Hydraulics and Pneumatics

Programme course

6 credits

Hydraulik och pneumatik

TMMI13

Valid from: 2017 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
2017-01-25

Main field of study
Mechanical Engineering

Course level
First cycle

Advancement level
G2X

Course offered for
- Mechanical Engineering, B Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Mathematics and Applied Mechanics.

Intended learning outcomes
The object of this course is to give knowledge about components and systems for fluid transfer of energy and control principles for fluid power systems. The knowledge aims for the course are:

- to convey profound knowledge about component functionality and characteristics in the area of ”Hydraulic and pneumatic energy transformation”.
- to give knowledge about system design and calculation methods.
- to convey profound knowledge about control principals with respect to controllability and energy consumption.
- to give insight in measurement methods and computer usage for system analyses.

The skill aims for the course are:

- be able to analyse fluid power systems with respect to performance, controllability and energy consumption.
- be able to apply calculation methods for component selections and system design.
- be able to perform measurements on components and systems.

Course content

- Energy transmission based on hydraulics and pneumatics. Basic fluid dynamics. Component knowledge with respect to functionality and design of pumps, motors, cylinders, valves, accumulators, filters and line components. Characteristics of fluids. System design for different hydraulic and pneumatic circuits. Calculation methods for components and systems.
- Basic system principles for control of position, velocity/speed, force/torque and power. Principles for load sensing hydraulic systems and hydrostatic transmissions. Characteristics of proportional- and servo-valves. Automatic sequence control. Measurement methods in hydraulic and pneumatic systems.

Teaching and working methods

The teaching consists of lectures, lessons and laboratory exercises.
The course runs over the entire autumn semester.

Examination

LAB1	Laboratory works	1.5 credits	U, G
TEN1	Written examination	4.5 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Peter Hallberg

Examiner

Liselott Ericson

Course website and other links

http://www.iei.liu.se/flumes/tmmi13

Education components

Preliminary scheduled hours: 66 h
Recommended self-study hours: 94 h

Course literature

Additional literature

Books

Rydberg K-E, (1997) *Basic Theory for Pneumatic System Design*

Compendia

Exempelsamling för kursen Fluidmekanisk Systemtekni
Formelsamling Hydraulik och Pneumatik
Laborations-PM
Olsson O, Rydberg K-E, Kompendium i Hydraulik

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.