No. 16

Course syllabus for First cycle studies						
1.	**Course title**	**Metallurgical Furnaces**				
2.	**Code**	MDE8E5				
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)**					
6.	**Academic year / semester**	IV/VIII	**7.**	**Number of ECTS**	5	
8.	**Instructors**	**Prof Sveto Cvetkovski**				
9.	**Prerequisites for course enrollment**					
10.	**Objectives of the course syllabus (competences):** Objectives of the subject program (competencies) are: for students to acquire knowledge about furnaces used in metallurgy as well as their constructive, technological and thermal characteristics. **Acquired skills (competences):**					
11.	**Content of the course:** Thermal characteristics of metallurgical furnaces. Temperature regime of furnaces. General heat balance of the furnaces. Heat supply. Heat from fuel combustion. Physical heat of fuels. Physical heat of fuels. Physical heat of the air. Physical heat of water vapor. Physical heat of the insert. Heat of exothermic reactions. Heat consumption for heating the insert. Heat removed with the slag. Physical heat of the exit gases. Heat losses due to incomplete combustion of fuels. Mechanical loss of heat. Heat consumption for endothermic reactions. Heat losses through the hearths and working space of the furnaces. Heat losses due to radiation. Heat losses with the outgoing flue gases. Heat losses due to water cooling. Heat losses due to the accumulation of heat from the walls of the furnaces. Unknown losers. Basic materials for the construction of the furnaces. Structural elements of the furnaces. Plants for utilization of heat from flue gases. Heat removed with the slag. Physical heat of the exit gases. Heat losses due to incomplete combustion of fuels. Mechanical loss of heat. Heat consumption for endothermic reactions. Heat losses through the hearths and working space of the furnaces. Heat losses due to radiation. Heat losses with the exhaust gases. Heat losses due to water cooling. Heat losses due to the accumulation of heat from the walls of the ovens. Unknown losers. Basic materials for the construction of the ovens. Heat consumption for endothermic reactions. Heat losses through the hearths and working space of the furnaces. Heat losses due to radiation. Heat losses with the exhaust gases. Heat losses due to water cooling. Heat losses due to the accumulation of heat from the walls of the ofurnaces. Unknown losers. Basic materials for the construction of the furnaces. Structural elements of the furnaces. Plants for utilization of heat from flue gases. Recuperators. Regenerators. Classification of furnaces accoding working regime and technological and constructive characteristics. Basic working principles of metallurgical furnaces. Fuel furnaces. Electro furnaces.					
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**	english		
21.	**Method for monitoring the quality of lectures**			
22.	**LITERATURE**			

22.1. Compulsory literature

No.	Author	Title	Publisher	Year
1.	S. Cvetkovski	Metallurgiccal furnaces, Autorized material	FTM Skopje	2010
2.	Tatjana Volkov Husovic Karlo Raic	Metallurgical furnaces Tatjana Volkov Husovic	FTM Belgrade	2010
3.	Milan Jovanovic	Furnaces in mrtallurgy of steel and iron	FTM Belgrade	1971

22.2. Additional literature

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