



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Manufacturing and processing of materials [S1Lot1>WiOM]

### Course

Field of study

Aviation

Year/Semester

2/3

Area of study (specialization)

Aircraft Piloting

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 (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

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### Lecturers

### Prerequisites

Basic knowledge of mathematics, physics and materials science. Logical thinking skills, using information sources (library, Internet) and understanding the need to learn and acquire new knowledge.

### Course objective

Learning about the three basic technologies for producing machine parts, i.e. plastic processing (methods metal forming in the production of parts and operation of machines, and introduction with machines and equipment for metal forming), foundry (casting methods and basics of the casting technology simulation process) and machining (machining methods, cutting tools, process course and its physical, technological and economic effects).

### Course-related learning outcomes

none

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Written assessment carried out at the end of the semester (pass if obtaining at least 50.1% correct answers). Up to 50.0% - ndst, from 50.1% to 60.0% - dst, from 60.1% to 70.0% - dst+, from 70.1 up to 80.0 - db, from 80.1% to 90.0% - db+, from 90.1% - very good.

Lab:

Assessment criteria based on oral or written answer regarding the content of each activity laboratory exercise, report on each laboratory exercise as indicated conducting laboratory exercises. To pass the laboratories, all exercises must be completed be passed (positive grade for answers and reports).

## Programme content

### I) PART I. Forging

Lecture:

1. Basic theoretical knowledge about the plastic shaping of metals and their alloys (conditions plasticity, plastic deformation mechanism).
2. Technological operations of shaping products from sheet metal (cutting, bending, stamping) and rods (forging, rolling, extrusion, drawing).
3. Materials susceptible to plastic processing.
4. Changing the properties of materials when shaping products using plastic forming methods.
5. Defects in products and methods of prevention as well as examples of technological processes,

Lab:

1. Cutting sheet metal using guillotine and circular shears.
2. Pressing a cylindrical extrudate using a hydraulic press.
3. Volumetric plastic working processes - forging and extrusion.
4. Pressing a rectangular extrusion using a hydraulic press.
5. Longitudinal and transverse rolling using laboratory rolling mills.

### II) PART II. Foundry

Lecture:

1. Main and auxiliary molding materials and methods of testing the properties of molding sands.
2. Methods of producing castings in disposable and permanent molds.
3. Introduction to casting design.
4. Technological properties of selected casting alloys. Crystal structure of alloys foundry.
5. Methods of destructive and non-destructive testing of castings.

Lab:

1. Research on selected properties of molding/core sands.
2. Making castings by hand molding.
3. Die casting.
4. Computer simulation of selected foundry processes.
5. Identification and assessment of features of castings obtained by various methods.

### III) PART III. Machining

Lecture

1. Types and varieties of cutting. Conditions for cutting to occur (material decohesion).
2. Technological and geometric cutting parameters and the basis for their selection.
3. Materials for blades and cutting tools. Blade wear and durability.
4. Accuracy and actual and theoretical roughness of the machined surface.
5. Selected tribological aspects. Machinability of various workpiece materials. Characteristic top layer.

Lab

1. Technological capabilities of milling and drilling machines (machine tool, tools, process)
  2. Technological capabilities of lathes and grinders (machine tool, tools, process).
  3. Construction of cutting tools and analysis of tool materials
  4. Assessment of the geometric and physical features of the surface layer after various processing methods
- PART - 66 (THEORY - 7.5 hours, PRACTICE 11.25 hours)

## MODULE 6. MATERIALS AND EQUIPMENT

### 6.1 Aircraft materials containing iron

- a) Characteristics, properties and identification of commonly used alloy steel used in aircraft;

## Course topics

none

## Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board.  
Laboratory: performing tasks given by the teacher - practical exercises.

## Bibliography

Podstawowa

Literatura podstawowa:

I) CZEŚĆ I. Obróbka plastyczna

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.

II) CZEŚĆ II. Odlewnictwo

1. Praca zbiorowa red. J. Jackowski, Podstawy odlewnictwa. Ćwiczenia laboratoryjne. Wyd.PP, Poznań 1993.
2. Szweycer M., Nagolska D., Metalurgia i odlewnictwo, Wyd. PP, Poznań 2002.
3. Perzyk M. i inni, Odlewnictwo, WNT Warszawa 2004
4. Tabor A., Odlewnictwo, Wyd. Politechniki Krakowskiej, Kraków 2007

III) CZEŚĆ III. Obróbka skrawaniem

1. Dul-Korzyńska B.: - Obróbka skrawaniem i narzędzia. Oficyna Wydawnicza Politechniki Rzeszowskiej 2009.
2. Erbel J. (red.): Encyklopedia technik wytwarzania w przemyśle maszynowym. Tom II. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001.
3. Filipowski R., Marciniak.: Techniki obróbki mechanicznej i erozyjnej. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000.
4. Kosmol J. (red.): Techniki wytwarzania ? obróbka wiórowa i ścierna. Wydawnictwo Politechniki Śląskiej, Gliwice 2002.
5. Olszak W.: Obróbka skrawaniem. WNT Warszawa 2008.
6. Wysiński M.: Nowoczesne materiały narzędziowe WNT Warszawa 1997.
7. Żebrowski H. : Techniki wytwarzania. Obróbka wiórowa, ścierna i erozyjna. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2004.

Uzupełniająca

Literatura uzupełniająca:

I) CZEŚĆ I. Obróbka plastyczna

1. Erbel S., Golański T., Kuczyński K., Marciniak Z. i inni: Technologia obróbki plastycznej na zimno. Warszawa: SIMP-ODK 1983. Muster A.: KUCIE MATRYCOWE, Warszawa 2002.
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.

II) CZEŚĆ II. Odlewnictwo

1. Praca zbiorowa red. J. Sobczak, Poradnik Odlewnika. Odlewnictwo współczesne. Tom I Materiały, Wyd. STOP, 2013.
2. Braszczyński J., Teoria procesów odlewniczych, PWN Warszawa 1989
3. Górny Z., Odlewnicze stopy metali nieżelaznych, Przygotowanie ciekłego metalu, struktura i właściwości, WNT Warszawa 1992.
4. Ignaszak Z., Bazy danych i walidacja, Wyd. Politechniki Poznańskiej, Poznań 2002.
5. Ashby M. i in., Materiały inżynierskie tom I i II, WNT, 1996.

III) CZEŚĆ III. Obróbka skrawaniem

1. Cichosz P.: Narzędzia skrawające. WNT. Warszawa 2008.
2. Jemielniak K.: Obróbka skrawaniem. Oficyna Wydawnicza Politechniki Warszawskiej - Warszawa 1998.
3. Grzesik W.: Podstawy skrawania materiałów metalowych, WNT Warszawa 1998.

4. Shaw M.C.: Metal Cutting Principles. Oxford University Press, Oxford 1996.

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	0	0,00
Classes requiring direct contact with the teacher	0	0,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	0	0,00