



### COURSE SPECIFICATION

Course code	<b>M#1-S1-ME-KWW-609</b>
Course title in Polish	<b>Maszyny technologiczne do obróbki plastycznej</b>
Course title in English	<b>Metal Forming Machinery</b>
Valid from (academic year)	<b>2019/2020</b>

### GENERAL INFORMATION

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

### COURSE OVERVIEW

Course type	<b>specialism-related</b>
Course status	<b>compulsory</b>
Language of instruction	English
Semester of delivery	<b>semester 5</b>
Pre-requisites	<b>Fundamentals of Metal Forming Fundamentals of Metal Forming Design</b>
Examination required (YES/NO)	NO
ECTS value	<b>4</b>

Mode of instruction	lecture	class	laboratory	project	seminar
No. of hours per semester	<b>30</b>		<b>30</b>		

## LEARNING OUTCOMES

Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	On completion of the course, the student will have knowledge about the construction and principles of operation of various technological machinery used in the processes of cold and hot metal forming.	<b>MiBM_W08 MiBM_W010 MiBM1_W015</b>
	W02	On completion of the course, the student will have knowledge of the classification and applicability of machinery for the production of various metal products, made with metal forming methods.	<b>MiBM_W08 MiBM_W010 MiBM1_W015</b>
	W03	On completion of the course, the student will have knowledge of the operation and performance parameters of metal forming machinery.	<b>MiBM_W08 MiBM_W010 MiBM1_W015</b>
Skills	U01	On completion of the course, the student will be able to use the acquired knowledge to select a specific type of technological machine for making metal products of a given shape	<b>MiBM1_U010</b>
	U02	On completion of the course, the student will be able to work individually and knows how to estimate the time needed to carry out tasks related to the preparation for laboratory classes	<b>MiBM1_U020</b>
	U03	On the basis of practical familiarization with the construction and the principle of operation of selected machinery, the student will be able to prepare a report containing a discussion of the results and observations.	<b>MiBM1_U04</b>
	U04	On completion of the course, the student will ability to self-educate in order to solve problems related to the use of machinery for specific metal forming processes.	<b>MiBM1_U021</b>
Competence	K01	On completion of the course, the student will understand the need for lifelong learning in order to improve professional qualifications regarding technological machinery used in metal forming processes.	<b>MiBM1_K01</b>
	K02	On completion of the course, the student will be aware of responsibility for their own work and responsibility for the tasks performed.	<b>MiBM1_K04</b>
	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.	<b>MiBM1_K06</b>

## COURSE CONTENT

Type of instruction	Topics covered
lecture	1. Classification of machines and devices for cutting and heating the material before performing cold or hot plastic working.
	2. Technological division of machines for metal forming. Classification, construction and principle of operation of open die forging hammers.
	3. Classification, construction and principle of operation of swaging machines and electro-upsetters used for open die forging.
	4. Classification, construction and principle of operation of die hammers with anvil block and counterblow die hammers.
	5. Classification, construction and principle of operation of forging machines and forging rolling mills.
	6. Classification, construction and principle of operation of drawbenches.

	7. Classification, construction and principle of operation of drum drawers.
	8. Division of rolling mills. Classification, construction and principle of operation of longitudinal rolling mills.
	9. Classification, construction and principle of operation of cross and skew rolling mills.
	10. Classification, construction and principle of operation of special rolling mills (WPM, WPMR, ROTO-FLO, planetary, pilger mills).
	11. Classification, construction and principle of operation of general purpose mechanical presses: crank and eccentric.
	12. Classification, construction and principle of operation of general purpose mechanical presses: screw and toggle.
	13. Classification, construction and principle of operation of hydraulic presses.
	14. Classification, construction and principle of operation of specialized presses.
	15. Classification, construction and principle of operation of pipe bending machines.
laboratory	1. Construction and principle of operation of mechanical presses – PMS-100 eccentric press.
	2. Methods of determining the accuracy of production and technical condition of presses.
	3. Methods of securing mechanical presses against overload.
	4. Construction and principle of operation of hydraulic press BUSSMANN.
	5. Strength check of selected elements of the hydraulic press.
	6. Construction and principle of operation of longitudinal rolling mill DUO-100
	7. Construction and principle of operation of cross rolling mill WPM-120.
	8. Construction and principle of operation of the PXW-100a hydraulic press with a swinging die
	9. Construction and principle of operation of the PSHT-250 screw press.
	10. Educational tour - Construction of machinery and equipment for the production of draw-pieces.
	11. Educational tour - Construction of machinery and equipment for the specialized production.
	12. Educational tour - Construction of machinery and equipment for the production of forgings

## 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			
W03			X			
U01			X		X	
U02			X		X	
U03					X	
U04					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.
laboratory	non-examination assessment	Regular class attendance. A pass mark for each post-lab report. A minimum of 50% for all the in-class tests.

