

Faculty of Metallurgy and Technology / /

Course:				
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
10805	Optional	1	7	3+1+1
Programs				
Prerequisites	No mutual dependency			
Aims	The objectives are focused on training the students to deeply understand mechanism of sintering and to apply them in accordance with treated material and its performances			
Learning outcomes	After the completion of this course, student should: 1. Fully understand sintering phenomena 2. Be capable to prove a certain sintering mechanism based on structure of the sample 3. Deeply understand different types of sintering and processes of material transport 4. Understand and apply sintering regimes on different samples: light, heavy, refractory metals as well as Fe alloys			
Lecturer / Teaching assistant	Prof. dr Mira Vukčević			
Methodology	Lectures, exercises, debates, assay, final exam			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	General characteristics of metal sintering process			
I week exercises	Crystal lattice defects, vacancies, dislocations			
II week lectures	Characteristics of real lattice, processes of position change			
II week exercises	Characteristics of real lattice, discussion with prepared data and photographs			
III week lectures	Sintering in the presence of solid phase			
III week exercises	Forming and growth of the contacts, densification processes			
IV week lectures	Contacts densification velocity, grain borders, sintering of two or more phases in solid state			
IV week exercises	Examples from different experiments			
V week lectures	The basic elements of the sintering in the presence of liquid phase, analysis of the experimental microstructure, examples			
V week exercises	Sintering in the presence of liquid phase			
VI week lectures	Sintering in the presence of liquid phase: processes in early stage of sintering, processes in the interim sintering stage, final stage of sintering			
VI week exercises	1st. Colloquium			
VII week lectures	Special cases of the sintering in the presence of liquid phase			
VII week exercises	Examples for supersolidus sintering, infiltration, reaction sintering			
VIII week lectures	Strengthened sintered material-copper based			
VIII week exercises	Dispersed strengthened Cu Alloys			
IX week lectures	Light-metals-based sintered materials			
IX week exercises	Sintered ultra light Al Alloys, Strength sintered Al alloys, refractory sintered Al alloys			
X week lectures	Sintered refractory metals			
X week exercises	Refractory and heavy metals			
XI week lectures	The use of different hardener, SiC, intermetallides			
XI week exercises	Examples			
XII week lectures	Presentation of assays			
XII week exercises				
XIII week lectures	Sintering of ceramics			
XIII week exercises	Examples on sintering of ceramics			
XIV week lectures	2nd Colloquium			

XIV week exercises	Corrective 2nd Colloquium					
XV week lectures						
XV week exercises						
Student workload						
Per week			Per semester			
7 credits x 40/30=9 hours and 20 minuts 3 sat(a) theoretical classes 1 sat(a) practical classes 1 excercises 4 hour(s) i 20 minuts of independent work, including consultations			Classes and final exam: 9 hour(s) i 20 minuts x 16 =149 hour(s) i 20 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 9 hour(s) i 20 minuts x 2 =18 hour(s) i 40 minuts Total workload for the subject: 7 x 30=210 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 42 hour(s) i 0 minuts Workload structure: 149 hour(s) i 20 minuts (courses), 18 hour(s) i 40 minuts (preparation), 42 hour(s) i 0 minuts (additional work)			
Student obligations			Presence during the lectures, Completion of exercises. Colloquia, assays, final written exam			
Consultations			Tuesdays and Thursdays from 12a.m			
Literature			1.M.Mitkov, D.Božić, Z.Vujović, Metalurgija praha (1998) 2. R.German G.Messing, R.Cornwall, Sintering technology (edited) (2013) 3. Z.Z.F, Sintering of advanced materials (2021) 4.S-Joong, I.kang, Sintering: Densification, Grain Growth, Microstructure (2022)			
Examination methods			Colloquia, assays, final exam			
Special remarks			-			
Comment			-			
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points