

Course Unit Descriptor

Study Programme: Production engineering			
Course Unit Title: Heat treatment			
Course Unit Code: P105			
Name of Lecturer(s): Branko Škorić, Lazar Kovačević			
Type and Level of Studies: bachelor			
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: 6			
Prerequisites: none			
Course Aims: The objective of the course is to introduce students to fundamentals of heat treatment, heat treatment processes and basic theory of heat transfer.			
Learning Outcomes: Upon successful completion of this course, students will be able to: 1. name, describe and compare heat treatment processes; 2. name and describe key parameters of specific heat treatment process; 3. analyze given part and in accordance with required mechanical properties, part geometry and quantity select adequate heat treatment processes and determine all necessary parameters for the selected processes; 4. select appropriate heating and cooling equipment and atmosphere required for specific heat treatment process; 5. show the type of microstructure material will have after heat treatment; 6. calculate heating and cooling time for simple geometry elements; 7. analyze given part and in accordance with required mechanical properties and part geometry select adequate part material, which can meet required properties through heat treatment; 8. name basic safety measures in heat treatment.			
Syllabus. Introduction to heat treatment. Heating and cooling in heat treatment. Types of heat treatment processes. Annealing processes, stress-relief annealing, normalizing, spheroidizing annealing, diffusion annealing, recrystallization annealing. Quenching. Time, temperature and transformation diagrams. Hardening and application of austenitic steels. Tempering processes. Hardenability. Steel selection based on hardenability. Residual stresses, dimensional changes and distortion. Surface hardening processes, carburizing, nitriding, flame hardening, induction hardening. Heat treatment of carburized parts. Safety measures in heat treatment.			
Required Reading: Pantelić I. Tehnologija termičke obrade čelika 1 Radivoj Ćirpanov, Novi Sad 1974 Pantelić I. Tehnologija termičke obrade čelika 2 Radivoj Ćirpanov, Novi Sad 1974 G.E. Totten Steel Heat Treatment Handbook CRC Press 2007 Dosssett J.L. Boyer H.E. Practical Heat Treating ASM International 2006			
Weekly Contact Hours: 2	Lectures: 3	Practical work: 0	
Teaching Methods: Teaching is held interactively as lectures and laboratory practice			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Attendance			
Computer exercises			
Tests (4x)			

