COURSE DESCRIPTION CARD - SYLLABUS

Course name

Non-wastage technologies

Course

Field of study

Management and production engineering

Year/Semester

1/1

Area of study (specialization)

-

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

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Responsible for the course/lecturer:

Prerequisites

Knowledge: Basic information on the processes of production techniques (foundry, plastic processing and plastic working).

Skills: Logical thinking, analyzing the occurring phenomena, using the knowledge obtained from scientific, technical and popular science literature.

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

Course objective

Learning about selected non-waste manufacturing technologies used in material technologies

Course-related learning outcomes

Knowledge

1. The student has detailed knowledge in the field of non-waste technologies, knows contemporary trends and directions of development of foundry, plastic working and plastic processing - [K2_W02]

2. The student is able to propose a method of manufacturing a product depending on the assumed needs - [K2_W02]

3. The student is able to identify modern materials and technologies of their processing - [K2_W01]

4. The student is able to indicate the use of computer systems in material technologies - [K2_W08]

Skills

1. The student is able to select the manufacturing technology for products shaped by material technologies - [K2_U09]

2. The student is able to use rapid prototyping methods for the production of metal products - [K2_U10]

3. The student has the necessary preparation to work in an industrial environment. The student is able to carry out the process of manufacturing castings in a safe manner - [K2_U05]

Social competences

1. The student understands the need for continuous learning; can inspire and organize the learning process of team members - [K2_K01]

2. The student is able to cooperate and work in a team, assuming different roles - [K2_K03]

3. The student is able to think and act in a creative and entrepreneurial way - [K2_K06]

4. The student is open to discussion about technical issues - [K2_K07]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Written exam at the end of the semester (credit if at least 50.1% of correct answers are obtained). Up to 50.0% - ndst, from 50.1% to 60.0% - dst, from 60.1% to 70.0% - dst +, from 70.1 to 80.0 - db, from 80.1% up to 90.0% - db +, from 90.1% to 100% - bdb.

Laboratories:

Participation in laboratory classes. Providing an oral or written answer to the teacher, graded on a scale from 2 to 5. Final grade on a grade scale from 2 to 5, the average of the obtained laboratory grades (all must be positively assessed, above 2)

Programme content

Lecture:

Discussion of the material and rheological foundations of polymer processing. Description, examples of use and principles of designing technological processes of injection and extrusion of polymers in industrial practice, including machines, devices and environmental impact. Assessment of the quality of products made of polymeric materials, taking into account their applications and manufacturing methods. Application of the Rapid Prototyping method in foundry. Place of computer support in the design of casting technology. Modeling and simulation methods of complex foundry processes. Computer simulation of the casting process. Thermophysical databases in simulation systems. Simple and vice versa. Thermophysical coefficients determined from inverse problems. Application examples. Modern molding methods and production lines. Examples of innovative technologies in metal forming and directions of development of technologies, materials, machines and devices used for plastic forming of metals. The use of new or modified construction materials in mechanical engineering and other fields (e.g. in the automotive industry, in medicine). Applications of new generation drives and control in machines and technological devices, as well as technological lines and sockets (e.g. CNC centers for punching, bending pipes and bars, mechanical and liquid stamping). Examples of powder production systems (powder metallurgy) and powder metal products. Lubrication and greases. Product quality. Health and safety in plastic working.

Lab:

Presentation of polymer processing technologies, such as injection, extrusion and vacuum forming, taking into account the most important regulatory parameters and their influence on the properties of the product. Manufacture of precision castings from models made by Rapid Prototyping. Pouring molds under the action of centrifugal force or vacuum. The process of multi-operation extrusion on an automatic press. Cold welding of metals. Product defects. Methods of assessing the suitability of metallurgical materials for plastic working processes.

Teaching methods

Lecture: multimedia presentation illustrated with examples given on the blackboard, solving problems.

Laboratory exercises: performing experiments, solving problems, discussion, working in a team.

Bibliography

Basic

1. Przetwórstwo tworzyw wielkocząsteczkowych, R. Sikora, Wydawnictwo Żak, Warszawa, 1993

2. Mechanizacja odlewni , Chudzikiewicz R, WNT, Warszawa, 1980

3. Kształtowanie elementów nadwozi samochodowych, Kapiński S., WKŁ, Warszawa, 1996

Additional

1. Technologia odlewnictwa - projektowanie , Rączka J., Tabor A., Skrypt Politechniki Krakowskiej, Kraków, 1981

2. Poradnik Tworzywa Sztuczne, Pr. Zbiorowa, WNT, Warszawa, 2006

3. Konstrukcja tłoczników, Marciniak Z, Ośrodek Techniczny A.Marciniak, Warzawa, 2002

4. Technologia obróbki plastycznej na zimno, Antosik J., Golatowski T., Nagiel W, , Wyd. SIMP ODK w Warszawie, Warszawa, 1985

5. Metalurgia i odlewnictwo, Szweycer M., Nagolska D., Wyd. Politechniki Poznańskiej, Poznań, 2002

6. Tworzywa sztuczne w praktyce, Haponiuk J.T., Wyd. Verlag Dashofer, Warszawa, 2008

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/tutorials, preparation for tests/exam, project preparation) [1]	40	1,5

[1] delete or add other activities as appropriate