Study program: Mechanical engineering

Type and level of studies: Bachelor studies

Course unit: Engineering materials

Teacher in charge: Erić Cekić Olivera

Language of instruction: English

ECTS:6

Prerequisites:

Semester:Winter semester

Course unit objective: Acquisition of basic knowledge about the method of obtaining, structure, properties and testing methods of metal materials in mechanical engineering, as well as basic data about the ferrous metals and the non-ferrous metals and complex materials. Expanding and acquiring new knowledge in the field of engineering materials selection and application.

Learning outcomes of the course unit

Acquisition of basic knowledge is used for a) defining the required material properties in the construction process, b) choosing the procedure for testing the mechanical properties of metals and alloys, c) determining the thermal and thermomechanical treatment of metals, d) choice of materials according to mechanical characteristics, optical strength, fatigue, corrosion and wear resistant.

Course unit contents

Theoretical classes

Introduction about materials in general. Dependency of material properties from atomic, crystal micro i macro structures. Characteristic of atomic and crystal material structures. Imperefections (errors) in crystals.

Strengthening methods and Plasticity of Polycrystals. Theory of alloying. Characteristic types of phase diagrams, one-, two- and three components systems. Phase transformations liquid/solid and solid/solid. Mechanisms of material strengthening and fracture. Classification and characteristics of engineering materials. Metal materials. Impact of microstructure on metal material properties. Importance of mechanical properties and their experimental determination.Yield strength, tensile strength and Ductility, Effect of grain size on mechanical properties, Creep deformation and fracture, Allotropic Forms of Pure iron, Iron-Carbon Equilibrium Diagram, Steels, High temperature alloys, Non-ferrous metals and alloys. Selection of materials.

Practical classes

In the practical classes, student should do a seminar paper and present it.

Literature

1. Michael F. Ashby, David R.H. Jones: Engineering Materials 1 An Introduction to properties Applications and Design Fourth Edition Oxford OX5 UK 2009 Elsevier

2. R. E. Smallman, R. J. Bishop Metals and Materials 1995 Buttenvorth-Heinemann, Oxford

3. Charles, J.A. F.A.A. Crane and J.A.G. Furness 1997 Selection an use of engineering materials Butterworth-Heineman

4. H.Suman Metallography 1981 TMF Belgrade

Number of active teaching hours				**Other classes**
Lectures:3	Practice: 1	Other forms of classes:	Independent work: 1	

Teaching methods

Theoretical teaching is in the form of lectures. Practical teaching: auditory and independent exercises and preparation of seminar.

Examination methods (maximum 100 points)

Exam prerequisites	**No. of points:**	**Final exam**	**No. of points:**
Student's activity during lectures	5	oral examination	
practical classes/tests		written examination	65
Seminars/homework		.....	

Project	30		
Other			

Grading system		
Grade	**No. of points**	**Description**
10	**95-100**	Excellent
9	**85-94**	Exceptionally good
8	**75-84**	Very good
7	**65-74**	Good
6	**55-64**	Passing
5	**Less than 55**	Failing