

Study program: Industrial Engineering			
Course title: Hydraulic and Pneumatic Systems			
Professor/assistant: PhD Boban Cvetanovic			
Type of course: elective			
ECTS credits: 5			
Pre-requisites:			
Aims of the course: Prepare a student to: - learn to read hydraulic and pneumatic systems, - recognize and analyze system elements and their functionality, - learn the basics of calculating elements, wagons as well as hydraulic and pneumatic systems as a whole.			
Learning outcomes: The student is able to: - explain basic principles and methods in hydraulics, - identify basic parts in hydraulic and pneumatic systems, - assess the design's applicability and choose the appropriate hydraulic and pneumatic systems, - design and calculate simple hydraulic and pneumatic systems.			
Syllabus			
<u>Theoretical part</u> Introduction to oil hydraulics. Application of hydraulic oil. Basic equations. Equations for calculating stationary regimes of hydraulic oil systems. Bernul's equation. Equation of continuity. Equilibrium of straightening and rotational motion. Energy balance and degree of utility of hydraulic systems. Pump aggregates and executive organs. Oil hydraulic pumps and hydromotors. Oil-hydraulic working cylinders. Oil hydraulic distributors and control components. Hydraulic accumulators. Storage and transportation of oils. Introduction to the tire. Calculation of basic current processes. Air circulation in the barrels and local resistance. Iso-thermal flow of gas in the barrels. Pneumatic system elements.			
<u>Practical part</u> Applying theoretical knowledge to the solution of concrete practical examples with the necessary instructions for solving certain types of tasks.			
Literature			
1. V. Savić, <i>Osnovi uljne hidraulike</i> , 1995. 2. S. Stefanović, M. Krstić, <i>Hidraulične komponente i sistemi</i> , DTD Tehdis, 2009. 3. T. Bašta, <i>Mašinska hidraulika</i> , 1972. 4. Ž. Adamović i dr., <i>Osnove hidraulike i pneumatike sa izvodima teorije i zbirkom rešenih praktičnih primera</i> , 2007.			
Number of active classes			Other forms of teaching:
Lectures: 2	Practical classes: 2	Research work:	
Teaching methods Teaching is performed interactively in the form of lectures, auditorial, laboratory and computer exercises. In lectures, theoretical part of the material is presented together with characteristic examples for easier understanding. Computer-based exercises do upgrading in information communication technologies to master the knowledge of the observed area. In addition to lectures and exercises, consultations are also held regularly.			
Grading system (maximum 100 points), grading scale from 5 to 10: below 51 points grade 5, grade 6 from 51-60 points, grade 7 from 61-70 points, grade 8 from 71-80 points, grade 9 from 81-90 points, grade 10 from 91-100 points.			
Pre-exam obligations	points	Final exam	points
activity during theoretical lectures	10	written exam	30
practical training		oral exam	
colloquium(s)/seminar papers	40+20		
Sum	70	Sum	30