



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Tool systems

### Course

Field of study

Mechanical engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

PhD.Eng. Zbigniew Nowakowski

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

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### Prerequisites

Basic knowledge of the methods and kinematics of cutting, the cutting tools used and the construction of machine tools. The ability to operate simple technical devices, capability of making use of information retrieved from different sources.

### Course objective

Getting to know the current solutions of tool systems and their exploitation, setup of tools for machining operations, implementation of new tooling systems in manufacturing plant.

### Course-related learning outcomes

Knowledge

The student knows how to recognize basic types of cutting tool holding systems and can describe its



exploitation properties.

The student knows how to describe and identify types of tools and cutting tool materials according to ISO standard.

#### Skills

The student is capable of analysis of economical viability of introduced tooling system.

The student is capable of choosing proper tooling system for given machining operation.

The student is capable of applying computer software to aid tool management and selection process.

#### Social competences

The student acquires skills of finding solution for technical problems by himself/herself through search of knowledge in literature and on the Internet.

The student acquires skills of teamwork and forming inquiry questions.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lectures is verified at the end of the semester, in the form of a mixed test, a single choice of 36-40 questions. The pass threshold is 50%.

Skills acquired in the laboratory classes are verified by evaluating student activity and skills to solution basic problems. The skill to present and analyze research results is checked in the form of experience reports.

#### Programme content

Scope of lecture:

- design and classification of cutting tools based on different criteria,
- identification of cutting tools, cutting wedge and cutting materials according to ISO standard,
- the genesis of tool systems,
- definitions, types, basic elements and functions of the tool system,
- economic aspects of using tool systems,
- overview of the design, physical and exploitation properties of the clamping: cutting tools, tool systems and interfaces,
- static and dynamic properties (stiffness and damping) of modular tools,
- systems for clamping of indexable inserts cutting tools,
- identification and coding of cutting tools in the ESW, measuring principles and setting the cutting tools to size outside the machine tool (wedge corner position in the tolerance field, wear compensation),
- selection of tooling system for HSM machining – preparation of tool for HSM machining.

The laboratory classes consists of exercises in which the students: get acquainted with the construction and properties of various solutions of modular tool systems, conduct research on the influence of geometric features of modular tools on their physical properties, analyze the construction of indexable insert tools with particular emphasis on the systems of clamping cutting wedges, set the modular tool to size outside the machine tool.



## Teaching methods

Lecture: multimedia presentation illustrated with examples, animations and short films, discussion.

Laboratory classes: execution of experimental studies, solving problem, discussion, teamwork.

## Bibliography

### Basic

Cichosz P., Narzędzia skrawające. Wydawnictwa Naukowo-Techniczne, Warszawa 2006.

Kosmol J., Automatyizacja obrabiarek i obróbki skrawaniem. Wydawnictwa Naukowo-Techniczne, Warszawa 2000.

Meldner B., Darlewski J., Narzędzia skrawające w zautomatyzowanej produkcji. Wydawnictwa Naukowo-Techniczne, Warszawa 1991.

### Additional

Honczarenko J., Elastyczna automatyzacja wytwarzania. Obrabiarki i systemy obróbkowe. Wydawnictwa Naukowo-Techniczne, Warszawa 2000.

Stephenson D.A., Agapiou J.S., Metal cutting. Theory and practice. Second edition. CRC Press Taylor & Francis Group. 2006.

Stós J., Składane systemy narzędziowe. Prace Instytutu Obróbki Skrawaniem. Seria: Opracowania analityczno-syntetyczne, Nr1/1991, Kraków 1991.

## Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	40	2
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) <sup>1</sup>	35	1,0

<sup>1</sup> delete or add other activities as appropriate