COURSE DESCRIPTION CARD - SYLLABUS

Course name
Forming technologies [N1Mech2>TF]

Course

Field of study
Mechatronics

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
16

Laboratory classes
16

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

Lecturers

Prerequisites

Basic knowledge of physics, chemistry and materials science. 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 in the technologies of casting, metal forming and plastics processing. Learning about the characteristics of selected technologies of casting, metal forming and plastics processing.

Course-related learning outcomes

Knowledge:
1. The student is able to characterize typical phenomena characteristic of casting technology, metal forming and plastics processing.
2. The student is able to characterize selected casting methods.
3. The student is able to characterize selected methods of manufacturing products by metal forming.
4. The student is able to characterize selected methods of manufacturing products by plastics processing.

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 think and act in an entrepreneurial manner.
2. The student understands the need for continuous education.
3. 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:
Completion of laboratory classes based on an oral/written answer or a report/elaboration as indicated by the instructor for each laboratory exercise. To obtain credit for the laboratories, all exercises must be credited. To obtain a credit for the laboratories, all exercises must be passed.

Programme content

Familiarization with phenomena characteristic of forming technologies. Production of metal products by casting and forming. Production of plastic products. Characteristics of products manufactured using forming technologies.

Course topics

Lecture:
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.
Preparation of raw materials for plastics processing (drying, granulation, mixing). Injection molding technology, construction of injection molding machine and molds, parameters, process variations. Extrusion of polymeric plastics, single- and twin-screw plasticizing systems, calibration of the extrudate, profile processing. Laminating technology, raw materials, molds, laminating methods. Thermoforming technology (vacuum forming). Methods of joining polymeric plastics, welding, bonding. Technology of applying polymeric plastics to metal products.
Laboratory:
1. Die casting.
2. Hand molding method of sand casting.
3. Special casting methods (investment casting and casting in shell molds).
4. Free forging and die forging, extrusion.
5. Rectangular pressing.
6. Injection molding technology.
7. Extrusion technology.
8. Laminating technology.
9. Thermoforming.

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. Perzyk M. i inni, Odlewnictwo. WNT, Warszawa 2004
3. Erbel S., Kuczyński K., Marciniak Z.: Obróbka plastyczna. Warszawa: PWN 1986
4. K. Wilczyński, Przetw. Tworzyw Sztucznych, wyd. Politechnika Warszawska, 2000
5. W. Frącz, Przetwórstwo tworzyw polimerowych, wyd. Politechnika Rzeszowska, Rzeszów 2011

Additional:
1. Nagolska D., Szweycer M.: Technologia materiałów. Metalurgia i Odlewnictwo, Wydawnictwo Politechniki Poznańskiej, Poznań 2002
2. Morawiecki M., Sadok L., Wosiek E.: Teoretyczne podstawy technologicznych procesów przeróbki plastycznej, Wyd. Śląsk, 1986
3. Poradnik: Tworzywa Sztuczne, WNT, W-wa, 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	32	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	68	2,50