

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Metallurgy and Foundry		Code 1010601221010240012
Field of study Mechanical Engineering	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: 2 Laboratory: - Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 4 100%
Responsible for subject / lecturer: dr inż. Krzysztof Grzeskowiak email: krzysztof.grzeskowiak@put.poznan.pl tel. 61 665-2403 Faculty of Mechanical Engineering and Management ul. Piotrowo3, 60-965 Poznań		Responsible for subject / lecturer: dr inż. Łukasz Bernat email: lukasz.bernat@put.poznan.pl tel. 61 665-2422 Faculty of Mechanical Engineering and Management ul. Piotrowo3, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basics in the field of chemistry and physics of solid, liquid and gas bodies
2	Skills	Logical thinking. Use of information sources (library, internet). Ability to perceive lecture content.
3	Social competencies	Understanding the need to learn and acquire new knowledge
Assumptions and objectives of the course: Understanding the theoretical fundamentals and the course of metallurgy and foundry processes, classic casting technologies		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has basic, ordered knowledge of metal materials used in the construction of machines, such as: iron, aluminum, copper alloys, and in particular their manufacturing methods - [M1_W09]		
2. Has basic knowledge of manufacturing techniques used in the engineering industry - casting. - [M1_W14]		
Skills:		
1. Can design a casting technology for a simple machine element. - [M1_U13]		
2. Is able to use a technical language to the extent that allows understanding technical texts in the field of metallurgy and foundry (knowledge of technical terminology) - [M1_U23]		
Social competencies:		
1. Is ready to critically evaluate own knowledge and content. - [M1_K01]		
2. Is ready to think and act in an entrepreneurial way. - [M1_K05]		
Assessment methods of study outcomes		

<p>Lecture</p> <p>Written test. Positive rating in case of obtaining min. 50.1% correct answers. Up to 50.0% - ndst, from 50.1% to 60.0% - dst, from 60.1% to 70.0% - dst +, from 70.1 to 80 - db, from 80.1% to 90 , 0% - db +, from 90.1% - very good.</p> <p>Exercises</p> <p>Positive written or oral answers to the teacher's questions, accepted by the reporter.</p>		
Course description		
<p>Lecture:</p> <p>Definition of metallurgy. Basic concepts related to metallurgy. Stages of metal and alloys production. Metal-bearing compounds. Primary and secondary metals. They have their characteristics and methods of processing. Methods of ore enrichment. Initial metallurgical process (methods). Characteristics of raw metal. Impurities in metals and alloys: origin, character and properties. Refining processes, their purpose, methods, course and effect. Refined metal (characteristics, properties, purpose). Geese and ingots and their processing. Metallurgy of iron alloys. Great oven. Batch to the blast furnace, process flow and its products. Salad. The steelmaking process. Stages of the process and its course and effect. Steel casting. Obtaining aluminum, raw materials and their processing. Al₂O₃ electrolysis. Aluminum raw and refined link. Casting of geese and ingots. Electrolytic aluminum. Preparation of copper, ore, their transformation. Stages of production of pure copper and its alloys. Preparation of other selected non-ferrous metals (Cr, Zn, Pb, Ti). Basic concepts related to foundry. Foundry materials (basic characteristics and application). Molds. Forming of the cast in the casting mold. Filling system - elements, purpose, operation. The flow of metal through the gating system and filling the mold. Formation of the casting surface layer. Solidification and cooling of metal. The course of solidification. Desorption of pollution. Contraction phenomena before and after casting. Power contraction. Feeding of castings - rules. Controlling the coagulation process. Infusions and coolers. Foundry shrinkage. Free and inhibited contraction. Removal of mold castings. Final machining of castings. The quality of castings. Inspection and repair of castings. Review of casting production methods. Features of casts and methods of their production.</p> <p>Exercises:</p> <ol style="list-style-type: none"> 1. Research on selected properties of molding / core sand. 2. Making casts using the manual forming method. 3. Design of cast products. Basics. 4. Die casting. 5. Production of shell molds. 6. Precision casting technology. The method of smelted models. 7. Computer simulation of selected foundry processes. 8. Identification and evaluation of casting characteristics obtained with different methods. 		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. Szweycer M., Nagolska D., Metalurgia i odlewnictwo, Wyd. Politechniki Poznańskiej Poznań 2002. 2. Jackowski J., Podstawy odlewnictwa. Ćwiczenia laboratoryjne, Wyd. Politechnika Poznańska 1993 3. Tabor A., Odlewnictwo , Wyd. Politechniki Krakowskiej, Kraków 2007 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Błaszowski K., Technologia formy i rdzenia. WSiP, Warszawa 1979 lub 1984 2. Górny Z., Odlewnicze stopy metali nieżelaznych, Przygotowanie ciekłego metalu, struktura i właściwości, WNT Warszawa 1992 3. Perzyk M. i inni , Odlewnictwo, WNT Warszawa 2000 		
Result of average student's workload		
Activity		Time (working hours)
1. Participation in lectures		30
2. Strengthening the content of the lecture		10
3. Consultations		5
4. Preparation for passing		20
5. Preparation for exercises		15
6. Participation in the exercise classes		30
Student's workload		
Source of workload	hours	ECTS
Total workload	110	4
Contact hours	65	2
Practical activities	30	2