Information sheet for the course
Material Diagnostics

University: *Alexander Dubček University of Trenčín*	
Faculty: *Faculty of Industrial Technologies in Púchov*	
Course unit code: *M-PV-3*	**Course unit title:** *Material Diagnostics*
Type of course unit: *optional*	

Planned types, learning activities and teaching methods:
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

Number of credits: 8

Recommended semester: *1st semester in the 1st year full-time*
1st semester in the 1st year part-time

Degree of study: *the 3rd degree of study (PhD. degree)*

Course prerequisites: *none*

Assessment methods:

PhD students will create a project individually. This project is focused on detailed analysis and characterization of testing and diagnostic methods that are applicable when examining the properties of materials and objects of research within the dissertation thesis. Students receive information from the actual state of the problem, based on data from the literature and international scientific publications in connection with the development of the project. Finished project will be presented in the form of presentations prior the teacher and classmates by each graduate student. The task of the PhD student is answering the questions during the discussion. After graduation of all Lecturers and exercises on the subject, which are guided through discussion between the teacher and students, doctoral students receive a written work with an individual focus on diagnostic methods used in the investigation of properties of the material under the concrete solutions of dissertation, and principles of methods that will be used to study of the properties of the material.

Successful presentation of the project and obtaining min. 60% of the points of the written work is a minimum condition for obtaining credits.

Learning outcomes of the course unit:

The student will acquire deeper knowledge of diagnostics material properties of industrially important materials. The student also obtain detailed knowledge about a wide range of experimental methods and applications, also of appropriate and available testing methods for detecting properties of materials, which examines in its dissertation thesis. He knows the context and the relationship between chemical composition and subsequent treatment of the various processes, on the properties of investigate material and the material characteristics of the final product. He completely understands the study of structural properties and other important material characteristics of investigated materials. He is able to independently analyze and evaluate the solved problem, he can predict the final properties of the examined material and propose solutions for the development of new types of materials including a processing technology on the basis of changes in structural properties

Course contents:

The characteristics of the chemical composition of the materials examined in the context of dissertations - methods for the detection of chemical composition - crystalline structure of materials - lattice defects and their study - influencing the structure with the thermal and mechanical processing - X-ray, microscopic and microfractographic study of the properties of materials. Diagnostic methods for evaluation of the quality of materials and final products (plant components). Characteristics examined material, composition, structure, important physical and mechanical properties and relationships between them. The basic principles of the methods used to study the characteristics of the material under investigation (methods of chemical analysis, structural analysis, spectrum analysis, thermal analysis, dynamic mechanical analysis, the method of determining the physical and mechanical properties, etc ...)

Recommended of required reading:

1. Jandoš, F, Říman, R., Gemperle, A. : Využití moderních laboratórnych metód v metalografii, SNTL, Praha, 1985
2. Hrivňák, I. :Elektrónová mikroskopia ocelí, VEDA, Bratislava, 1986
3. Kopec, B. : Nedestruktivní zkoušení, CERM, Brno,2008
4. Ptáček, L.. a kol.: Náuka o materiálu I, II . Akademické nakladatelství CERM, Brno,2002.
5. Bezecný, J. : Vznik trhlín a lomov pri tepelnom spracovaní ocelí. TnU AD. Trenčín 2007.
6. Bezecný, J. : Diagnostické metódy v materiálovom inžinierstve, Digitalizácia TnUAD: Rozvoj inovatívnych foriem vzdelávania a skvalitnenie študijných programov TnU AD, Trenčín, 2013.
7. Odborná literatúra a zahraničné vedecké publikácie k téme dizertačnej práce.

Language: *Slovak*

Remarks:

Evaluation history:

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

Lecturers: *doc. RNDr. Ján Bezecný, CSc.*

Last modification: *30.04.2014*

Supervisor: *prof. Ing. Darina Ondrušová, PhD.*