Information sheet for the course
Methods of Structural Analysis

University: *Alexander Dubček University of Trenčín*	
Faculty: *Faculty of Industrial Technologies in Púchov*	
Course unit code: *MT-P-34*	**Course unit title:** *Methods of Structural Analysis*
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: 0* *Laboratory tutorial: 2 hours weekly/26 hours per semester of study; face to face*	
Number of credits: *5*	
Recommended semester: *5th semester in the 3rd year full-time* *7th semester in the 4th year part-time*	
Degree of study: *the 1st degree of study (Bachelor's degree)*	
Course prerequisites: *MT-P-4 Material Science I.; MT-P-29 Materials Science II.*	
Assessment methods: *check tests, individual work on microscopes – microscopic analysis of selected structures*	
Learning outcomes of the course unit: **S***tudents are acquainted with standards, instructions and working standards of metallic materials. They can use tools and equipment for analyzing structures of materials, interpret physical and metallurgical processes from microstructures prepared by metallography, identify individual structural phases before and after heat treatment, combined chemical and heat treatment, etc. in various types of metallic materials. Students gain experimental knowledge on applicating materials engineering and technical work experience.*	
Course contents: *Basic specification of steels according to STN 420074 and STN 420075. Material standards.* *Comparison of steels according to EN and STN standards. Materials engineering in mechanical engineering. Application of theoretical fundamentals of heat treatment of steels in structural analysis. Process of austenitization. Character of microstructures from the isothermal and anisotropic transformation of austenite – TTT diagrams.* *Description of microstructures obtained by annealing, quenching and tempering.* *Combined chemical and heat treatment. Evaluation of layers after case hardening, nitriding and carbonitriding.* *Microstructures of steels before and after hardening treatment. Evaluation of the quality of microstructures of bearing steels.* *Structures of steels with higher yield strength. Evaluation of steel welds.* *Evaluation of unrequired phases in corrosion resistant, creep resistant and tool steels.* *Initiation of corrosion, types of corrosion according to STN and their microscopic analysis.* *Non-ferrous metals and their alloys. Microstructure of aluminium and its alloys.* *Microstructural analysis of copper and its alloys (brass, bronze, etc.)* *Titanium. Nickel, cobalt and their alloys from the viewpoint of their microstrucures.* *Evaluation of the metallic matrix and graphite in graphite cast irons.* *Professional consultancy, answers to students´ questions on the lectured issues.*	
Recommended references and resources:	

1. *MARTINKOVIČ, M., RÍZEKOVÁ - TRNKOVÁ L.: Náuka o materiáloch I - NÁVODY NA CVIČENIA. Trnava: AlumniPress, 2009. 183s. Edičné číslo: 19/AP/2008, ISBN 978-80-8096-079-7, EAN 9788080960797, zverejnené na https://is.stuba.sk*
2. *MORAVČÍK, R., HAZLINGER, M., HUDÁKOVÁ, M., MARTINKOVIČ, M., ČIČKA, R.: Náuka o materiáloch I. Trnava: AlumniPress, 2010, 249s. Edičné číslo: 8/AP/2009, ISBN 978-80-8096-123-7, EAN 9788080961237, zverejnené na https://is.stuba.sk*
3. *KONEČNÁ, R., FINTOVÁ, S.: Praktická metalografia, 2010, http://kmi2.uniza.sk/wp-content/uploads/2010/10/Prakticka_Metalografia.pdf*
4. *MORAVČÍK, R., HAZLINGER, M.: Náuka o materiáli II. Trnava: AlumniPress. 2009. 243 s. Edičné číslo: 1/AP/2009, ISBN 978-80-8096-081-0, EAN 9788080960810, https://is.stuba.sk*
5. *HÍREŠ, O.: Fyzikálna metalurgia ocelí a ich tepelné spracovanie. Vysokoškolská učebnica, Trenčín: Trenčianska univerzita AD v Trenčíne, 2006, 169s. ISBN 80-8075-099-8, EAN 9788080750998.*
6. *ORAVEC, K.: Vybrané kapitoly z tepelného spracovania kovov. Košice: Vydavateľstvo: C - PRESS, 2005, ISBN 80-8073-248-5.*
7. *ZÁBAVNÍK, V., BURŠÁK, M.: Materiál, Tepelné spracovanie, Kontrola kvality. Košice: Vydalo: Tlač - Emilena, Košice, 2004, 279s. ISBN 80-8073-159-4, EAN 9788080731565.*

Language: *Slovak*

Remarks:
Compulsory training courses for students on safety of work with microscopes

Evaluation history:

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

Lecturers: *prof. Ing. Františka Pešlová, PhD., Ing. Ľuba Hajduchová, PhD.*

Last modification: *31.03.2014*

Supervisor: *doc. Ing. Marta Kianicová, PhD.*