	UNIVERSITY OF EAST SARAJEVO **Faculty of Technology Zvornik**	
	Study program: Chemical Engineering and Technology	
	First cycle studies / **Year III**	

Course	**FUNDAMENTALS OF REACTION ENGINEERING**
Department	**Department for Process Engineering**

Code	**Status**	**Semester**	**ECTS**
04-1-031-6	**Compulsory**	V	6

Teacher	Vladan Mićić, PhD, full professor
Teaching Assistant	Duško Kostić, MSc, teaching assistant

Class fund/ teaching load (weekly)			**Individual student workload (hours per semester)**			**Student load factor So**
Lectures	**Auditory Exercises**	**Laboratory Exercises**	**Lectures**	**Auditory Exercises**	**Laboratory Exercises**	**S_o**
3	2	0	63	42	0	1,40

total teaching load (in hours, per semester) 3*15 + 2*15 + 0*15 = 75	total student workload (in hours, per semester) 3*15*1,40 + 2*15*1,40 + 0*15*1,40 = 105

Total course load (teaching + student): 75+ 105 = 180 semester hours

Learning outcomes	After finishing the course, students will be able to: 1. demonstrate and utilize the fundamental knowledge of the elements of chemical reaction engineering 2. demonstrate and utilize the fundamental knowledge of chemical reaction kinetics, analysis and performance of reactors.
Prerequisites	-
Teaching methods	Lectures, auditory exercises, consultations, seminar paper, mid-term tests/colloquia, exams
Syllabus outline per week	**I Lectures** 1. Introduction; Chemical reaction engineering and chemical reactors 2. Material Balance of Ideal Reactors: Characteristics of Ideal Reactors, General Material Balance, Batch Reactors, Ideal Stirred Flow Reactor, Tubular Reactor, Catalytic Tubular Reactor 3. Rate of chemical reaction: Stoichiometry of chemical reaction, types of chemical reactions, degree of conversion, utilization and selectivity, rate of chemical reaction 4. Dependence of the rate of a chemical reaction on concentration, dependence of the rate of a chemical reaction on temperature, kinetic models of chemical reactions, rate of a chemical reaction and volume change, space, time and volume change 5. Kinetics of chemical reactions in homogeneous systems and kinetic models: Irreversible, reversible and complex chemical reactions 6. Kinetics of chemical reactions in heterogeneous systems 7. Mid-term test/Colloquium I 8. Kinetics of catalytic chemical reactions: Catalysis, catalysts, mechanism of heterogeneous catalysis, adsorption, kinetic models of catalytic reactions 9. Methods of processing the results of experimental research on the kinetics of chemical reactions: Selection of a laboratory reactor, Selection of a kinetic model and adjustment of the reaction system, Integral method of processing experimental data, differential method of processing experimental data 10. Analysis of chemical reactors in isothermal operating conditions: Batch reactor, Flow reactor with ideal mixing 11. Tubular reactor, Semi-flow reactor 12. Analysis of chemical reactors in non-isothermal operating conditions: Energy balance basic concepts and settings, enthalpy change due to chemical reaction, adiabatic operations in reactors, recapitulation of energy balance equations of different types of ideal reactors 13. Energy balance of a batch reactor, Energy balance of a flow reactor with ideal mixing, energy balance of a tubular reactor, energy balance of a semi-flow reactor 14. Flow and mixing in real reactors, Industrial reactors 15. Attendance verification. Mid-term test/Colloquium II

Main literature			
Author	**Title of publication, publisher**	**Year**	**Pages (from-to)**
Milovan Jotanović, Vladan Mićić	Hemijsko reakcijsko inženjerstvo, Tehnološki fakultet Univerziteta u Istočnom Sarajevu	2016	1-293
Zoran Gomzi	Kemijski reaktori, drugo izdanje, Hinus d.o.o. Zagreb	2009	1-520
Dejan Skala, Milorad Sokić	Zbirka zadataka iz Osnova teorije i projektovanja hemijskih reaktora, Tehnološko metalurški fakultet Univerziteta u Beogradu	1979	1-218
Additional reading			
Author	**Title of publication, publisher**	**Year**	**Pages (from-to)**
Octave Levenspiel	Osnovi teorije i projektovanja hemijskih reaktora, prevod, Tehnološko metalurški fakultet Beograd	1991	1-251
H. Scott Fogler	Elements of Chemical Reaction Engineering, fourth edition, Pearson Education International	2008	1-645
E. Bruce Nauman	Chemical Reactor Design, Optimization, and Scaleup, McGraw-Hill Education	2002	1-125

	Type of student work evaluation	**Points**	**Percentage**
Obligations, assessment methods and grading system	Pre-exam obligations		
	Attendance at lectures/exercises	6	6 %
	Seminary paper	14	14%
	Mid-term test/Colloquium 1	25	25 %
	Mid-term test/Colloquium 2	25	25 %
	Final exam		
	Final exam	30	30 %
	Total	100	100 %
Date of certification	2023		