



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Metal forming in automotive manufacturing [S1MiTPM1>OPwPM]

Course

Field of study

Materials and technologies for automotive industry

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

Basic knowledge of chemistry, physics, mathematics and mechanics; skills of logical thinking; association of knowledge of many branches; getting and using information from library and internet; social expertise: needs of continuous learning, getting new knowledge

Course objective

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

Course-related learning outcomes

Knowledge:

Students have general knowledge of metal forming, focused on the design, manufacture and operation of motor vehicles.

Students know how to correlate the criteria for selecting materials with their plastic and mechanical properties.

Students know the basic assumptions and the course of selected forming processes. They have a basic understanding of engineering design in the field of plastic forming processes.

Skills:

Students are able to obtain information from literature, databases and other properly selected sources in the field of plastic working technology.

Students choose a technology in order to obtain the desired product with the assumed properties, they can select a material susceptible to plastic deformation

Students are able to analyze, evaluate and solve technical issues of the automotive industry using knowledge in the field of plastic working.

Social competences:

Students are aware of technological developments (including in forming), following it and understand the need for lifelong learning.

Students are able to interact, think and act in a team, in an entrepreneurial way. They understand the need for teamwork.

Students are able to properly determine priorities for the implementation of a task specified by themselves or others.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Written exam (pass 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% to 90.0% - db+, from 90.1% - n/a.

Laboratory:

Credit, on the basis of an oral or written answer on the content of each laboratory exercise, a report on each laboratory exercise according to the instructions of the laboratory instructor. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

Programme content

Theoretical foundations of plastic deformations (stress tensor, strain hypotheses, yield point, hardening curves).

Machines and tools (tool materials) in plastic working. Friction - the influence on tools and product properties.

Materials used for plastic forming and their properties.

Forming processes: cutting, bending, stamping, forging. Rolling.

Course topics

Lecture:

1. Basic theoretical knowledge about plastic forming of metals and their alloys (stress tensor, plasticity conditions, mechanism of plastic deformation).

2. Materials susceptible to plastic working.

3. Change in the properties of materials during the forming of products.

4. Technological operations of shaping sheet metal products (cutting, bending, stamping).

5. Technological operations of shaping products from bars (forging, rolling, extrusion, drawing).

6. General knowledge about tool materials and technological lubricants (taking into account friction aspects in plastic working).

7. Defects in products and methods of their prevention

Laboratory

1 Characteristics of the forming machines located in the Forming Hall.

2. Cutting metal sheets with guillotine and circular shears.

3. Cylinder extrusion stamping by hydraulic press.

4. Free forging by drop hammer and die forging by screw press; extrusion by hydraulic press.

5. Stamping rectangular stamping by hydraulic press.

6. Longitudinal and transverse rolling by laboratory rolling mills.

7. Determination of basic properties of materials (tensile test and ERICHSEN test).

Teaching methods

Wykład:

Prezentacja multimedialna ilustrowana przykładami (grafikami, filmami)

Laboratorium:

Przeprowadzanie eksperymentów - prezentacja wyników oraz praktyczne działania studentów, dyskusja

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., Golański 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	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00