

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Manufacturing Techniques II		Code 1010604231010610171
Field of study Transport	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 16 Classes: - Laboratory: - Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: dr inż. Marta Paczkowska email: marta.paczowska@put.poznan.pl tel. +4861 647-5906 Wydział Maszyn Roboczych i Transportu ul. Piotrowo 3, 60-965 Poznań		Responsible for subject / lecturer: dr inż. Zbigniew Rybak email: zbigniew.rybak@put.poznan.pl tel. +4861 665-2248 Wydział Maszyn Roboczych i Transportu ul. Piotrowo 3, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Student has basic knowledge of metals, their structures, metallurgy, heat treatment, and cutting and joining of materials.
2	Skills	Student has skills of metals structure identification, and skills of using physics and metallurgy knowledge to production process analysis.
3	Social competencies	Student is indoctrinated of importance of cause-and-effect relationships between technology, property and functional characteristics of products.
Assumptions and objectives of the course: The aim of the course is getting to know about designing of products by metal forming, powder metallurgy, metals thermal cutting and joining, and technology influence on structure, properties and functional characteristics of products		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
<ol style="list-style-type: none"> 1. Student knows of products designing techniques selection rules - [K1A_W03] 2. Student knows of sheet and bulk metal production - [K1A_W03] 3. Student knows of the specificity of powder metallurgy production and possibilities of their application - [K1A_W03] 4. Student knows of production technology processes by powder metallurgy methods - [K1A_W03] 5. Student knows of heat and chemical-heat treatment of metals and their alloys. - [K1A_W03] 6. Student shows understanding of using protective gases to increase the metals heat treatments efficiency - [K1A_W03] 7. Student knows of thermal cutting of metals and their alloys - [K1A_W03] 8. Student knows of phenomenon?s which taking place during heat using in metals joining - [K1A_W03] 9. Student knows of modern and generally using techniques of metals joining in aspect of construction safety threat - [K1A_W03] 10. Student knows of machines and devices using during production techniques - [K1A_W03] 		
Skills:		

1. 1. Student is able to get information in available sources indispensable to elaborating, analyzing, achieving of technological process of products manufacturing. - [K1A_U01-15]
2. 2. Student is able to communicate in her/his professional area by using general available and specialistic way of communication - [K1A_U01-15]
3. 3. Student is able to self-education as a condition of means of transport manufacturing techniques knowledge improvement - [K1A_U01-15]
4. 4. Student is able to makes optimal decisions of solving of technological problems taking in to account technique and economy - [K1A_U01-15]
Social competencies:
1. Student understands means of manufacturing techniques in designing of products quality - [K1A_K01-08]
2. Student understands need of manufacturing technique knowledge completing and intensifying to come up the challenges which appearing with technique developing in the world - [-]

Assessment methods of study outcomes		
Written test		
Course description		
General definitions of products manufacturing technology. Metal and alloys powder as a specific constructional material in manufacturing processes. Porous materials properties created by powder methods using nanotechnology. Powder materials application. Application of metal forming in manufacturing processes. Technology characterization. Physical and functional properties of products created by cold and hot metal forming. Forming machines. Characteristic of heat sources using in thermal cutting, joining, welding of metals and metal products. Welding metallurgy. Identification of dangers during welding work ? material and environment aspects. Analysis of welding techniques as an aspect of their technological and economical efficiency. Rules of welding procedures working out. Nondestructive methods of welds quality test. Heat and chemical-heat treatment technologies. Heat and chemical-heat treatment equipment. Protective gases in manufacturing processes.		
Basic bibliography:		
1. Erbel S Obróbka plastyczna metali.		
2. Erbel J- Encyklopedia technik wytwarzania stosowanych w przemyśle maszynowym. Tom I i II.		
3. Klimpel A. Spawanie, zgrzewanie i cięcie metali ? technologie. WNT Warszawa ,1999		
4. Dobrzański L.A. Metaloznawstwo i obróbka cieplna, WSZiP, Warszawa, 1997		
Additional bibliography:		
1. Grzyb J.,Trzciałkowski J. Urządzenia do obróbki cieplnej w atmosferach regulowanych.WNT,W-wa, 1975		
2. Gourd L. M. Podstawy technologii spawalniczych,WNT,W-wa,1997		
3. Ciszewski B. Przetakiewicz W. Nowoczesne materiały w technice. Bellona, W-wa 1993		
4. KapińskiS. Kształtowanie elementów nadwozi samochodów, WKiŁ, W-wa 1996		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparing to lecture	4	
2. Lecture	30	
3. Consultations	4	
4. Preparing to examination	8	
5. Exam	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	48	2
Contact hours	36	1
Practical activities	0	0