



COURSE SPECIFICATION

Course code	M#1- S1-ME-207
Course title in Polish	Podstawy obróbki plastycznej
Course title in English	Fundamentals of Metal Forming
Valid from (academic year)	2019/2020

GENERAL INFORMATION

Programme of study	MECHANICAL ENGINEERING
Level of qualification	first-cycle
Type of education	academic
Mode of study	full-time
Specialism	all
Department responsible	Department of Metal Science and Manufacturing Processes
Course leader	Dr inż. Jarosław Pacanowski
Approved by	

COURSE OVERVIEW

Course type	basic
Course status	compulsory
Language of instruction	English
Semester of delivery	semester 2
Pre-requisites	None
Examination required (YES/NO)	NO
ECTS value	1

Mode of instruction	lecture	class	laboratory	project	seminar
No. of hours per semester	15				

LEARNING OUTCOMES

Category of outcome	Out-come code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	On completion of the course, students will have a fundamental theoretical knowledge of cold and hot metal forming processes by using different machinery.	MiBM_W10
	W02	Having successfully completed this course, students will be able to use a acquired theoretical knowledge to select a type of metal forming technology in order to manufacture mechanical elements of a given shape.	MiBM_W19
Competence	K01	On completion of the course, students will understand the need for and know the opportunities of gaining further professional qualifications, related to metal forming processes used in the manufacturing of various metal elements.	MiBM1_K01
	K02	By the end of this course, students will be aware of the responsibility for their work and performed tasks.	MiBM1_K04
	K03	On completion of the course, the student will be aware of the social role of a graduate of a technology-oriented university and understand the need to inform in a comprehensive way the general public about accomplishments in mechanical engineering.	MiBM1_K06

COURSE CONTENT

Type of instruction*	Topics covered
lecture	1. Introduction to metal forming : definition, advantages of disadvantages, classifications of metal forming processes on basis different criterias, examples of metal forming products, applications, elastic and plastic deformations of material
	2. Classification of forming methods of drawpieces, classification of processes of shaping on presses, discussion of selected processes: deep drawing, redrawing, blanking, bending (definitions, schematic representations, methods, degrees of deformations, technological parameters, advantages and limitations)
	3. Selected problems of forming methods from sheets: total coefficient of deep drawing, types of shearing processes, the most significant sheet-bending processes course of V- and U-die bending processes.
	4. Discussion of drawing processes: definitions, schematic representation of the wire drawing process, methods of tube drawing process - schemes and characteristic of processes, degrees of deformation, drawing machines , advantages and limitations of drawing process.
	5.-6. Rolling: classifications on the basis of kinematics, tool geometry, and workpiece geometry; schematic representations for longitudinal, cross and skewed rolling; flat rolling and profile rolling; geometrical relationship for longitudinal rolling; degrees of deformation of material after rolling ; gripping condition; discussion of forward slip phenomenon; advantages and limitations of rolling process
	7. Extrusion process: classification depending upon the direction of material flow in relation to the tool movement direction, definitions, schematic representations, degrees of deformation, advantages and limitations of extrusion process.
	8. Forging process, classifications, definitions, schematic representations, machines, advantages and limitations of forging process

ASSESSMENT METHODS

Outcome code	Methods of assessment <i>(Mark with an X where applicable)</i>					
	Oral examination	Written examination	Test	Project	Report	Other

W01			X			
W02			X			
K01						X
K02						X
K03						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction*	Assessment type	Assessment criteria
lecture	non-examination assessment	The pass mark is a minimum of 50% for the final in-class test.

OVERALL STUDENT WORKLOAD

ECTS weighting							
	Activity type	Student workload					Unit
		L	C	Lab	P	S	
1.	Scheduled contact hours	15					h
2.	Other contact hours (office hours, examination)	4					h
3.	Total number of contact hours	19					h
4.	Number of ECTS credits for contact hours	0,8					ECTS
5.	Number of independent study hours	6					h
6.	Number of ECTS credits for independent study hours	0,2					ECTS
7.	Number of practical hours	0					h
8.	Number of ECTS credits for practical hours	0,0					ECTS
9.	Total study time	25					h
10.	ECTS credits for the course <i>1 ECTS credit = 25-30 hours of study time</i>	1					ECTS

READING LIST

1. Lange K: Handbook of metal forming, MCGraw-Hill Book Company,
2. Lascoe O. D.: Handbook of fabrication processes, ASM International, Ohio, 1988
3. Miłek T.: Techniques of production. Kielce University of Technology, Kielce 2012 (www.wmibm-moodle.tu.kielce.pl)
4. Golański T.: Design of deep drawing process and press-forming dies Selected problems. Warsaw: Warsaw University of Technology, 1984 (in Polish)
5. Pacanowski J.: Design of deep drawing process of axisymmetric drawpieces and design press-forming dies T1 Methods and directives for deep drawing of axisymmetric drawpieces, Kielce: Kielce University of Technology, 2018 (in Polish)
6. Marciniak Z Limit strains in deep drawing process of sheet metals, Warsaw: WNT, 1971 (in Polish)
7. Erbel J i inni.: Encyklopedia technik wytwarzania stosowanych w przemyśle maszynowym. Tom I, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001
8. Gorecki W.: Inżynieria wytwarzania i przetwórstwa płaskich wyrobów metalowych, Wydawnictwo Politechniki Śląskiej, Gliwice 2006

9. Gronostajski J.: Obróbka plastyczna metali, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1973.
10. Łuksza J., Sadok L.: Wybrane zagadnienia z ciągarstwa, Skrypty Uczelniane AGH nr 1025, Kraków 1986
11. Łuksza J.: Elementy ciągarstwa, Wydawnictwo Naukowo-Dydaktyczne AGH, Kraków 2001
12. Morawiecki M., Sadok L., Wosiek E.: Przeróbka plastyczna. Podstawy teoretyczne, Wydawnictwo Śląsk, Katowice 1986.
13. Muster A.: Kucie matrycowe. Projektowanie procesów technologicznych, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2002.
14. Pacanowski J., Chałupczak J.: Projektowanie procesów kucia matrycowego odkuwek kołowo-symetrycznych na młotach i prasach korbowych. Wydawnictwo Politechniki Świętokrzyskiej w Kielcach, Kielce 2011.
15. Pater Z., Samołyk G.: Podstawy technologii obróbki plastycznej metali, Politechnika Lubelska, Lublin 2013.
16. Sińczak J. i inni: Podstawy procesów przeróbki plastycznej. Wydawnictwo Naukowe AKAPIT Kraków 2010.