

Study Programme: Production engineering			
Course Unit Title: Mechanical engineering materials			
Course Unit Code: M105			
Name of Lecturer(s): Rajnović Dragan			
Type and Level of Studies: Bachelor			
Course Status (compulsory/elective): compulsory			
Semester (winter/ summer): winter+summer			
Language of instruction: english			
Mode of course unit delivery (face-to-face/distance learning): face-to-face			
Number of ECTS Allocated: 8			
Prerequisites: none			
Course Aims: Acquisition of basic knowledge in the field of science on materials and materials used in mechanical engineering.			
Learning Outcomes: Acquired knowledge is used to establish relationship between characteristics and properties of materials and application of materials in different mechanical parts and structures.			
Syllabus. Introduction about materials in general. Dependency of material properties from atomic, crystal micro and macro structures. Characteristic of atomic and crystal material structures. Imperfections (errors) in crystals. Crystal plasticity. Theory of alloying. Characteristic types of phase diagrams, one-, two- and three- component systems. Phase transformations liquid/solid and solid/solid. Mechanisms of material strengthening and fracture. Classification and characteristics of engineering materials: 1. Metal materials. Impact of microstructure on metal material properties. Importance of mechanical properties and their experimental determination. Metal materials based on iron, copper and aluminium, properties and application. 2. Ceramic materials – structure, properties and application. 3. Polymers – structure, properties and application. 4. Composite materials (nano, micro, and macro composite materials). Properties and application. Selection of materials. Methods of mechanical and microstructural testing of materials. Determination of standard mechanical properties: yield and proof strength, ultimate tensile strength, elongation, modulus of elasticity, Brinell, Vickers and Rockwell hardness, dynamic strength, impact energy and fracture toughness.			
Required Reading: Callister, W.D.: Materials Science and Engineering: an Introduction, John Wiley & Sons, New York, 2007 Martin, John W. : Materials for engineering, Cambridge: Woodhead publishing limited, 2006 D. R. Askeland and P. P. Fulay : Essentials of Materials Science and Engineering, Cengage Learning, 2010			
Weekly Contact Hours:	Lectures: 4	Practical work: 3	
Teaching Methods: The course is interactive in the form of lectures and laboratory practice. During lectures theoretical part of the course is presented and followed by typical examples for better understanding. During laboratory practice, acquired knowledge is applied on the available laboratory equipment. Besides lectures and practice, consultations are held on a regular basis.			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Attendance			
Computer exercises			
Tests (4x)			

