
	UNIVERSITY OF EAST SARAJEVO Faculty of Technology Zvornik					
	Study programme: Chemical Engineering and Technology					
	Cycle I	Year II				
Course title	MATERIAL AND ENERGY BALANCES					
Department	Department for Process Engineering – Faculty of Technology Zvornik					
Course code	Course status	Semester	ECTS			
04-1-022-4	Compulsory	IV	5			
Teacher	Goran Tadić, PhD, Full Professor					
Teaching assistant	Nebojša Vasiljević, MsC, Senior Assistant					
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	2	0	45	45	0	1.5
$2*15 + 2*15 + 0*15 = 60$ hours			$2*15*1.5 + 2*15*1.5 + 0*15*1.5 = 90$ hours			
Total course workload $60 + 90 = 150$ hours per semester						
Learning outcomes	After finishing the course, students will be able to: <ol style="list-style-type: none"> graphically present simple process schemes, define the system boundary and identify input and output process flows and process sizes; find and use the literature data needed to determine the physical and chemical properties of the components present in the process; set up and solve equations of material and energy balance for processes that take place in stationary conditions, with or without chemical reaction, as well as for simpler cases of non-stationary processes; use the MATLAB software tool to solve different types of equations (linear and non-linear algebraic equations, ordinary differential equations); analyze and present methods of solving tasks and obtained results. 					
Prerequisites	No prerequisites					
Teaching methods	Lectures, auditory exercises, seminar paper, mid-term tests (colloquia).					
Syllabus per week	outline	<ol style="list-style-type: none"> Introduction to Chemical Engineering. The role of chemical engineers in the chemical process industry. Process parameters. Physico-chemical properties of matter. Interpretation, analysis and processing of process data. Equilibrium in single-phase and multi-phase systems. Single- and multi-component systems. Material balance - basic terms; balance equation of stationary and non-stationary processes. Material balance of process unit without chemical reaction. Material balances of multiple-unit processes. Process balance with recirculation and bypass flow. Material balance of process unit with chemical reaction. Material balance of the combustion process as a special case of the process with a chemical reaction. Energy balance - basic terms; forms of energy; general form of the balance equation. Energy balance of closed systems. Energy balance of open systems. Energy balances in processes without chemical reaction. Energy balances in processes with chemical reaction. Energy balance of the combustion process. Strategy for setting the energy balance for non-stationary processes. Balancing of processes that require the simultaneous solution of the system of relations of material and energy balance. <p>Mid-term tests are taken after the 8th week and the 15th week. Semester verification is required after the 15th week.</p>				
Obligatory reading						

Author	Title, publisher	Year	Pages	
Jotanović, M., Tadić, G.	Fundamentals of Chemical Engineering, Faculty of Technology, Zvornik	2012	1-287	
Additional reading				
Author	Title, publisher	Year	Pages	
Suljkanović, M.	Material and energy balances, Faculty of Technology, Tuzla	2007	1-367	
Obradović, B.	Introduction to Chemical Engineering, Faculty of Technology and Metallurgy, Belgrade	2007	1-90	
Felder , RM, Roussean, RW	Elementary Principles of Chemical Processes, John Wiley & Sons	2005	1-575	
Himmelblau, DM, Riggs, JB	Basic Principles and Calculations in Chemical Engineering, Prentice Hall	2012	1-589	
Westerberg , A. W.	Process flowsheeting, Cambridge University Press, Cambridge	1979	1-240	
Gilat, A.	MATLAB: An Introduction with Applications, John Wiley & Sons	2008	1-357	
Obligations, assessment methods and grading system	Type of student evaluation		Grade points	Percentage
	Pre-exam obligations			
	Attendance		6	6 %
	Seminar paper		14	14 %
	Mid-term test (Colloquium) 1		25	25%
	Mid-term test (Colloquium) 2		25	25%
	Final examination			
	Final examination (oral)		30	30 %
	Total		100	100 %
Web page	www.tfzv.ues.rs.ba			
Date	2023			