

Fluid power systems, advanced course

Programme course

6 credits

Fluidmekanisk systemteknik, avancerad kurs

TMHP06

Valid from: 2021 Spring semester

Determined by

Board of Studies for Mechanical Engineering
and Design

Date determined

2020-09-29

Main field of study

Mechanical Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Master's Programme in Mechanical Engineering
- Mechanical Engineering, M Sc in Engineering

Prerequisites

Fluid Power Systems, Automatic Control

Intended learning outcomes

The course is intended to give a broad knowledge in hydraulic system design. After the course, the student should:

- be able to analyze and discuss fluid power systems in terms of performance, power consumption, controllability and dynamic properties.
- be able to model and implement dynamic analyses of fluid power systems.
- be able to create and apply calculation basis for component selection and system design.
- be able to explain component functions and component characteristics in the field of fluid power.
- be able to consider environmental aspects and ergonomically suitable solutions.
- conduct laboratory experiments and present experiments and results in writing.
- be able to incorporate and account for research literature in relevant journals.

Course content

Hydraulic machines: Design of different types of pumps and motors. Analyses of losses and efficiency models. Flow pulsations from hydraulic machines. Control actuators for variable displacement machines. Dynamic properties of hydraulic machines. Simulation and optimization of fluid power pumps/motors.

Transmission systems: Mobile and industrial applications. Completely hydraulic and hydro mechanical divided types of transmissions - principles of automatic control and dynamic characteristics. Servo systems for control of shaft speed and torque. Simulation of transmission drive systems.

Valve-controlled systems: Steady state and dynamic properties of pressure and flow control valves. Mobile and industrial applications. Open and closed systems. Load sensing hydraulic systems. Simulation of valve-controlled systems.

Teaching and working methods

The teaching consists of lectures, lessons and laboratory exercises

Examination

UPG2	Assignments	U, 3, 4, 5	3.5 credits
LAB1	Laboratory work	U, G	1 credits
UPG1	Scientific article	U, G	1.5 credits

Grades

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

Other information

Supplementary courses

TMMS13 - Electro Hydraulic Systems
TMPM06 - Project Course Advanced - Mechatronics

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is Swedish, the course as a whole or in large parts, is taught in Swedish. Please note that although teaching language is Swedish, parts of the course could be given in English. Examination language is Swedish.

- If teaching language is Swedish/English, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English (depending on teaching language).
- If teaching language is English, the course as a whole is taught in English. Examination language is English.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Mikael Axin

Examiner

Liselott Ericson

Education components

Preliminary scheduled hours: 51 h

Recommended self-study hours: 109 h

Course literature

Compendiums

Formula Book: Hydraulic and Pneumatics
LiTH, 2016

Other

Miscellaneous literature and laboration memos available on the course homepage.