

Information sheet for the course

Technology of Production of Thin Layers and Coatings

University: Alexander Dubček University of Trenčín	
Faculty: Faculty of Industrial Technologies in Púchov	
Course unit code: M-PV-1	Course unit title: Technology of Production of Thin Layers and Coatings
Type of course unit: optional	
Planned types, learning activities and teaching methods: <i>Lecture: 2 hours weekly/26 hours per semester of study; face to face Seminar: 2 hours weekly/26 hours per semester of study; face to face Laboratory tutorial: 0</i>	
Number of credits: 8	
Recommended semester: 1 st semester in the 1 st year full-time 1 st semester in the 1 st year part-time	
Degree of study: the 3 rd degree of study (PhD. degree)	
Course prerequisites: none	
Assesment methods: <i>Students of the doctoral study program will individually work on a project focused on the detailed analysis and characteristic properties of materials which will be a part of the research of their dissertation. In the project the students will base their investigations on the present state of the issue, on data from literature and foreign scientific publications. Each doctoral student will present his project in the form of a ppt presentation to his lecturer and schoolmates and will answer questions in a debate. After attending all lectures and consultations on the subject, executed in form of a discussion between the lecturer and students, the doctoral study graduate will work out a written report focused on the characteristics of the particular material investigated in his/her dissertation, and the fundamentals of the method used in the study of the given material. The minimum requirement for obtaining credits is the successful defendance of the project and gaining at least 60% points for the written report.</i>	
Learning outcomes of the course unit: <i>Students will extend their knowledge in materials engineering, which they will apply to industrially significant materials. They will gain broad knowledge of the effect of the chemical composition of a material on the comprehensive properties of the material which they investigate in their dissertations and will find the relations between the chemical composition of the studied material and the material characteristics of the final product. The students will perfectly understand the principles of methods of the study of important material characteristics which affect the utilization of the materials in operating conditions. They will be able to analyze and comprehensively and independently evaluate the investigated issue, to predict, from the variating material properties, the final properties of the investigated material and to suggest development of new types of materials and composites with an environmentally friendly composition.</i>	
Course contents: <i>Surface of the material and its function. Effect of surface roughness on the quality of surface treatment. Diffusion mechanisms in crystalline materials. Ficks's laws. Surface treatment before coating. Combined chemical and heat treatment PVD, CVD, CVD-PACVD, PVD-PAPVD. (Coatings created from the gaseous phase, from solutions, melted, partially-melted and solid phases). Single-component, two-component, multicomponent mono and multilayer coatings,</i>	

mono and multiphase, nanocomposite and functionally graded – FGM Magnetron sputtering, thermal diffusion and diffusion coating. Wear tests.

Recommended references and resources:

1. Macek,K.,Zuna,P., Janovec,J.:*Tepelné úpravy kovových materiálů*; Vydatelství ČVUT, Praha 2001.
2. *ASM Handbook, Vol. 8, (1973)*, ASM International, Materials Park, OH 44073.
3. Musil,J., Vyskočil,J.:*Tenké vrstvy nitridu titanu*, Academia, Praha,1989.
4. *Zborníky „Vrstvy a povlaky“*. Bratislava: Slovenská elektrotechnická spoločnosť, ISBN 80-968711-7-X, ČasopisY „Tribotechnika“.
5. A.Anders, A.: *Handbook of Plasma Immersion Ion Implantation and Deposition*, Wiley-VCH, 2000.
6. AFONIN, B.K. and ERMAKOV, V.S. *Metals and Alloys: Handbook NPO Professional*, 2003.
7. J.Georges, D.Cleugh: *Active Screen Plasma Nitriding, Stainless Steel 2000*, ed. T.Bell, K.Akamatsu.
8. J. Reece Roth: *Industrial Plasma Engineering*, IoP, 2001

Language: Slovak

Remarks: none

Evaluation history: Total number of classified students : 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Lecturers: prof. Ing. Františka Pešlová, PhD.

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Supervisor: prof. Ing. Darina Ondrušová, PhD.