MODULE DESCRIPTION

Module code	**Z-ZIP-1009**
Module name	**Techniki wytwarzania I**
Module name in English	**Manufacturing Techniques 1**
Valid from academic year	**2016/2017**

A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	**Management and Production Engineering**
Level of education	**1st degree** *(1st degree / 2nd degree)*
Studies profile	**General** *(general / practical)*
Form and method of conducting classes	**Full-time** *(full-time / part-time)*
Specialisation	**All**
Unit conducting the module	**The Department of Applied Computer Science and Armament Engineering**
Module co-ordinator	**Jarosław Pacanowski, PhD**
Approved by:	

B. MODULE OVERVIEW

Type of subject/group of subjects	**Major** *(basic / major / specialist subject / conjoint / other HES)*
Module status	**Compulsory** *(compulsory / non-compulsory)*
Language of conducting classes	**English**
Module placement in the syllabus - semester	**3rd semester**
Subject realisation in the academic year	**Winter semester** *(winter / summer)*
Initial requirements	**Materials Science** *(module codes / module names)*
Examination	**No** *(yes / no)*
Number of ECTS credit points	**3**

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	**15**		**15**		

C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Module target	The aim of the module is to familiarise students with bonding techniques, plastic working, and founding applied in industry as well as with practical learning of the selected manufacturing methods.

Effect symbol	Teaching results	Teaching methods *(l/c/lab/p/other)*	Reference to subject effects	Reference to effects of a field of study
W_01	A student has knowledge of diverse bonding techniques, mechanical engineering, and their service.	l/lab	K_W09	T1A_W04 T1A_W06
W_02	A student has knowledge of manufacturing processes, particularly plastic forming of metals on different machines.	l/lab	K_W09	T1A_W04 T1A_W06
W_03	A student has knowledge concerning the assessment of manufacturing possibility of various products as well as introducing new products in industrial conditions.	l/lab	K_W16	T1A_W04 T1A_W06
W_04	A student has basic knowledge explaining the phenomena occurring in bonding and plastic forming and the assessment of their influence on the manufactured products.	l/lab	K_W09	T1A_W04 T1A_W06
W_05	A student has basic knowledge of manufacturing products using founding methods.	lab	K_W09	T1A_W04 T1A_W06
U_01	A student can utilise the acquired knowledge to select a particular technology type to manufacture metal products with a given shape.	l/lab	K_U01 K_U02 K_U03	TA1_U01 TA1_U02 TA1_U03
U_02	A student can choose an appropriate material type providing the required product performance parameters.	l/lab	K_U01 K_U02 K_U03	TA1_U01 TA1_U02 TA1_U03
U_03	On the basis of the subject of laboratory classes, a student can practically learn the selected technologies and machines as well as describe the influence of technological parameters on the possibilities of obtaining products in terms of the shape, measurement accuracy, and quality.	lab	K_U01 K_U02 K_U03	TA1_U01 TA1_U02 TA1_U03
K_01	A student understands the necessity of lifetime learning in order to raise his/her professional qualifications as regards manufacturing processes, which is a result of technological development.	l/lab	K_K01	T1A_K01 T1A_K02 T1A_K03 T1A_K07

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	Physical fundamentals of bonding. Bonding processes metallurgy.	W_01 W_04 U_01 U_02 U_03 K_01
2	Bonding ability of metals. Metallurgical welding processes.	W_01 W_04

		U_01 U_02 U_03 K_01
3	Bondable joints and the principles of designing them.	W_01 W_04 U_01 U_02 U_03 K_01
4	The mechanisms of plastic deformations. Materials plasticity. Temperature ranges of plastic forming: hot and cold plastic forming.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
5	Discussing the rolling technology of products using different methods.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
6	Discussing flat die and drop forging technologies.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
7	Discussing the methods of drawing wires, rods, and pipes.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
8	Discussing the methods of extruding full and empty profiles.	W_02 W_03 W_04 U_01 U_02 U_03 K_01

2. Teaching contents as regards classes

Class number	**Teaching contents**	**Reference to teaching results for a module**

3. Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a module
1	OHS principles in the Welding Laboratory. Gas welding and thermal cutting.	W_01 W_04 U_01 U_02 U_03 K_01
2	Manual metal arc welding and pad welding.	W_01 W_04 U_01 U_02 U_03 K_01
3	Testing the effectiveness of automated gas shielded metal arc welding.	W_01 W_04 U_01 U_02 U_03 K_01
4	Tools, instrumentation, and founding models. Research methods of sands and moulding sand: sieve analysis and labelling the content of binder.	W_05 U_01 U_02 U_03 K_01
5	OHS principles in the Laboratory of Metal Forming.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
6	Drawing and redrawing of cylindrical drawpieces.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
7	Full and empty profile extrusion.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
8	Longitudinal rolling of flat bars.	W_02 W_03 W_04 U_01 U_02 U_03 K_01
9	Rod drawing.	W_02 W_03 W_04 U_01 U_02

		U_03 K_01

4. The characteristics of project assignments

The methods of assessing teaching results

Effect symbol	Methods of assessing teaching results *(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)*
W_01	A test on the lectures. A final test on laboratory classes.
W_02	A test on the lectures. A final test on laboratory classes.
W_03	A test on the lectures. A final test on laboratory classes.
W_04	A test on the lectures. A final test on laboratory classes.
W_05	A final test on laboratory classes.
U_01	Obtaining a credit for a report on laboratory classes.
U_02	Obtaining a credit for a report on laboratory classes.
U_03	Obtaining a credit for a report on laboratory classes.
K_01	A discussion during laboratory classes.

D. STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	**Student's workload**
1	Participation in lectures	**15**
2	Participation in classes	
3	Participation in laboratories	**15**
4	Participation in tutorials (2-3 times per semester)	**6**
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	
8		
9	**Number of hours requiring a lecturer's assistance**	**36** *(sum)*
10	**Number of ECTS credit points which are allocated for assisted work** *(1 ECTS point=25-30 hours)*	**1.3**
11	Unassisted study of lecture subjects	**4**
12	Unassisted preparation for classes	
13	Unassisted preparation for tests	**8**
14	Unassisted preparation for laboratories	**18**
15	Preparing reports	**18**
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	
19		
20	**Number of hours of a student's unassisted work**	**48** *(sum)*
21	**Number of ECTS credit points which a student receives for unassisted work** *(1 ECTS point=25-30 hours)*	**1.7**
22	**Total number of hours of a student's work**	**84**
23	**ECTS points per module** *1 ECTS point=25-30 hours*	**3**
24	**Work input connected with practical classes** *Total number of hours connected with practical classes*	**61**
25	**Number of ECTS credit points which a student receives for practical classes** (1 ECTS point=25-30 hours)	**1.8**

E. LITERATURE

Literature list	1. Praca zbiorowa, *Poradnik Inżyniera. Spawalnictwo*, WNT, Warszawa 1983. 2. Butnicki S., *Spawalność i kruchość stali*, WNT, Warszawa 1991. 3. Węgrzyn J., *Fizyka i metalurgia spawania*, Wydawnictwo Politechniki Śląskiej, Gliwice 1990. 4. Jakubiec M., Lesiński K., Czajkowski H., *Technologia konstrukcji spawanych*, WNT, Warszawa 1983. 5. Pilarczyk J., Pilarczyk J., *Spawanie i napawanie elektryczne metali*, Śląsk, Katowice 1996. 6. Klimpel A., *Technologia spawania i cięcia metali*, Wydawnictwa Politechniki Śląskiej, Gliwice 1997. 7. Opartny-Myśliwiec D., Myśliwiec M., *Spawalnictwo*, PWN, Warszawa 1991.

	8. Ferenc K. I inni, *Spawalnictwo*, WPW, Warszawa 1989. 9. Radomski T., Ciszewski A., *Lutowanie*, WNT, Warszawa 1984. 10. Wasiunyk P., *Kucie matrycowe*, WNT, Warszawa 1987. 11. Gronostajski J. i inni, *Obróbka plastyczna metali*, Skrypt Politechniki Wrocławskiej. Wrocław, 1973. 12. Erbel S., Kuczyński K., Marciniak Z., *Obróbka plastyczna*, PWN, Warszawa, 1981. 13. Erbel J. i inni, *Encyklopedia technik wytwarzania stosowanych w przemyśle maszynowym*, Tom 1. Oficyna Wyd. Politechniki Warszawskiej. Warszawa 2001. 14. Markiewicz E., *Poradnik tłoczarza*, WNT, Warszawa 1969 15. Romanowski W., *Poradnik obróbki plastycznej na zimno*, WNT. Warszawa 1976. 16. Mazurkiewicz A., Kocur L., *Obróbka plastyczna – laboratorium*, Wydawnictwo Politechniki Radomskiej. Radom 2001. 17. Łuksza J., *Elementy ciągarstwa*, Uczelniane Wydawnictwa Naukowo-Dydaktyczne. Kraków 2001. 18. Rudol F., *Ćwiczenia laboratoryjne z odlewnictwa*, Skrypt Politechniki Świętokrzyskiej, Kielce, 1988. 19. Falęcki Z., *Podstawy formowania z modeli odlewniczych*, Wydawnictwa AGH, Kraków, 1994. 20. Lewandowski L., *Materiały formierskie badania*, Wydawnictwa AGH, Kraków, 1992. 21. Ferenc K. i inni, *Spawalnictwo – laboratorium*, WPW, Warszawa 1987. 22. Pałasz J., *Poradnik spawacza gazowego*, WNT, Warszawa 1986. 23. Szustakowski J., *Poradnik spawacza elektrycznego*, WNT, Warszawa 1985. 24. Szymański J., Windyga A., Wiśniewski M., *Laboratorium metaloznawstwa spawalniczego z atlasem*, WPW, Warszawa 1987.
Module website	