
	UNIVERSITY OF EAST SARAJEVO Faculty of Technology Zvornik					
	Study programme: Chemical Engineering and Technology					
	Cycle I	Year II				
Course title	CEMENT TECHNOLOGY					
Department	Department for Physical Chemistry, Electrochemical Engineering and Materials / Department for Chemical Technology – Faculty of Technology Zvornik					
Course code	Course status	Semester	ECTS			
04-2-044-7	Compulsory	III	4			
Teacher	Dr Dragica Lazić, Full Professor					
Teaching assistant	Dr Dragana Kešelj, Associate Professor					
Number of classes/ teaching workload (per week)		Individual student workload (in hours per semester)		Student workload coefficient S₀		
Lectures	Auditory exercises	Laboratory exercises	Lectures	Auditory exercises	Laboratory exercises	S₀
2	1	0	50	25	0	1.67
$2 \cdot 15 + 1 \cdot 15 + 0 \cdot 15 = 45$ hours			$2 \cdot 15 \cdot 1,67 + 1 \cdot 15 \cdot 1,67 + 0 \cdot 15 \cdot 1,67 = 75$ hours			
Total course workload $45 + 75 = 120$ hours per semester						
Learning outcomes	After finishing the course, students will: <ol style="list-style-type: none"> 1. be able to demonstrate theoretical knowledge in cement technology 2. have the ability to practically manage the technological process of cement production 3. have the ability to calculate the material and energy balance 4. be able to demonstrate knowledge of the working conditions of the basic stages of production 5. be able to demonstrate knowledge about types and standards for cement 					
Prerequisites						
Teaching methods	Lectures, auditory and laboratory exercises, mid-term tests (colloquia).					
Syllabus outline per week	<ol style="list-style-type: none"> 1. History, definitions and symbols in cement chemistry; 2. Basics of Portland cement chemistry (basic chemical components of cement clinker, mechanism of formation of chemical compounds in clinker, mineral composition of clinker); 3. Raw materials for the production of Portland cement; Basic and corrective raw materials; Methodology for calculating the chemical and mineralogical composition of cement clinker 4. Cement hydration, cement setting time, heat of cement hydration, physical and mechanical properties of cement; 5. Production of Portland cement; Preparation of raw materials by dry process; 6. Production of Portland cement. Preparation of raw materials by wet process 7. Production of Portland cement; Clinker production; Basic operations of the clinker production process; Physico-chemical processes of clinker firing, drying, dehydration and de-carbonization of the limestone component, Reactions in the pre-sintering and sintering phase; Clinker cooling; Thermo-chemistry of the clinker firing process 8. Kilns for baking clinker; Rotary kilns; Rotary kilns for dry processing; Rotary kilns for the wet process 9. Kilns for baking clinker; Vertical (shaft) furnaces; Basic principles of vertical furnace operation; The construction of a vertical furnace, the main characteristic of modern vertical furnaces; Comparative analysis of the main characteristics of clinker kilns; 10. Preheaters (heat exchangers) installed in the rotary kiln; Preheaters (heat exchangers) installed outside the rotary kiln; Basic types of multistage cyclone preheaters; 11. Coolers used in clinker production; Systematization of coolers; The basic scheme of installing coolers for clinker firing in the rotary kiln system; Transport and storage of clinker; 12. Grinding clinker into cement; Basic elements of the mill; Heat balance of the grinding process; Characteristics of mills for cement production; 13. Separation of ground cement; Separation with open material flow; Separation with closed material flow; The basic principle of work; Basic types of air separators; 14. Transport, storage, delivery and shipment of cement; Air transport troughs; Screw conveyor and bucket elevator; Basic methods of cement delivery; Storage of cement and shipment of bagged 					

	cement; Spraying and dusters; 15. Types and systematization of cement; Portland cement; Portland cement based on pure clinker; Portland cement with the addition of smelter slag; Portland cement with added pozzolan; White portland cement; Aluminate cement; Standards for cement. Mid-term tests are taken after the 8th week and the 15th week. Semester verification is required after the 15th week.			
Obligatory reading				
Author	Title, publisher	Year	Pages	
Brzaković, P.	Priručnik za proizvodnju i primenu građevinskih materijala nemetalnog porekla, knjiga 1 i knjiga 2, Orion Art, Beograd	2000	261-469	
Additional reading				
Author	Title, publisher	Year	Pages	
Petrovski, P., Bušatlić, I.	Cement i druga neorganska mineralna veziva, HIJATUS, Zenica	2006	3-202	
Zelić, J., Osmanović, O.	Čvrstoća i trajnost cementnih kompozita, Sveučilište u Splitu, Split	2014	1-329	
Obligations, assessment methods and grading system	Type of student evaluation		Grade points	Percentage
	Pre-exam obligations			
	Attendance		6	6 %
	Auditory exercises		10	10%
	Mid-term test (Colloquium) 1		27	27%
	Mid-term test (Colloquium) 2		27	27%
	Final examination			
	Final examination (oral)		30	30 %
Total		100	100 %	
Web page	www.tfzv.ues.rs.ba			
Date	2023			