BM1400

Study program / course: Mechanical Engineering

Type and level of study: Academic studies (bachelor degree)

Course: MATERIALS SCIENCE

Lecturers: Adamović D. Dragan, Lazić N. Vukić, Ratković R. Nada

Status of course: Obligatory for all modules, I semester

Number of ECTS: 7

Precondition: none

The objective of course

The main course objective is introduction of the types and matter of the most commonly used technical materials, metal and non-metal ones to students. Also, students need to gain certain knowledge in relation to heat treatment of metal materials and to different methods of material testing.

The outcome of course

Based on gained knowledge, students should know how to properly select the material and to determine appropriate heat treatment.

Syllabus

Theoretical study

Internal material structure (starting with lattices up to connection between the structure and mechanical characteristics of real materials), binary alloys diagrams, phase changes within metal systems, kinetic transformation diagrams, main types of heat and chemical-heat material treatment, overview of characteristics and application of steels, cast iron and of the most important non-steel materials and their alloys, non-metal materials (technical ceramics, glass, glue, plastics, rubber, composite materials, technical wood, sintered materials etc), metal coatings, corrosion, material characteristics (mechanical, physical), material selection.

Practical Studies*:*

Exercises (oral): Explanation of steel notation according to old and new system through practical cases examples, application of (level rule), course repetition and preparation for 1st preliminary exam, and 1st test, explanation of isothermal decomposition diagrams, as well as continuous cooling with practical examples, course repetition and preparation for 2nd preliminary exam, and 2nd test, practical examples of material selection, course repetition and preparation for 3rd preliminary exam, and 3rd test.

Laboratory Exercise: Material notation, tension testing, determination of modulus of elasticity, pressing testing, toughness testing, determination of hardness, determination of dynamical hardness, testing of hardenability, technological testing, non-destructive testing, metallographic testing, grain size determination.

Recommended reading

1. Jovanović, M., Adamović, D., Lazić, V., Ratković, N.: Machine materials, Faculty of Mechanical Engineering Kragujevac, 2003. (In Serbian)
2. Đorđević, V.: Machine materials – first part, Faculty of Mechanical Engineering Belgrade, 1999. (In Serbian)
3. Lučić, R.: Machine materials – science and engineering, Vuk Karadžić, Paraćin, 1995. (In Serbian)
4. Đukić, V.: Faculty of Mechanical Engineering, 1994. (In Serbian)
5. Printed materials and electronic materials (In Serbian)

The number of hours of active teaching				Other classes: 0
Theory: 2	Practical classes: 1.6	Other forms of teaching: 1.4	Research study: 0	

Methods of teaching

Lectures, oral and laboratory exercises.

Evaluation of knowledge (the maximum number of points 100)

Pre-final exam obligations	**points**	**Final exam**	**points**
Activities during the classes	**7**	Written exam or	
Practical classes	**21**	Oral exam	**30**
Preliminary tests	**42**		
Seminars			