



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

New materials and cutting tools

### Course

Field of study

Management and Production Engineering

Area of study (specialization)

Production Systems

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

8

Laboratory classes

8

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### 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

To acquaint students with the current trends in the development of cutting materials and tools.

Justification for the purpose of using new, often more expensive solutions for tools and tool materials.

### Course-related learning outcomes

Knowledge



The student should characterise the properties of tool materials and anti-wear coatings.  
The student should describe technological capabilities of modern cutting tools.

#### Skills

The student is capable to select the correct cutting tool material for the machining task.  
The student is capable to compare different cutting edges in terms of machining economy.

#### 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 an exam. The exam consists of several theoretical and problem 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:

- characteristics, scope of application of new tool materials and anti-wear coatings for cutting tools;
- new geometry solutions, application and technological possibilities of cutting edges;
- tool problems in high speed machining;
- vibrations in the cutting process and their compensation;
- mechatronic tools;
- deep-hole machining;
- tool management and management information systems.

Laboratory classes include: presentation of information systems supporting the work of technologists in the aspect of tool selection as well as tool management; assessment of the impact of tool design on technological aspects of the cutting process; comparison of different cutting edges geometries in economic and technological aspects of the cutting process; analysis of the impact of applied tool holders on selected physical and technological aspects of machining.

#### 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.

Kupczyk M.: Wytwarzanie i eksploatacja narzędzi skrawających z powłokami przeciwzużyciowymi. Wydawnictwo Politechniki Poznańskiej, Poznań 2009.

Przybylski L., Strategia doboru warunków obróbki współczesnymi narzędziami. Toczenie – wiercenie – frezowanie. Wyd. II, Zakład Graficzny Politechniki Krakowskiej, Kraków 2000.

Wysiecki M.: Nowoczesne materiały narzędziowe. WNT Warszawa 1997.

Additional

Kupczyk M.: Inżynieria powierzchni. Powłoki przeciwzużyciowe na ostrza skrawające. Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

Przybylski L., Współczesne ceramiczne materiały narzędziowe. Seria Mechanika. Wydawnictwo politechniki Krakowskiej, Kraków 2000.

Popular science and promotional and informational articles from tool companies – Sandvik-Coromant, Walter, Kennametal, Iscar ... . Mechanik – Miesięcznik Naukowo Techniczny.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) <sup>1</sup>	30	1,0

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