W09
	W04	A student has knowledge of the assessment of the possibility of producing various products and introducing new products in industrial conditions.	ZIP1_W16 ZIP1_W18
Skills	U01	A student can utilise the acquired knowledge to select a particular technology type to manufacture metal products with a given shape.	ZIP1_U01 ZIP1_U19
	U01	A student can choose an appropriate material type providing the required product performance parameters.	ZIP1_U01 ZIP1_U19
Social competences	K01	A student understands the need for personal development in the field of manufacturing techniques in order to improve professional qualifications related to the continuous development of these techniques.	ZIP1_K01
	K02	A student is aware of the importance and understands the relationship between the activities in the field of production techniques and non-technical in terms of the effects of environmental impact and responsibility for decisions made.	ZIP1_K02

TEACHING CONTENTS

Method of conducting classes	Teaching contents
Lecture	<p>Introduction to manufacturing techniques in the machine-building industry. The history of materials development and the method of their processing - key solutions and achievements, tools, machines. Examples of products.</p> <p>Mechanisms of plastic deformation. State of stress and state of deformation. Plasticity conditions. Work of deformation and work of friction</p> <p>Plastic flow curve. Influence of temperature and strain rate on plastic flow of metals and alloys. Cold, semi-hot and hot plastic working.</p> <p>Cutting methods. Mechanical cutting methods. Backlash in the punching process. Construction of the punch. Guillotine shears. Mechanical crank and eccentric presses. Hydraulic presses. Turret punching machine.</p> <p>Review of bending methods. Return deformation. Shaping of moldings - tools, folding and cracking of sheet metal. Limiting extrusion ratio. Examples of the production of beverage cans.</p>

	<p>Volumetric plastic working - examples of products. Ways of upsetting. Drawing of bars, wires and pipes. Longitudinal rolling. Extrusion of profiles. Shaping the outer layer by burnishing, thread shaping.</p> <p>Discussion of the free and die forging technology. The shape and dimensions of the forgings. Construction of matrices. Forging temperature and heat activated processes. Technological machines.</p> <p>Foundry - methods, casting materials. Main tasks in foundry processes. Foundry molds - rules of mold division, gating system. Centrifugal casting, shell casting, mold casting, pressure casting.</p> <p>Solidification of the casting. Foundry shrinkage. Selection of foundry technologies, product parameters. Casting examples.</p> <p>Welding - classification of processes. Physical basics of welding processes. Welding arc. Metallurgy of welding processes. Cohesion of metals. Gas welding.</p> <p>Arc welding with a coated electrode, submerged arc, process automation. Welding with MIG and MAG consumable electrodes and TIG non-consumable electrodes.</p> <p>Welded joints and principles of their design. Welding and laser cutting.</p> <p>The importance and role of subtractive processing in production processes. The essence of machining, abrasive and erosive machining. Cutting heat. Basic technological, geometric and kinematic concepts and parameters characterizing the machining and abrasive machining processes.</p> <p>Construction and application of machine tools. Modern cutting tools for processing materials. Modern materials for cutting blades and development trends in the design of tools.</p> <p>Methods and application of machining and abrasive machining in the production of machine parts and devices: turning, milling, drilling and reaming, broaching, grinding and lapping.</p>
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METHODS OF ASSESSING TEACHING RESULTS

Symbol	Methods of checking the learning outcomes <i>(select X)</i>					
	Oral exam	Written exam	Test	Project	Statement	Other
W01			X			
W02			X			
W03			X			
W04			X			
U01			X			
U02			X			
K01			X			
K02			X			

FORM AND CONDITIONS OF PASSING

Form of classes	Form of credit	Passing conditions
Lecture	Credit with grade	Grade at least satisfactory from the final test .

STUDENT WORKLOAD

Balance of ECTS points												
No.	Type of student's activity	Student's workload										Unit
		full-time					part-time					
		Lc	C	Lb	P	O	Lc	C	Lb	P	O	
1.	Participation in the activities	30					18					h
2.	Other (consultation, exam)	2					2					h
3.	Number of hours of a student's as- sisted work	32					20					h
4.	Number of ECTS credit points which are allocated for assisted work	1,3					0,8					ECTS
5.	Number of hours of a student's un- assisted work	18					30					h
6.	Number of ECTS credit points which a student receives for unassisted work	0,7					1,2					ECTS
7.	Work input connected with practical classes	0					0					h
8.	Number of ECTS credit points which a student receives for practical classes	0,0					0,0					ECTS
9.	Total number of hours of a stu- dent's work	50					50					h
10.	Punkty ECTS za modul <i>1 ECTS=25 hours</i>	2										ECTS

LITERATURE

1. Gupta H.N., Gupta R.C., Mittal A. (2009), *Manufacturing processes*, second edition, New Age International (P) Limited, Publishers (Available online: <https://soaneemrana.org/onewebmedia/Manufacturing%20Processes%20By%20H.N.%20Gupta.pdf>).
2. Sharma P.S. (2018), *A textbook production technology (manufacturing processes)*, S. Chand & Company PVT. LTD., New Delhi (Available online: <https://dokumen.pub/qdownload/a-textbook-of-production-technology-8nbsped-9788121911146.html>).
3. Virasak L. (2019), *Manufacturing processes*, Open Oregon Educational Resources (Available online: <https://openoregon.pressbooks.pub/manufacturingprocesses45/>).
4. The specific websites provided by the lecturer.