COURSE DESCRIPTION CARD - SYLLABUS

Course name
Plastic working [N1Mech1>OP]

Course

Field of study
Mechatronics

Year/Semester
1/2

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
8

Laboratory classes
8

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

Lecturers

dr inż. Dariusz Bartkowski
dariusz.bartkowski@put.poznan.pl

Prerequisites

The student has basic knowledge in the field of mathematics and physics. In addition, student has the ability to reason logically and associate the information acquired during the education process. Student can obtain information from literature and the Internet. Student understanding the necessity of learning, gaining and synergy of new knowledge as well as constant expansion of knowledge.

Course objective

Acquainting with the methods of plastic working of metals in the production of parts and exploitation of machines, as well as getting acquainted with machines and equipment for plastic working of metals.

Course-related learning outcomes

Knowledge:
1. Student knows the issues related to plastic processing of metals, including the causes of defects in products and methods of their prevention as well as tooling used for plastic processing.
2. Student knows the methods of plastic working of metals in the production of parts and operation of machines.
3. Student has a basic knowledge of the operation of metal forming machines.

Skills:
1. Student can identify technical problems in the field of plastic forming processes and operation of machines and instrumentation.
2. Student canchoose materials with properties that enable their shaping in specific conditions.
3. Student canchoose appropriate technologies for plastic shaping of products with required properties.
4. Student canchoose the machines for plastic working depending on the required assumptions.

Social competences:
1. Student can communicate information about plastic working in a generally comprehensible way.
2. Student candefine technical and non-technical conditions related to plastic working.
3. Student canthink and act in an entrepreneurial manner.
4. Student understands the need for continuous training.
5. Student can interact 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:

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Lecture:
Written credit 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% - very good.
Laboratories:
Passing on the basis of an oral or written answer concerning 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 on the answers and passed reports).

Programme content

Lectures:
Basic theoretical knowledge about plastic working of metals and their alloys (stress tensor, plasticity conditions, plastic strain mechanism). Materials susceptible to plastic working. Changing the properties of materials during shaped products by plastic working methods. Technological operations of shaping sheet products (cutting, bending, stamping). Technological operations of shaping products from bars (forging, rolling, extrusion, drawing). General information about tool materials and technological lubricants (taking into account the aspects of friction in plastic working). Defects in products and methods of their prevention.
Laboratories:
1. Characteristics of plastic working machines.
2. Sheet metal cutting using guillotine and circular shears.
3. Punching the cylindrical drawpiece with a hydraulic press.
4. Open-die forging with a drop hammer and die 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 using laboratory rolling mills. 7. Determination of basic properties of materials (tensile test and ERICHSEN test).

Teaching methods

Lecture: multimedia presentation illustrated with examples given on the board, solving problems.
Laboratories: performing experiments, solving problems, discussion, working in a team.

Bibliography

Basic
1. Obróbka plastyczna, Erbel S., Kuczyński K., Marciniak Z., PWN, Warszawa, 1981
2. Poradnik obróbki plastycznej na zimno, Romanowski W.P., WNT, Warszawa, 1976
3. Erbel S., Kuczyński K., Marciniak Z.:Obróbka plastyczna. Warszawa: PWN 1986.
4. Morawiecki M., Sadok L., Wosiek E.: Teoretyczne podstawy technologicznych procesów przeróbki

plastycznej, Wyd. Śląsk, 1986
5. Z. Marciniak: KONSTRUKCJA TŁOCZNIKÓW, Ośrodek Techniczny A. Marciniak, Warszawa, 2002.
Additional
1. Teoretyczne podstawy technologicznych procesów przeróbki plastycznej, Morawiecki M., Sadok L., Wosiek E., Śląsk, Katowice, 1977
2. Zarys obróbki plastycznej metali, Dobrucki W., Śląsk, Katowice, 1974
3. Kucie matrycowe, Wasiunyk P., WNT, Warszawa, 1975
4. Erbel S.,Golatowski T.,Kuczyński K., Marciniak Z. i inni: Technologia obróbki plastycznej na zimno. Warszawa: SIMP-ODK 1983. Muster A.: KUCIE MATRYCOWE,
5. Muster A.: KUCIE MATRYCOWE Projektowanie procesów technologicznych, Oficyna Wydawnicza Politechniki Poznańskiej, Warszawa 2002.
6. Zalecenia do obróbki plastycznej metali. Instytut Obróbki Plastycznej - Poznań.
7. M. Ustasiak, P. Kochmański: OBRÓBKA PLASTYCZNA Materiały pomocnicze do projektowania, Politechnika Szczecińska, Szczecin, 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	25	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00