	UNIVERSITY OF EAST SARAJEVO Faculty of Technology Zvornik	
	Study programme: *Chemical Engineering and Technology*	
	Cycle I / Year III	

Course title	PROCESS MEASUREMENT AND CONTROL
Department	Department for Process Engineering – Faculty of Technology

Course code	**Course status**	**Semester**	**ECTS**
04-1-032-6	Compulsory	VI	6

Teacher	Goran Tadić, PhD, Full Professor
Teaching assistant	Goran Tadić, PhD, Full Professor

Number of classes/ teaching workload (per week)			**Individual student workload (in hours per semester)**			**Student workload coefficient S_o**
Lectures	**Auditory exercises**	**Laboratory exercises**	**Lectures**	**Auditory exercises**	**Laboratory exercises**	**S_o**
3	2	0	63	42	0	1.40
3*15 + 2*15 + 0*15 = 75 hours			3*15*1.4 + 2*15*1.4 + 0*15*1.4 = 105 hours			
Total course workload 75 + 105 = 180 hours per semester						

Learning outcomes	After finishing the course, students will be able to: 1. understand the importance and basic practical aspects of process control in the chemical industry, as well as the role of the chemical engineer in this field; 2. form dynamic models of elementary systems and analyze their representation in the time, Laplace and frequency domains; 3. know different methods of measuring variable processes, as well as the principles of operation of measuring and regulating equipment (measuring element, regulator (controller) and control element); 4. analyze and create basic negative feedback control configurations; 5. use modern software tools (MATLAB) in solving engineering problems related to process control.
Prerequisites	No prerequisites
Teaching methods	Lectures, exercises, work in the computer laboratory, seminar work, colloquiums.
Syllabus outline per week	1. Introductory considerations and importance of process control in the chemical industry. The role of the chemical engineer in this field. Basic definitions, principles and elements of the automatic control system. 2. Basics of process dynamics. Dynamic model of the system in the time and Laplace domain. Transfer function of the control system. 3. Dynamics of elementary systems. Characteristic examples in the chemical industry (pipeline with laminar flow, liquid tank system, isothermal ideal mixed flow reactor, cascade of two isothermal ideal mixed flow reactors, etc.). 4. Block diagrams and block diagram algebra. 5. Time responses of the system. Solving problems using the Matlab software package. 6. Dynamic model of the system in the frequency domain. Frequency characteristics and graphical representation using Nyquist and Bode plots. 7. Negative feedback control configuration (closed loop control system). Regulator (controller) in a closed loop control system. 8. Dynamics of closed loop control system. Creation of closed loop control system model and time response analysis by simulation using the Matlab/Simulink software package. 9. Stability analysis of closed loop control system. 10. Selection and design of regulators in a closed loop control system. 11. Measuring elements. Static and dynamic characteristics of measuring elements. Sensing and conversion parts of measuring elements. 12. Instruments for measuring flow, pressure and pressure difference. 13. Instruments for measuring level, temperature, composition and concentration. 14. Control valve. Basic elements and types of control valves. Static and dynamic characteristics of control valves. Control valve selection and specification.

	15. Overview of the basic characteristics and most commonly used process control schemes in the chemical industry. 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**
Petkovska, M., Nikačević, N.	Basics of automatic control, TMF, Belgrade	2018	1-365
Nikačević, N., Petkovska, M.	Basics of Automatic Control – Manual for exercises, TMF, Belgrade	2016	1-102
Additional reading			
Author	**Title, publisher**	**Year**	**Pages**
Cingara, A., Peruničić, M.	Dynamics and process regulation, Faculty of Technology, Novi Sad	1994	1-278
Šaper, R., Mitrović, M.	Automatic process regulation, TMF, Belgrade	1982	1-252
Seborg, D.E., Edgar, T.E., Mellichamp, D.A., Doyle, F.J.	Process Dynamics and Control, Wiley	2016	1-512
Luyben, W.L.	Process Modeling, Simulation and Control for Chemical Engineers, McGraw-Hill, New York	1996	1-710
Ignatowitz, E.	Chemietechnik 7. Auflage, Verlag Europa-Lehrmittel, Haan-Gruiten	2003	268-317
Ignatowitz, E.	Chemical Engineering, Process and Apparatus, Tehnosphere, Moscow	2007	525-600
Perry, R. H., Green, D.W.	Perry's Chemical Engineers' Handbook, 7th Edition, McGraw-Hill, New York	1997	8.31-8.36 8.43-8.53
Gilat, A.	MATLAB: An Introduction with Applications, John Wiley&Sons	2008	1-357

	Type of student evaluation	**Grade points**	**Percentage**
Obligations, assessment methods and grading system	Pre-exam obligations		
	Attendance	6	6 %
	Seminar	14	14 %
	Colloquium 1	25	25%
	Colloquium 2	25	25%
	Final examination		
	Final examination (oral)	30	30 %
	Total	100	100 %
Web page	www.tfzv.ues.rs.ba		
Date	2023		