COURSE DESCRIPTION CARD - SYLLABUS

Course name
Tool Materials [S2IMat1-MMiTS>MN]

Course

Field of study
Materials Engineering

Year/Semester
1/2

Area of study (specialization)
Metal and Plastics Materials

Profile of study
general academic

Level of study
second-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

dr hab. inż. Andrzej Miklaszewski prof. PP
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Lecturers

Prerequisites

The student posses the basic knowledge in physics, mathematics, mechanics, materials science. He can use the acquired knowledge to analyze specific tool materials and knows how to use information obtained from the library and the Internet. The student shows independence in solving problems, acquiring and improving the acquired knowledge and skills, understanding the need to learn.

Course objective

none

Course-related learning outcomes

none

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Credit based on a test or oral egzam conducted at the last class in the semester (in the case of answers to: from 50 to 60% of questions - Dst, over 60 to 70% - dst +, over 70 to 80% - db, over 80 to 90% - db +, over

90 up to 100% - very good)

Programme content

Lecture
Modern tool materials
Mechanisms and wear factors of tool materials
Powder metallurgy and manufacturing processes of tool materials
Tool steels
Tungsten carbide and stellite
Cermets
Tool ceramics and mechanisms of its strengthening
Super hard materials
Properties of surface layers, expectations, classification, characteristics of production methods
SWOT analysis
Examples of applications of anti-wear coatings
Lab
Assessment and selection of technological parameters for the production of tool materials on the matrix of the binding phase
Manufacture of microcrystalline composites on the matrix of a metallic phase by powder metallurgy
Production of nanocrystalline composites based on a metallic phase by powder metallurgy
Assessment of the basic physical properties of the produced sinters (density, porosity)
The influence of grain size on the technological and mechanical properties of the produced composites
The influence of the ceramic phase share on the technological and mechanical properties of the produced composites

Course topics

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The influence of the ceramic phase share on the technological and mechanical properties of the produced composites

Teaching methods

1. Lecture: multimedia presentation, presentation illustrated with examples given on the blackboard.
2. Laboratory exercises: practical exercises, discussion and preparation of the results in the form of a report, formulation of conclusions concerning the issues discussed during classes.

Bibliography

1. Erbel J. (red.): Encyklopedia technik wytwarzania w przemyśle maszynowym tom II. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001
2. M. Kupczyk., Wytwarzanie i eksploatacja narzędzi skrawających powłokami przeciwzużyciowymi, Wyd.

PP 2009.
3. Nanonauki i nanotechnologie, A. Mazurkiewicz (Red.), Wyd. Instytutu Technologii Eksploatacji, Radom 2007
4. M. Jurczyk, Nanomateriały, Wyd. PP 2001
5. M. Jurczyk, J. Jakubowicz, Nanomateriały ceramiczne Wyd. PP 2004
6. M. Wysiecki, Nowoczesne materiały narzędziowe, WNT Warszawa 1997
7. J. Nowacki, Spiekane metale i kompozyty z osnową metaliczną, WNT Warszawa 2005

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