No. 13

Course syllabus for First cycle studies					
1.	**Course title**	Nanomaterials and nanotechnologies			
2.	**Code**	MDE6E3			
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 cycle**			
6.	**Academic year / semester**	3 year	6.	**Number of ECTS**	4
8.	**Instructors**	Prof. Dr. Aleksandar Dimitrov Associate prof. Aleksandar Petrovski			
9.	**Prerequisites for course enrollment**				
10.	**Objectives of the course syllabus (competences):** Acquiring theoretical and practical knowledge in the field of nanomaterials and nanotechnologies **Acquired skills (competences):** Ability to work in the laboratory and industry on certain processes for the development and production of nanomaterials				
11.	**Content of the course:** Introduction, Physical Chemistry of Solid Surfaces, Zero-Dimensional Nanostructures: Nanoparticles (Synthesis of Metal Nanoparticles, Synthesis of Semiconductor Nanoparticles, Synthesis of Oxide Nanoparticles), One-Dimensional Nanoparticles: Nanofibers, Nanorods, (Evaporation-Condensation, Gas-Liquid-Solid), Two-Dimensional Nanostructures (Basic Knowledge of Film Formation, Basic Knowledge of Vacuum Science (Physical Vapor Deposition (PVD), Chemical Vapor Deposition (CVD)), Atomic Layer Deposition, Electrochemical Deposition, Sol-Gel Film, Special Nanomaterials: Carbon Nano Structures, Micro and Mesoporous Structures, Core-Shell Structures, (Metal-Oxide Structures, Metal-Polymer Structures, Oxide-Polymer Structures), Intercalation Compounds, Nanocomposites, Characterization, Properties and Properties of nanomaterials, Application of nanomaterials.				
12.	**Study methods:** Lectures and exercises, consultations, project (homework, seminar) assignments, home study (exam preparation)				
13.	**Total available time**	120			
14.	**Allocation of available time**				
15.	**Teaching activities**	15.1.	Lectures - theoretical teaching	60	
		15.2.	Exercises (laboratory, lecture), seminars, teamwork: classes	15	
16.	**Other types of activities**	16.1.	Project tasks: hours	10	
		16.2.	Homework - assignments	35	
		16.3.			
17.	**Grading system**				
	17.1.	Tests: points		80	
	17.2.	Seminar paper/project, written and oral presentation:		20	

		points	
	17.3.	Final exam: points	100
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**	Regular attendance at classes, preparation of exercises	
20.	**Language in which lectures are conducted**	English	
21.	**Method for monitoring the quality of lectures**	Anonymous student survey	

22. **LITERATURE**

22.1. Compulsory literature

No.	Author	Title	Publisher	Year
1.	Aleksandar Dimitrov	Nanomaterials	UKIM - TMF, (Electronic version)	2019
2.	Sabu Thomas, C. Sarathchandran, S.A. Ilangovan, Juan Carlos Moreno-Piraján, Elsevier, Book,	Handbook of Carbon-Based Nanomaterials,	Elsevier	2021
3.				

22.2. Additional literature

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