COURSE DESCRIPTION CARD - SYLLABUS

Course name
Foundry and metal forming

Course

Field of study
Biomedical engineering
Area of study (specialization)
-
Level of study
First-cycle studies
Form of study
full-time
Year/Semester
2/3
Profile of study
general academic
Course offered in
English
Requirements
compulsory

Number of hours

Lecture
30
Laboratory classes
30
Other (e.g. online)
0
Tutorials
0
Projects/seminars
0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

Basic knowledge of chemistry, physics, mathematics and mechanics; skills of logical thinking; association

of knowledge of many branches; geting and using information form library and internet; social expertise: needs of continuous learnig, geting new knowledge

Course objective

Getting knowledge about casting processes and metal forming applying in manufacturing and exploatation of machines elements; recognise tools and machines used for casting processes and metal forming.

Course-related learning outcomes

Knowledge

1. He/she has well-founded theoretical general knowledge about manufacturing technologies. He/she knows how to describe processes of manufacturing engineering materials, techniques of creating metals and alloys, machining and advanced technologies of subtractive machining, modern formation techniques

2. He/she can describe the specificity foundry processes

3. He/she can describe the basic casting technologies

4. He/she is able to safely perform the casting process for the selected casting technology

5. He/she is able to choose the casting technology depending on the product requirements

Skills

1. He/she knows how to assess usefulness of methods and tools routinely used to solve engineering tasks of a practical character typical for materials engineering and select and use the right methods and tools

2. He/she knows how to solve technical problems using laws of mechanics and carry out strength analyses of machine elements and mechanical systems

Social competences

1. He/she is well aware of the necessity for continuous learning and knows how to inspire and organize the process of learning of other people

2. He/she is well aware of the social role of a graduate of a technical university, understands the need to formulate and inform the public through mass media about technical achievements and of other aspects of engineering activity and makes sure that such information and opinions are conveyed in a way that is generally understood

3. He/she knows how to cooperate and work in teams assuming various roles within

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Written test of general questions (positive note for minimu 50.1% correct answers: <50% - ndst, [50.1% - 60.0%]- dst, [60.1% -70.0%]- dst+, [70.1% - 80 %]db, [80.1% - 90.0%] - db+, [90.1% - 100%]- bdb)

Laboratorium:

Oral or written test of questions related to each experiment done in laboratory, written report of each experiment (according to lecturer instructions). To get credit every exercise must be passed (test and report).

Programme content

Lecture:

1. Foundry molds - raw materials and methods of making them.

2. Characteristic features and properties of foundry molds.

3. Physico-chemical phenomena during filling molds with liquid casting material.

4. Influence of cooling and solidification conditions of liquid metal on the properties of the casting.

5. Overview of casting methods.

6. Features of castings and methods of their production.

7. Theoretical knowledge about plastic forming of metal (plastic conditions, yield point, mecanism of plastic deformations).

8. Technological operation of sheets forming (cutting, bending, stamping) and rods (forging, rolling, extrusion).

9. mateiral used in metal forming.

10. Changing of materil paramteres (characteristics) during plastic forming.

11. Information aobut tols materials and technological greases.

12. Imperfections in workpieces obtained in metal forming.

13. Technological processes - examples.

Laboratory:

1. Preparation and testing of the basic properties of molding sand.

2. Sand casting.

3. Die casting.

4. Special casting methods (lost wax method and casting in shell molds).

5. Application of computer technology in foundry.

6. Comparison of the features of castings obtained with different methods.

7. Charasteristics of metal forming machines.

8. Sheet cutting using guillotineand disc scissors.

9. Stamping of cylidrical drawpiece using hydraulic press.

10. Open forging using gravity hammer and die forging using screw press; extrusion using hydraulic press.

11. Stamping rectangular workpiece using hydraulic press.

12. Longitudinal and transverse rolling.

13. Estimation of material characteristics (tensile test, Erichsen test).

Teaching methods

Lecture:

Multimedia presentation (images, graphs, videos, simulations)

Laboratory:

Perform of experiments - presentation of results, practical work of students, discussion.

Bibliography

Basic

1. Szweycer M., Nagolska D.: Metalurgia i odlewnictwo. Wyd. PP, Poznań 2002

2. Jackowski J.: Podstawy odlewnictwa. Ćwiczenia laboratoryjne, Wyd. PP, Poznań 1993

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

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

5. Erbel S., Kuczyński K., Marciniak Z.:Obróbka plastyczna. Warszawa: PWN 1986.

6. Morawiecki M., Sadok L., Wosiek E.: Teoretyczne podstawy technologicznych procesów przeróbki plastycznej, Wyd. Śląsk, 1986

7. Z. Marciniak: KONSTRUKCJA TŁOCZNIKÓW, Ośrodek Techniczny A. Marciniak, Warszawa, 2002.

Additional

1. Braszczyński J. : Teoria procesów odlewniczych. PWN , Warszawa 1989

2. Łybacki W., Modrzyński A., Szweycer M. : Technologia topienia metali. Wyd. PP Poznań 1986

3. Erbel S.,Golatowski T.,Kuczyński K., Marciniak Z. i inni: Technologia obróbki plastycznej na zimno. Warszawa: SIMP-ODK 1983. Muster A.: KUCIE MATRYCOWE,

4. Muster A.: KUCIE MATRYCOWE Projektowanie procesów technologicznych, Oficyna Wydawnicza Politechniki Poznańskiej, Warszawa 2002.

5. Zalecenia do obróbki plastycznej metali. Instytut Obróbki Plastycznej, Poznań.

6. M. Ustasiak, P. Kochmański: OBRÓBKA PLASTYCZNA Materiały pomocnicze do projektowania, Politechnika Szczecińska, Szczecin, 2004

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	60	2,5
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) [1]	40	1,5

[1] delete or add other activities as appropriate