



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Machining [S1IMat1>OS]

### Course

Field of study

Materials Engineering

Year/Semester

2/4

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 (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr hab. inż. Paweł Twardowski prof. PP  
pawel.twardowski@put.poznan.pl

### Lecturers

### Prerequisites

Basic knowledge of machining and material science. The student is able to use the acquired knowledge to analyze specific manufacturing techniques and has the ability to obtain information from the indicated sources. The student shows independence in solving problems, gaining and improving the acquired knowledge and skills, understanding the need to learn.

### Course objective

Acquainting future engineers with kinematics, technological possibilities, machine tools and tools for various cutting methods. Understanding the method of calculating theoretical roughness, parameters and cutting power. Acquiring the ability to select the material, cutting edge geometry and cutting parameters. Understanding energy issues in the cutting process and tribological issues in the tool operation process.

### Course-related learning outcomes

Knowledge:

1. can characterize the basic issues of manufacturing technology: cutting methods (kinematics, technological possibilities and tools) - [k\_w10]
2. has knowledge of the types of tool materials and methods of their production - [k\_w05, k\_w06,

k\_w07, k\_w08]

#### Skills:

1. can select cutting methods, tools, run-up and run-down paths, and tool materials to make a given part. - [k\_u19]
2. can select appropriate manufacturing technologies to shape products, their structure and properties - [k\_u13, k\_u16, k\_u20]
3. can communicate using the basic concepts and quantities in the field of machining contained in books, magazines, tool catalogs, materials of machine tool companies - [k\_u13]
4. can distinguish and find different tools, methods of cutting and machine tools. - [k\_u19]

#### Social competences:

1. is able to cooperate within the team, fulfill the duties entrusted as part of the division of labor in a team - [k\_k03]
2. can actively engage in solving given problems, independently develop and expand their competences - [k\_k05, k\_k06]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: Credit based on a test containing questions from the content presented in the lecture (in the case of answers to: from 50 to 60% of questions – 3.0, over 60 to 70% - 3.5, over 70 to 80% - 4.0, over 80 to 90% - 4.5, above 90 to 100% - 5.0)

Laboratories: Assessment based on oral and / or written answers on the content of each performed laboratory exercise, reports on each performed exercise according to the teacher's instructions. In order to pass the laboratories, all exercises must be passed (positive grade from answers and reports).

### Programme content

#### Lecture

- 1) Characteristics of manufacturing techniques.
- 2) Types and methods of cutting.
- 3) Cutting conditions (material decohesion).
- 4) Machining kinematics, technological possibilities.
- 5) Technological and geometric cutting parameters and the basics of their selection.
- 6) Materials for cutting tools.
- 7) Wear and tool life.
- 8) Accuracy and real and theoretical roughness of the machined surface.
- 9) Forces, moment and cutting power.
- 10) Selected tribological aspects.
- 11) Machinability of various workpieces.
- 12) Characteristics of the surface layer.

#### Lab

- 1) Technological capabilities of milling machines and drills (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 geometrical and physical features of the surface layer after various processing methods
- 5) Evaluation of the machinability of cutting tools made of various tool materials
- 6) Assessment of machinability of processed materials

### Teaching methods

1. Lecture: multimedia presentation, presentation illustrated with examples
2. Laboratory exercises: practical exercises, performing experiments, discussion, teamwork, case studies.

### Bibliography

Basic

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. Wysiecki M.: Nowoczesne materiały narzędziowe WNT Warszawa 1997
7. Żebrowski H. : Techniki wytwarzania. Obróbka wiórowa, ścierna i erozyjna. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2004.

Additional

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	52	2,00
Classes requiring direct contact with the teacher	24	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	27	1,00