COURSE DESCRIPTION CARD - SYLLABUS

Course name
Materials technologies

Course

Field of study
Management and Production Engineering

Year/Semester
1/2

Area of study (specialization)

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
12	12	
Tutorials	Projects/seminars	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Faculty of Mechanical Engineering

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Prerequisites

Basic in the basics of machine construction, materials manufacturing and processing, polymer physicochemistry and materials science. Logical thinking, analyzing occurring phenomena, using knowledge obtained from scientific, technical and popular science literature. Understanding the need for learning and acquiring new knowledge.

Course objective

Knowledge of advanced methods of smelting and refining metals and alloys intended for the production of cast machine parts using special casting methods and plastics processing technology, and the possibility of production using their unique products.

Course-related learning outcomes

Knowledge

1. Student should characterize modern technologies of plastics processing and advanced methods of refining metals and casting alloys intended for making technologically advanced cast parts of machines. - [K_W08]

2. The student should be able to describe the course of these technological processes. - [K_W08]

3. The student should be able to propose a manufacturing process for the selected product. - [K_W08].

Skills

1. Student is able to choose the production process for the production of a specific product. - [K_U10].

2. Student is able to analyze the technological process. - [K_U10].

3. Student is able to control the technological process. - [K_U10].

Social competences

1. The student is aware of the role of production processes in the economy and human life. - [K_K02].

2. The student demonstrates an active attitude in the creation of plastics processing processes and the production of technologically advanced cast machine parts, taking into account the issues of natural resource protection. - [K_K08].

3. The student is determined to achieve the goals set. Is able to cooperate with various environments. - [K_K12].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written test carried out on the end of the term (in case of a credit min. 50.1% correct). Up to 50.0% - unsatisfactory (2.0) = F, from 50.1% to 60.0% - Satisfactory (3.0) = E, from 60.1% to 70.0% - Satisfactory plus (3,5) = D, from 70.1 to 80 - Good (4.0) = C, from 80.1% to 90.0% - Good plus (4,5) = B, from 90.1% - Very good (5,0) = A.

Laboratory: Passing the credit is conditioned by a positive assessment of each of the exercises (presence, written or oral answer to the topics indicated by the laboratory teacher.)

Programme content

Lecture:

Metallurgy refining methods of metals and alloys under normal and vacuum pressure, and metallurgical aggregates used. Technology for melting metals and reactive alloys and used metallurgical aggregates. Characteristics of selected special casting manufacturing methods. Making castings from titanium alloys used in technology and medicine. The use of Rapid Prototyping methods in foundry. Polymers in molten, straight state, rheological description of charging molten polymers. Properties of molten polymer processors. Basic parameters of the injection process and the impact of their selection on the properties

in the properties of products. Basics of extrusion line construction depending on product production. Forming structures and properties of extruded products made of thermoplastics.

Laboratory:

Designing casting technology using CAD / CAE systems. Computer simulation of the casting process in NovaFlow & Solid. Optimization of the casting supply conditions using the simulation of the casting process. Preparation of the lamination stand, preparation of reinforcement and execution of laminates by resin infusion. Acquaintance with the construction of a modern twin screw extruder and extruder control system, extrusion tests for various process parameters.

Teaching methods

1. Lecture: multimedia presentation.

2. Laboratory exercises: performing exercises, discussion, team work.

Bibliography

Basic

1. Poradnik Odlewnika, Sobczak J., Wyd. Stowarzyszenia Technicznego Odlewników Polskich, Tom 1, Kraków 2013.

2. Perzyk M., Waszkiewicz S., Kaczorowski M., Jopkiewicz A.: Odlewnictwo. WNT, Warszawa 2000.

3. Tabor A. : Odlewnictwo. Wyd. Politechniki Krakowskiej, Kraków 2009.

4. D.M. Stefanescu, Science and Enginnering of Casting Solidification. Springer Verlag.2009.

5. Przetwórstwo tworzyw wielkocząsteczkowych, Sikora R., Wyd. Żak, Warszawa, 1993.

Additional

1. Górny Z. :Odlewnicze stopy metali nieżelaznych. WNT Warszawa 1992

2. Braszczyński J. : Teoria procesów odlewniczych. PWN Warszawa 1989

3. Z. Ignaszak, Virtual Prototyping w odlewnictwie. Wyd. Politechniki Poznańskiej. Poznań 2002.

4. Tochowicz St., Klisiewicz Z., Metalurgia próżniowa stali, Wyd. Śląsk, Katowice 1979.

5. Aspekty rozwoju recyklingu w Polsce, Merkisz - Guranowska A., WITE, 2005.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) [1]	70	3,0

[1] delete or add other activities as appropriate