



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Metalurgy and Casting

Course

Field of study

Construction and operation of means of transport

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

30

Projects/seminars

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

PhD Łukasz Bernat

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phone. 61 665-2422

Faculty of Mechanical Engineering

Piotrowo3 street/60-965 Poznan

Responsible for the course/lecturer:

PhD Dorota Nagolska

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phone.

Faculty of Mechanical Engineering

Piotrowo3 street/60-965 Poznan

Prerequisites

Knowledge: Basics of chemistry and physics of solids, liquids and gases

Skills: Logical thinking. Use of information sources (library, internet). The ability to perceive the lecture content.

Social competences: Understanding the need to learn and acquire new knowledge



Course objective

Getting to know the theoretical basis and course of metallurgical and foundry processes, classic casting technologies.

Course-related learning outcomes

Knowledge

1. Has a basic, structured knowledge of metal materials used in mechanical engineering, such as iron, aluminum, copper alloys, and in particular about their production methods
2. Has a basic knowledge of manufacturing techniques used in the machinery industry - casting

Skills

1. Can design casting technology for a simple machine component.
2. Can use the technical language to a degree enabling the understanding of technical texts in the field of metallurgy and foundry (knowledge of technical terminology)

Social competences

1. Is ready to critically assess the knowledge and content received
2. Is willing to think and act in an entrepreneurial manner

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

Written credit. Positive evaluation in the 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.

Exercise

Positive written or oral answers to the teacher's questions, accepted by the person conducting the reports.

Programme content

Lecture:

Definition of metallurgy. Basic concepts related to metallurgy. Stages of producing metals and alloys. Metallic compounds. Primary and secondary metals. Ores, their characteristics and methods of processing. Ways of enriching ores. Initial metallurgical process (methods). Characteristics of the raw metal. Contaminants in metals and alloys: origin, form and properties. Refining processes, their purpose, methods, course and effect. Refined metal (characteristics, properties, purpose). Ingots and ingots and their processing. Ferrous metallurgy. Great oven. Blast furnace input, process course and its products. Salad. Steelmaking process. The stages of the process and its course and effect. Steel casting. Obtaining aluminum, raw materials and their processing. Al₂O₃ electrolysis. Raw and refined aluminum cell.



Casting of ingots and ingots. Electrolytic aluminum. Obtaining copper, ore, their processing. Stages in the production of pure copper and its alloys. Obtaining other selected non-ferrous metals (Cr, Zn, Pb, Ti). Basic concepts related to foundry. 2

Casting materials (basic characteristics and application). Foundry molds. Shaping of a casting in a casting mold. The gating system - elements, purpose, operation. Metal flow through the gating system and filling the mold. Formation of the casting surface layer. The solidification and cooling of the metal. The crystallization process. Desorption of impurities. Shrinkage phenomena before and after casting solidification. Power contraction. Feeding of castings - rules. Control of the coagulation process. Lugs and coolers. Foundry shrinkage. Free and inhibited contraction. Removal of castings from molds. Final treatment of castings. The quality of castings. Casting inspection and repair. Overview of casting manufacturing methods. Features of castings and methods of their production.

Exercises:

1. Research on selected properties of molding / core sand.
2. Manufacturing of castings by hand molding.
3. Designing of cast products. The basics.
4. Die casting.
5. Manufacture of shell forms.
6. Technology of precision castings. The smelted model method.
7. Computer simulation of selected casting processes.
8. Identification and evaluation of the features of castings obtained by various methods.

Teaching methods

Presentations, tasks for counting, practical tasks.

Bibliography

Basic

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

Additional

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	50	2,0

¹ delete or add other activities as appropriate