

## Electropneumatics and Electrohydraulics

Code: MK3EPNER4RX17-EN

ECTS Credit Points: 6

Evaluation: mid-semester grade

Year, Semester: 3<sup>rd</sup> year, 1<sup>st</sup> semester

Its prerequisite(s): Pneumatics and Hydraulics

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 0+4

### Topics:

Basic electropneumatic circuits. General operation of electric valves. Pneumatic electrical transducers. Pneumatic and electropneumatic controls. Electric converters, signal processors. Relays and protection relays. Connections of electric actuated valves. Direct and indirect management. Logic circuits. Time Tracking Control. Checking workflows. Electric drive. Proportional pneumatics. Proportional switching valves. Applications of FluidSIM-P program. Flow control valves. Basic electrohydraulic circuits. Electrohydraulic control. Hydraulic cylinders. Electrohydraulic circuits. Applications of the FluidSIM-H program. The signal storage path depends on the sequence control. Control of pneumatic and hydraulic processes using a PLC controller.

### Literature:

#### Compulsory:

- G. Prede, D. Scholz: Electropneumatics Basic Level Festo Didactic GmbH & Co., 2002.
- Dieter Scholtz: Fundamental of Electrohydraulics Festo Didactic GmbH & Co., 2001.
- Renate Aheimer, Eberhad Bauer, Frank Ebel, Christine Löffler, Dieter Merkle, Helmut Werner: Electrohydraulics Basic Level Festo Didactic GmbH & Co. 2011.

#### Recommended:

- De Silva, Clarence W.: Mechatronics : an integrated approach CRC Press, 2005.

### Schedule

#### 1<sup>st</sup> week Registration week

##### 2<sup>nd</sup> week:

**Practice:** Development of electropneumatics. Pneumatic-electric transducers, relays.

##### 4<sup>th</sup> week:

**Lecture:** -

**Practice:** Basics of electricity. The electrical power supply. Electric transducers, signal processors. Buttons, switches.

##### 6<sup>th</sup> week:

**Lecture:** -

**Practice:** Electrically operated valves. Usage of solenoid valves and structures. Construction methods.

##### 3<sup>rd</sup> week:

**Practice:** The basic concepts of a control technology. Pneumatic and electro-pneumatic controls. Basics of electricity.

##### 5<sup>th</sup> week:

**Lecture:** -

**Practice:** Sensors. Relays and contactors. Freely programmable controllers (PLC).

##### 7<sup>th</sup> week:

**Lecture:** -

**Practice:** Relay controls. Relay controls applications. Direct and indirect control. Logic controls. Signal storage with relay.

#### 8<sup>th</sup> week 1<sup>st</sup> drawing week, 1<sup>st</sup> Mid-term test

**9<sup>th</sup> week:****Lecture:** -**Practice:** Time tracking controls. Workflow controls. Pneumatic drives. Sensors. Signal processing.**11<sup>th</sup> week:****Lecture:** -**Practice:** Electrical symbols. Electro-hydraulic controls. (hydraulic, electrical diagram, function graphs)**13<sup>th</sup> week:****Lecture:** -**Practice:** Electro-hydraulic circuits (signal storage way control).**10<sup>th</sup> week:****Lecture:** -**Practice:** Electric drive proportional pneumatics. Proportional pressure control valves. Proportional valves.**12<sup>th</sup> week:****Lecture:** -**Practice:** Electro-hydraulic structure of equipment. Electrical basic concepts.**14<sup>th</sup> week:****Lecture:** -**Practice:** Electro-hydraulic circuits (falling edge automatic mode).**15<sup>th</sup> week 2<sup>nd</sup> drawing week, Test 2****Requirements****A, for a signature:**

Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Missed practice classes must be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as absence because of the lack of active participation in class.

**B, for a grade:**

Students have to fulfil a mid-term exercise at least for 50% to take part on the next practice classes. All students, who failed the mid-term exercise will not get a mid-semester grade. At the end of the semester, all students have to solve a real life problem in programming. Also a task, to make a complete documentation of the project file, using all the methods, mentioned during the semester. The course ends in a mid-semester grade. Based on the average of the grades of the tasks. The grade for the test is given according to the followings: Score Grade 0-50 fail (1) 51-65 pass (2) 66-75 satisfactory (3) 76-85 good (4) 86-100 excellent (5)