## OVERALL STUDENT WORKLOAD

ECTS weighting						
Activity type	Student workload					Unit
	L	C	Lab	P	S	
1. Scheduled contact hours	30		30			h
2. Other contact hours (office hours, examination)	2		2			h
3. <b>Total number of contact hours</b>	<b>64</b>					h
4. <b>Number of ECTS credits for contact hours</b>	<b>2,6</b>					ECTS
5. <b>Number of independent study hours</b>	<b>36</b>					h
6. <b>Number of ECTS credits for independent study hours</b>	<b>1,4</b>					ECTS
7. <b>Number of practical hours</b>	<b>50</b>					h
8. <b>Number of ECTS credits for practical hours</b>	<b>2,0</b>					ECTS
9. <b>Total study time</b>	<b>100</b>					h
10. <b>ECTS credits for the course</b> <i>1 ECTS credit = 25-30 hours of study time</i>	<b>4</b>					ECTS

## READING LIST

- Jaglarz Z., Leskiewicz W., Morawiecki M.: Technologia i urządzenia walcowni wyrobów płaskich. Wydawnictwo „Śląsk”, 1979
- Dobrucki W.: Podstawy konstrukcji i eksploatacji walcowni. Wyd. „Śląsk”, 1979
- Gierzyńska-Dolna M.: Maszyny do obróbki plastycznej. Skrypt Politechniki Częstochowskiej, 1984
- Grochowski E., Grosman F.: Maszyny ciągarские. Wyd. „Śląsk”, 1976
- Łuksza J.: Elementy ciągarstwa. Uczelniane Wydawnictwo Naukowo-Dydaktyczne AGH, Kraków 2001
- Muster A.: Kucie matrycowe. Projektowanie procesów technologicznych. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 2002.
- Wasiunyk P.: Kucie matrycowe. WNT, 1987
- Wasiunyk P.: Kucie na kuźniarkach. Wydawnictwo N-T, Warszawa 1973.
- Pacanowski J.: Projektowanie procesów ciągnięcia wytłoczek kołowo-symetrycznych i konstrukcji tłoczników. Tom I – Metody i zasady ciągnięcia wytłoczek kołowo-symetrycznych, Wydawnictwo PŚk, Kielce 2018..
- Pacanowski J.: Projektowanie procesów ciągnięcia wytłoczek kołowo-symetrycznych i konstrukcji tłoczników. Tom II – Konstrukcja i klasyfikacja tłoczników, Wydawnictwo PŚk, Kielce 2018.
- Romanowski W.P.: Poradnik obróbki plastycznej na zimno, WNT, Warszawa 1976.
- Pacanowski J., Chałupczak J.: Projektowanie procesów kucia matrycowego odkuwek kołowo-symetrycznych na młotach i prasach korbowych. Wydawnictwo PŚk, Kielce 2011
- Lipski T.: Kucie na kowarkach. WNT, 1979
- Szyndler R., Gogółka Z.: Kuźnictwo. Skrypt AGH, 1976
- Lisowski J.: Walcowanie kuźnicze, WNT, 1974
- Boczkarow J. A.: Prasy śrubowe. WNT, 1980
- Gosztowt L., Karaszkievicz A.: Prasy hydrauliczne. Wyd. Pol. Warszawy. 1972
- Dzidowski E. S.: Maszyny i urządzenia do obróbki plastycznej. Skrypt Politechniki Wrocławskiej, 1988
- Erbel J.: Encyklopedia technik wytwarzania stosowanych w przemyśle maszynowym. OW Politechniki Warszawskiej, Warszawa 2001
- Madej J., Wnęk Z.: Rurownictwo. Skrypt AGH, 1972
- Golatoski T.: Prasy mechaniczne. WNT, 1971
- Technical and operational documentation of machines in the Metal Forming Laboratory.
- Instructions for laboratory exercises.