No. 5

Course syllabus for First cycle studies						
1.	**Course title**	**Investigation of metals**				
2.	**Code**	MDE5M1				
3.	**Study Program**	Metallurgical Digital Engineering				
4.	**Study program organizer (unit, institute, department, division)**	Faculty of Technology and Metallurgy				
5.	**Degree (first, second, third cycle)**	first				
6.	**Academic year / semester**	III/V	7.	**Number of ECTS**	5	
8.	**Instructors**	**Prof Sveto Cvetkovski**				
9.	**Prerequisites for course enrollment**					
10.	**Objectives of the course syllabus (competences):** The aim of the course is to gain knowledge to the students about the basic methods and techniques for examining metals **Acquired skills (competences):**					
11.	**Content of the cours** Content of the program: Introduction. Types of investigation in metallurgy. 1. Instrumental methods of chemical analysis: Spectrophotometry, emission spectroscopy, flame photometry and atomic absorption spectrometry, X-ray methods of chemical analysis, mass spectrometry. 2. Mechanical investigations: static, dynamic. Tensile test, pressure test, bendingntest, torsion testing. Modulus of elasticity and modulus of slip. Creep of metals. Impact tests - toughness of metals. Variable load test, Smith diagramt. Fatigue and permanent dynamic strength of metals. Determination of hadness; static and dynamic. Determination of microhardness. 3. Technological testings: bending test and deep drawing. 4. Physical tests: Thermal Testinga (TA and DTA). Thermoelectric effects and their application. Dilatometry; Electrical properties. Magnetic properties; 5. Methods of examination of structure of metals. Metallographic investigations.; X-ray structural examinations. Areas of application of X-ray structural investigations in metallurgy.;					
12.	**Study methods:**					
13.	**Total available time**					
14.	**Allocation of available time**					
15.	**Teaching activities**	15.1.				
		15.2.				

16.	**Other types of activities**	16.1.		
		16.2.		
		16.3.		
17.	**Grading system**			
	17.1.			
	17.2.			
	17.3.			
18.	**Grading criteria (points/grade)**	Up to 61 points		5 (five) (F)
		From 61 to 69 points		6 (six) (E)
		From 70 to 79 points		7 (seven) (D)
		from 80 to 89 points		8 (eight) (S)
		From 90 to 95 points		9 (nine) (B)
		from 95 to 100 points		10 (ten) (A)
19.	**Prerequisites for taking the final exam**			
20.	**Language in which lectures are conducted**			
21.	**Method for monitoring the quality of lectures**			
22.	**LITERATURE**			

22.1. Compulsory literature

No.	Author	Title	Publisher	Year
1.	S. Cvetkovski	Investigation of metals	Authorized material	2020
2.	B.Chalmers& A.Quarrell	Physical examination of metals	London	1960
3.	D. Slavkov	Investigation o metals II	FTM Skopje	1995

22.2. Additional literature

No.	Author	Title	Publisher	Year
1.				
2.				
3.				