

Course Unit Descriptor

Study Programme: Mechanical Engineering, Industrial engineering in exploitation of oil and gas, Engineering management		
Course Unit Title: Machine materials 1		
Course Unit Code: 21.OAS029		
Name of Lecturer(s): Assistant Professor Jasmina Pekez		
Type and Level of Studies: Bachelor academic degree		
Course Status (compulsory/elective): Compulsory		
Semester (winter/summer): Winter		
Language of instruction: English		
Mode of course unit delivery (face-to-face/distance learning): face-to-face		
Number of ECTS Allocated: 5		
Prerequisites: None		
Course Aims: Acquisition of basic knowledge in the field of material science as well as introduction to the significance of materials selection from the standpoint of their structure, selected technology and designed properties.		
Learning Outcomes: Acquired knowledge is used to carry out research related to manufacturing, processing and machining as well as use of classical and novel engineering materials.		
Syllabus: <i>Theory</i> Introduction to materials, their significance and engineering. Connection between parameters of obtaining and processing of engineering materials with their properties, i.e. interdependence in triad: technology - structure - properties. Nano, micro and macro structure and its role in crystalline and amorphous materials. Errors in the crystal structure and their practical importance for material engineering. Phase diagrams and their practical significance. Static and dynamic material testing. Plastic deformation of polycrystalline materials. Mechanisms for strengthening crystalline materials. Influence of heating temperatures on the structure and properties of deformed metals and alloys. Metallic materials based on iron, aluminium and copper, their properties and applications. Fe-Fe ₃ C diagram. Steel, definition, types and purpose. Iron, definition, types and purposes. Ceramic, polymeric and composite materials. <i>Practice</i> Metal material testing – introduction. Designation of metal materials. Tensile test. Determination of elastic modulus. Compressive test. Bending test. Hardness test: static methods (Brinell, Vickers and Rockwell) and dynamic methods (Poldi and Shore tests). Toughness test. Determination of dynamic strength. Creep.		
Required Reading: Callister, W., Materials science and engineering, John Wiley and Sons, New York, 1997. Ashby, F.M., Jones, D. R. H., Engineering materials 1 and 2 – An Introduction to Their Properties and Applications, Butterworth-Heinemann, 2002.		
Weekly Contact Hours: 4	Lectures: 2	Practical work: 2
Teaching Methods: Verbal and textual, illustrative and demonstrative, laboratory and experimental.		

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation	10	written exam	
Practical work	10	oral exam	55
Preliminary exam(s)	25		
Seminar(s)			