COURSE DESCRIPTION CARD - SYLLABUS

Course name
Plastic processing [S1IMat1>OP]

Course

Field of study
Materials Engineering

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
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student has a basic knowledge of mathematics and physics. The skills of logical reasoning and associating the knowledge acquired during the education process according to the study program; ability to review and select literature. The student understands and feels the need to learn and acquire new knowledge and to constantly deepen it.

Course objective

Getting to know the methods of plastic working of metals in the production of parts and operation of machines, as well as familiarization with machines and tooling for metal working.

Course-related learning outcomes

Knowledge:
1. can list the conditions related to plastic forming of metals and can indicate materials that meet these criteria - [k_w08].
2. can characterize the methods of plastic working of metals for the production of parts - [k_w12].
3. has a basic knowledge of the operation of metal forming machines - [k_w12].
4. has a basic knowledge of the tooling used for plastic working - [k_w12].

Skills:
1. can choose materials with properties that enable their shaping in specific conditions. - [k_u21].
2. can choose appropriate technologies for plastic shaping of products with required properties - [k_u12, k_u16].
3. is able to select machines for plastic working depending on the required assumptions. - [k_u12].

Social competences:
1. understands the need for continuous training (eg through participation in courses and postgraduate studies) - [k_k01].
2. can provide information about plastic working in a generally understandable way - [k_k07].
3. can interact and work in a group, assuming different roles in it. - [k_k03].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:
Written credit carried out 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% - db, from 80.1% up to 90.0% - db +, from 90.1% - very good.
Lab:
Passing on the basis of an oral or written answer regarding the content of each performed laboratory exercise, a report on each laboratory exercise according to the instructions of the laboratory teacher. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

Programme content

Lectures:
Basics of the theory of plastic deformation (stress tensor, strength hypotheses, yield strength).
Defects of products obtained by plastic processing
Technological operations of shaping sheet metal products (cutting, bending, stamping) and shaping solids (forging).

Laboratories:
Characteristics of plastic forming machines.
Implementation of selected plastic processing processes of sheet metal and solids.

Course topics

Lectures:
1. Basic theoretical knowledge about plastic forming of metals and their alloys (plasticity conditions, the mechanism of plastic deformation).
2. Materials susceptible to plastic working. Change of material properties during shaped products by plastic working methods
3. General information about tool materials and technological lubricants.
4, 5. Technological operations for shaping sheet products (cutting, bending, stamping)
6. Technological operations of shaping products from bars (forging, rolling, extrusion, drawing).
7. Defects in products and methods of their prevention.
Laboratories:
1. Characteristics of plastic working machines located in ZOP.
2. Sheet metal cutting with guillotine and circular shears.
3. Punching the cylindrical drawpiece with a hydraulic press.
4. Open-die forging with a drop hammer and drop forging with a screw press; extrusion with a hydraulic press.
5. Punching a rectangular drawpiece with a hydraulic press.
6. Longitudinal and transverse rolling with the use of laboratory rolling mills.
7. Determination of basic properties of materials (tensile test and ERICHSEN test).

Teaching methods

1. Lecture: multimedia presentation, solving example tasks on the blackboard,
2. Laboratory exercises: practical exercises, performing experiments, discussion, team work.

Bibliography

Basic
1. Erbel S., Kuczyński K., Marciniak Z.:Obróbka plastyczna. Warszawa: PWN 1986.
2. Morawiecki M., Sadok L., Wosiek E.: Teoretyczne podstawy technologicznych procesów przeróbki plastycznej, Wyd. Śląsk, 1986
3. Z. Marciniak: KONSTRUKCJA TŁOCZNIKÓW, Ośrodek Techniczny A. Marciniak, Warszawa, 2002.
Additional
1. Erbel S.,Golatowski T.,Kuczyński K., Marciniak Z. i inni: Technologia obróbki plastycznej na zimno. Warszawa: SIMP-ODK 1983. Muster A.: KUCIE MATRYCOWE,
2. Muster A.: KUCIE MATRYCOWE Projektowanie procesów technologicznych, Oficyna Wydawnicza Politechniki Poznańskiej, Warszawa 2002.
3. Zalecenia do obróbki plastycznej metali. Instytut Obróbki Plastycznej - Poznań.
4. M. Ustasiak, P. Kochmański: OBRÓBKA PLASTYCZNA Materiały pomocnicze do projektowania, Politechnika Szczecińska, Szczecin, 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	65	2,00
Classes requiring direct contact with the teacher	35	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	1,00