

Course title: Pneumatic and hydraulic control techniques	Neptun code: GESGT409a
Course coordinator: Dr. László Rónai, assistant professor, PhD	
type and number of lesson: lecture /seminar/practical lesson/consultation, 2 / week or semester	
method of accountability: colloquium	
curriculum location of the subject: spring	
pre-study conditions:	
The task and purpose of the subject:	
Presentation of the structure and important elements of pneumatic and hydraulic systems, a description of the most important parameters and relationships of pneumatic-hydraulic systems. The description of system control elements and presentation of their operation.	
Course description:	
Application of an electrical analogy to describe the processes taking place in hydraulic and pneumatic circuits. Interpretation of hydraulic resistance, inductance and capacitance. Structural designs of rotating energy converters, their operation. Operating principle and grouping of working cylinders. Sizing for force and deflection. End-of-stroke damping of working cylinders. Structural design and operation of pressure and current control elements and diverters used in hydraulic circuits. Operating principle and structural design of hydraulic accumulators. The change in the absorbed liquid volume of the accumulator as a function of the sign of the state change and the pressure. Constant speed drives. Drive characteristics, transmission factor, field of application. Variable speed/speed drives. Actuators equipped with throttle and variable specific working volume energy converter. Characteristic properties of drive, transmission factor, field of application. Basic connections of hydraulic circuits. Hydraulic circuits for special tasks (braking, high-speed, energy saving, etc. circuits). Synchronous movement of hydraulic motors/working cylinders. Classification and characteristics of synchronous movements. Construction and operation of alternating current hydraulic drives. Hydraulic system losses. Dimensioning of tank for heating. Elements of a pneumatic network. Working cylinders, diverter valves, pneumatic limit switches. Logical AND, OR and NOT condition elements. Pneumatic grippers, fixing elements. Elements of vacuum technology. Systematic design of pneumatic control networks. Construction of electropneumatic networks. Operation of electropneumatic control networks using PLC. Computer simulation of pneumatic and electropneumatic circuit diagrams.	
Required literature:	
<ol style="list-style-type: none"> 1. Hantos, T.-Barak, A.-Nagy, L.-Simon, G., Hidraulika alapjai, Miskolc 2007. Készült a HEFOP-3.3.1-P.-2004-09-0102/1.0 projekt keretében. 2. Rabie, M. G., Fluid Power Engineering, McGraw-Hill, 2009 	
Recommended literature:	
<ol style="list-style-type: none"> 1. Peter Beater: Pneumatic Drives - System Design, Modelling and Control, 2007, Springer-Verlag Berlin Heidelberg, ISBN 978-3-540-69470-0 2. R.B. Walters: Hydraulic and Electric-Hydraulic Control Systems, Springer Dordrecht, doi: https://doi.org/10.1007/978-94-015-9427-1 	