



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Metallurgy and foundry [S1ETI2>MiO]

### Course

Field of study

Education in Technology and Informatics

Year/Semester

3/5

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr inż. Dorota Nagolska

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### Lecturers

### Prerequisites

Basic knowledge of physics and chemistry. Logical thinking, analyzing occurring phenomena, using knowledge obtained from scientific, technical and popular science literature. Understanding the need to learn and acquire new knowledge.

### Course objective

Learning about the basic phenomena and course of metallurgical and casting processing. Learning about classical casting technologies.

### Course-related learning outcomes

Knowledge:

1. The student is able to describe the stages of the metal and alloy production process.
2. The student is able to describe the process of obtaining iron alloys.
3. The student is able to characterize the methods of producing castings.
4. The student is able to indicate the relationships between foundry technologies and the characteristic features of castings.

### Skills:

1. The student is able to select manufacturing technology for simple products depending on the requirements.
2. The student is able to make a simple product in accordance with health and safety regulations.
3. The student is able to assess the quality of manufactured products and determine the causes of any defects.

### Social competences:

1. The student is able to convey information about casting and plastic processing in a generally understandable way.
2. The student is able to determine the technical and non-technical conditions related to casting and plastic processing technology.
3. The student is able to think and act in an entrepreneurial manner.
4. The student understands the need for continuous education.
5. The student is able to cooperate and work in a group, assuming different roles in it.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

### Lecture:

Written assessment. A positive assessment if at least 50% of correct answers are obtained. Up to 49.9% - 2,0, from 50.0% to 59.9% - 3,0, from 60.0% to 69.9% - 3,5, from 70.0 to 79.9 - 4,0, from 80.0% to 89.9% - 4,5, from 90.0% - 5,0.

### Laboratory:

Assessment based on an oral or written answer from the content of each laboratory exercise performed, a report from each laboratory exercise according to the instructions of the laboratory instructor. To obtain a credit for the laboratories, all exercises must be passed (a positive assessment of the answers and reports passed).

## Programme content

Familiarization with the process of manufacturing metals and metal alloys. Obtaining iron alloys. Manufacturing castings in a foundry mold. Familiarization with the processes of manufacturing castings.

## Course topics

### Lecture:

Metal ores. Stages of the metallurgical process. Primary and secondary metals. Methods of ore enrichment. Methods of concentrate consolidation. Preliminary metallurgical process. Impurities in metals and alloys: origin, form and properties. Refining processes, their purpose, methods, course and effect. Refined metal (characteristics, properties, purpose). Metallurgy of ferrous alloys. Blast furnace. Charge to the blast furnace, course of the process and its products. Pig iron. Steelmaking process. Stages of the process and its course and effect. Basic concepts related to foundry. Casting materials. Formation of a casting in a casting mould. Gating system - elements, purpose, operation. Solidification process. Shrinkage phenomena before and after solidification of the casting. Feeding of castings - principles. Control of the solidification process. Riser heads and chills. Casting shrinkage. Classification of casting production methods. Review of casting production methods. Hand molding, machine molding, die casting, casting by the melted pattern method, pressure casting, centrifugal casting. Features of castings and their production methods. Basic theoretical knowledge about plastic shaping of metals and their alloys. Materials susceptible to plastic processing. Change of material properties during the shaping of products by plastic processing methods. Technological operations of shaping sheet metal products. Technological operations of shaping products from bars. General information about tool materials and technological lubricants. Defects in products and methods of their prevention.

### Laboratory:

1. Preparation and testing of basic properties of molding sands.
2. Hand molding method of sand casting.
3. Die casting.
4. Special casting methods (investment casting and casting in shell molds).
5. Application of computer technology in foundry.

6. Comparison of characteristics of castings obtained by different methods.

### Teaching methods

Lecture: multimedia presentation, films presenting selected technologies.

Laboratory: performing experiments, solving tasks, discussion, teamwork.

### Bibliography

Basic:

1. Jackowski J. Podstawy odlewnictwa. Ćwiczenia laboratoryjne. Wydawnictwo PP, Poznań, 1993
2. Szweycer M. Metalurgia. Wyd. Politechniki Poznańskiej. Poznań 1993

Additional:

1. Nagolska D., Szweycer M.: Technologia materiałów. Metalurgia i Odlewnictwo, Wydawnictwo Politechniki Poznańskiej, Poznań 2002
2. Perzyk M. i inni, Odlewnictwo. WNT, Warszawa 2004

### Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	1,00