

**FS**UNIVERSITY OF LJUBLJANA
Faculty of Mechanical Engineering

Hydraulic Components and Systems (6030-M)

5 ECTS**Lecturer:** F. MajdičLectures: 30 h | Tutorials: 14 h | Labs: 12 h | Project: 4 h | Lang.: 

Objectives

1. To acquire advanced knowledge in the field of development and research of new hydraulic components.
2. To acquire advanced knowledge for the calculation of transient phenomena within hydraulic systems.
3. To acquire knowledge in the design of hydrostatic drives in closed circuits.
4. Expanding knowledge in the field of modern controlled hydraulic pumps and motors.
5. Know how to use proportional, digital and servo valves.
6. To know how to design hydraulic component and to use topological optimisation
7. To know how to do numerical calculations of hydraulic components and systems.

Programme

1. Transient phenomena in hydraulic systems.
2. Hydrostatic actuators in a closed circuit.
3. Hydraulic control of the direction of travel of mobile machines.
4. Advanced control and regulation of variable displacement pumps.
5. Design and development of new hydraulic components.
6. Electro-hydraulic control, proportional, servo and digital valves and controls.
7. Diagnostics of hydraulic systems.
8. Numerical calculations - simulations of hydraulic components in a three-dimensional system.
9. Simulations of hydraulic systems.
10. Current trends and guidance in the development of hydraulic components and systems.

Prerequisites

In order to successfully achieve this course, the students must have:

- Basic knowledge of hydraulics and pneumatics
- Basic knowledge of physics

Learning outcomes

Knowledge: In-depth theoretical, methodological and analytical knowledge of hydraulic components, their operation and synthesis of knowledge in the development and research of new hydraulic components and in the construction of complex hydraulic systems.

Skills:

- Mastering highly complex, complex work processes and methodological tools in the design of new hydraulic components and systems.
- Design and control of the design, calculation, measurement, installation and test run of a new hydraulic component and / or the entire system based on creative problem solving.
- Ability to reflect critically and original knowledge of hydraulic components and systems - new patents, products, devices and / or scientific articles.

Assessment

- A theoretical content (lectures): 50%,
- Independent work in exercises: 20%,
- Independent work in lab work (reports and assessment): 15%,
- Seminar: 15%.

Literature

- Matthies, H.J.: Renius, K.T.: Einführung in die Ölhydraulik, Teubner Verlag, 2003.
- D. Findeisen, S. Helduser, Ölhydraulik: Handbuch der hydraulischen Antriebe und Steuerungen, 6. Auflage, Springer Verlag, 2015
- J. L. Johnson: Basic electronics for hydraulic motion control, Penton Publishing Inc., 1992.
- H. Murrenhoff, H. Wallentowitz, Fluidtechnik für mobile Anwendungen, 3. Auflage 2006, RWTH Aachen, Schaker Verlag, Aachen