

		UNIVERSITY OF EAST SARAJEVO Faculty of Technology Zvornik					
		Study programme: Chemical Engineering and Technology					
		Cycle I		Year IV			
Course title		TECHNOLOGY OF SYNTHETIC POLYMERS					
Department		Department for Chemical Technologies– Faculty of Technology Zvornik					
Course code		Course status		Semester		ECTS	
04-2-061-8		Elective		VIII		4	
Teacher		Zoran Petrović, PhD, Assoc. Prof.					
Teaching assistant		Zoran Petrović, PhD, Assoc. Prof.					
Number of hours/ 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	0	2	30	0	30	1.00	
2*15+0*15+2*15=60 hours			(2*15*1+0*15*1+2*15*1)=60 hours				
Total course workload 60 + 60 = 120 hours per semester							
Learning outcomes		After finishing the course, students will be able to: 1. demonstrate and utilize fundamental knowledge about the main petrochemical raw materials and their processing into monomers 2. demonstrate and utilize fundamental knowledge of about polymerization, copolymerization and polycondensation procedures 3. demonstrate and utilize fundamental knowledge about the procedures for obtaining and processing frequently used polymers (RE, RR, RS, PA, etc.) 4. master the procedures for the characterization and identification of synthetic polymers.					
Prerequisites							
Teaching methods		Lectures, experimental exercises, student visits to refinery, mid-term tests, seminar paper.					
Syllabus outline per week		1. The term polymer. Differences between macromolecular and low molecular compounds, basic petrochemical raw materials and their production. 2. Chemistry of polymer formation. Functionality. Formation of unsaturated monomers, functionality, conditions for the formation of polymers, formation chemistry. 3. Process of production of synthetic polymers (polymerization, methods of polymerization, copolymerization, olicondensation, kinetics of formation of synthetic polymers). 4. Characterization of synthetic polymers (average molecular weight, distribution curves, polymer chain structure, technical testing, thermal and chemical testing, application behavior testing, mechanical testing, optical testing, electrical testing). 5. Technology of polyethylene. Description of the technological process and polymerization conditions. Types of polyethylene and their specificities in obtaining procedures, characteristics and application. Structure and characteristics. Processing procedures. 6. Polypropylene technology. Description of the technological process and polymerization conditions. Structure and characteristics. Processing procedures. Production of mono-oriented polypropylene film, production of biaxially oriented film. Application of the product. 7. Polyvinyl chloride technology. Description of the technological process and polymerization conditions. Structure and properties. Processing and application. 8. Polystyrene technology. Description of the technological process and polymerization conditions. Structure and properties. Production of expanded polystyrene. Processing procedures and application. 9. Polyethylene terephthalate technology (description of the technological process and polymerization conditions). Processing procedures and application. 10. Polyester technology (description of technological process and chemistry). Unsaturated polyester resins, synthesis of resins on an industrial scale, types of resins, hardening mechanism. Processing and application of alkyd polymers. 11. Synthetic rubber technology. Chemistry of formation, types of synthetic rubber, structure, application and processing. 12. Polyurethane technology (structure, basic raw materials, types, methods of obtaining, obtaining from natural raw materials, application and processing).					

	<p>13. Technology of polyamide polymers. Basic raw materials, chemistry of production, description of the technological process, processing and application. Technology of acrylic polymers. Description of the technological process and polymerization conditions. Structure and properties. Processing and application.</p> <p>14. Technology of acrylic polymers. Description of the technological process and polymerization conditions. Structure and properties. Processing and application.</p> <p>15. Basics of recycling of polymeric materials (comparison of natural and synthetic polymers in terms of raw materials, production process and biodegradability, needs for recycling and recycling procedures of synthetic polymers).</p>			
Obligatory reading				
Author	Title, publisher	Year	Pages	
Janović, Z.	Polimerizacija i polimeri, Kemija u industriji, Zagreb	1997		
Jovanović, S., Jeremić, K.	Karakterisanje polimera, Tehnološko-metalurški fakultet Beograd	2007		
Ilišković, N.	Organska hemijska tehnologija, Svjetlost, Sarajevo	1982		
Petrović, Z., Dugić, P., Aleksić, V.	Fizičko-hemijska ispitivanja u procesima organske industrije, Tehnološki fakultet Zvornik	2011		
Plavšić, M.	Polimerni materijali, Nauka i inženjerstvo, Naučna knjiga Beograd	1996		
Pejak, M.	Polipropilen, Logos, Bačka Palanka	2005		
Đaković, Lj.	Hemija sintetskih polimera, Tehnološki fakultet, Novi Sad	1987		
Rapajić, B.	Prerada plastičnih masa, Privredni pregled, Beograd	1986		
Additional reading				
Author	Title, publisher	Year	Pages	
Korsakov, V.	Технология пластических масс, Издательство, Химия	1996		
Obligations, assessment methods and grading system	Type of student evaluation		Grade points	Percentage
	Pre-exam obligations			
		Attendance	6	6 %
		Mid-term test (Colloquium) 1	20	20 %
		Mid-term test (Colloquium) 2	20	20 %
		Laboratory exercises	14	14 %
		Seminar paper	10	10 %
	Final examination			
	Final examination (oral)	30	30 %	
Total		100	100 %	
Web page	www.tfzv.ues.rs.ba			
Date	2023			