No. 22

Course syllabus for First cycle studies					
1.	**Course title**	**Physical metallurgy 2**			
2.	**Code**	MDE4M2			
3.	**Study Program**	Metallurgical digital engineering			
4.	**Study program organizer (unit, institute, department, division)**	Faculty of Technology and Metallurgy University "Ss. Cyril and Methodius" in Skopje			
5.	**Degree (first, second, third cycle)**	First cycle			
6.	**Academic year / semester**	Second year IV semester	7.	**Number of ECTS**	7
8.	**Instructors**	Prof. Dafinka Stoevska Gogovska			
9.	**Prerequisites for course enrollment**	Physial metallurgy 1			
10.	**Objectives of the course syllabus (competences):** To introduce students to the crystallization processes from melts, as well as to the phase transformations in the solid state as a result of temperature changes. Also, to provide an introduction to the elasticity and plasticity of metal crystals, as well as to the processes that occur during creep, fracture, and fatigue of metals.				
11.	**Content of the course:** Crystallization of metals and alloys (nucleation, homogenous, heterogeneous, crystals growth). Solid state phase transformations in metals and alloys (general principles, diffusional and diffusionless transformations, allotropic transformations, eutectoid transformation, martensitic transformation, bainite transformation, precipitation from supersaturated solid solutions). Elasticity of metals. Plastic deformation of metals. Strengthening of metal alloys. Recovery and recrystallization. Creep of metals. Fracture of metals. Fatigue of metals.				
12.	**Study methods:** Lectures and exercises, consultations, project (homework, seminar) assignments, home study (exam preparation)				
13.	**Total available time**	210 hours			
14.	**Allocation of available time**				
15.	**Teaching activities**	15.1.	Lectures	45 hours	
		15.2.	Exercises (laboratory,computation), teamwork	45 hours	

		15.3	Industrial practice	0 hours
16.	**Other types of activities**	16.1.	Project assignments	20 hours
		16.2.	Independent assignments	20 hours
		16.3.	Home study	80 hours

17.	**Grading system**		
	17.1.	Tests	80 points
	17.2.	Seminar's work/project (presentation> written and oral)	10 points
	17.3.	Final exam	10 points

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**	Minimum 11 pts from activities 17.1 and 17.2
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.	J. S. Magdeski	Physical metallurgy 1	Internal material	2010
2.	J. K. Mickovski	Physical metallurgy first book	University Ss Cyril and Methodius in Skopje	1999
3.				

22.2. Additional literature

No.	Author	Title	Publisher	Year
1.	R. Abbaschian, L.Abbaschian, R.E. Reed-Hill	Physical Metallurgy Principles, Fourth ed.	CENGAGE Learning	2004
2.	R.E.Smallman, R.J. Bishop	Modern Physical Metallurgy and Materials Engineering, Sixth ed.	Butterworths Heinemann	1999
3.	H. Suman	Metalografija	TMF Beograd	1989