

Study Programme: Material Engineering		
Course Unit Title: Polymeric materials- structure and properties		
Course Unit Code: MO 301		
Name of Lecturer(s): Prof. Branka M. Pilić, PhD		
Type and Level of Studies: Undergraduate Academic Studies		
Course Status (compulsory/elective): compulsory		
Semester (winter/summer): Winter/Summer		
Language of instruction: English		
Mode of course unit delivery (face-to-face/distance learning): Face-to-face		
Number of ECTS Allocated: 7		
Prerequisites: None		
<p>Course Aims:</p> <p>The aim of this course is to get basic theoretical knowledge of the polymeric materials structure and properties, the influence of the polymeric materials structure on the macroscopic properties, the behavior of polymeric materials in solution, melt, solid state, physical and phase states of polymeric materials, as well as practical knowledge on methods of characterization of polymeric materials.</p>		
<p>Learning Outcomes:</p> <p>At this course student acquires knowledge, develops skills, abilities in the field of polymeric materials: independently solves practical and theoretical problems in the field of structure and properties of polymeric materials, obtains knowledge how to connect the polymeric materials structure with their properties and applications, using basic methods of polymer characterization</p>		
<p>Syllabus:</p> <p><i>Theory</i> Introduction - polymers and polymeric materials - basic concepts about the type of polymers and polymeric materials, the concept of polymeric engineering. Structure of the polymers -chemical structure and composition the polymer chain structure and supermolecular structure. Polymers solubility and conformation. Molecular masses and distribution -methods for molecular weight characterization. Phase states, phase transitions, physical states of polymers – characterization methods. Properties of polymeric materials - thermal properties, thermomechanical and dynamic mechanical properties, mechanical properties, electrical properties.</p> <p><i>Practice</i></p> <p>Preliminary identification of the most important polymeric materials, characterization of the acrylonitrile butadiene styrene (ABS) chemical structure by infrared spectroscopy (IR). Determination and calculation of molecular masses and their distribution by viscosimetry, gel chromatography, light scattering. characterization of polyethylene terephthalate (PET), polypropylene (PP), polyethylene (PE), phase and physical states by differential scanning calorimetry (DSC). Thermal expansion coefficient using TMA, elasticity and loss modulus in PE, PP, polymethylmethacrylate (PMMA), crystallinity degree by DSC, tensile and elongation at the (PP).</p>		
Required Reading: Gottfried W. Ehrenstein, Polymeric Materials, Structure-Properties-applications, Hanser, 2001		
Weekly Contact Hours: 7	Lectures: 4	Practical work: 3
<p>Teaching Methods:</p> <p>Lectures and students group work</p>		

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation	20	written exam	
Practical work	20	oral exam	40
Preliminary exam(s)	20	
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			