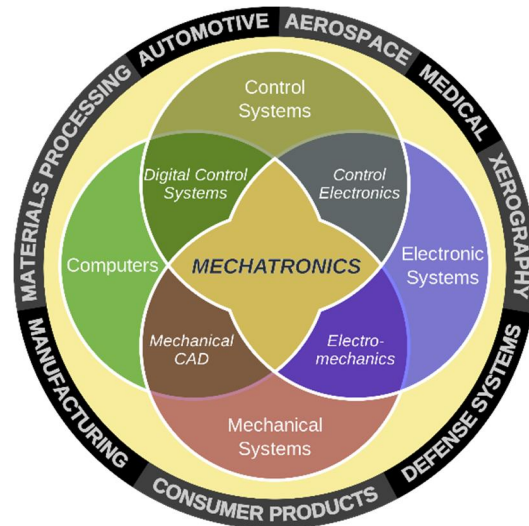


Mechatronics

Mechatronics education package gives an in-depth understanding of the multidisciplinary field of mechatronics which integrates mechanical, electrical, telecommunications, control and computer engineering. Teaching provides principles and practice for designing and constructing mechatronic apparatuses and machines, either fixed or mobile, using various power transmission and control methods. The research orientated studies are primarily made up of various theoretical and hands-on exercises, assignments, experiments and project works. Students can compose personal study paths by including various courses of different Schools of Aalto University in their studies. Of these only some are listed here:

- **Mechatronic specialist**
- **Vehicle engineer**
- **Fluid Power specialist**



After finishing the studies of Mechatronics the student has, besides strong conceptual and theoretic background, also practical expertise on the different technology areas of the subject; machine design, fluid power, vehicle engineering, electronics, automation, control engineering, programming, modeling and simulation. In general, the student is able to

- solve multidisciplinary problems creatively with different methods
- critically evaluate the adaptability of alternative technologies to applications of various standards
- analyze system characteristics, operation and quality with measurements and simulations
- design and build mechatronic systems and machines that meet the set requirements regarding, e.g., system performance, energy economics, functionality, behavior and price-performance ratio

Mechatronics' courses

Autumn 1	Spring 1	Autumn 2
Mechanical engineering in society (5 cr)	Mechatronic machine design (5 cr)	Vehicle mechatronics (5 cr)
Machine design project (5 cr)	Fluid power basics (5 cr)	Fluid power systems (5 cr)
Machine design (5 cr)	Mechatronics project (10 cr)	Fluid power dynamics (5 cr)
Selection of engineering materials (5 cr)		
Production engineering (5 cr)		
Quality management and metrology (5 cr)		

The courses of mechatronics and the supporting courses of the Aalto School of Electrical Engineering provide the student a solid background to operate as specialist in a wide range of work duties and environments. Some of the specialization areas that the studies provide are presented in the following pages.

The multidisciplinary nature of mechatronics and the continuously and fast developing techniques related to the matter will guarantee that the work duties will remain interesting and challenging throughout a person's professional career.

Study path: Fluid Power

Profile

Besides broad understanding of mechanical engineering in general, a fluid power specialist has solid understanding of hydraulics, pneumatics and control systems as well as their applications in fixed industrial installations and mobile machines. He/she masters the underlying theory of fluid power, is familiar with the latest technology of the area and is able to apply this knowledge to design energy efficient high performance systems and analyze their dynamic properties with measurements and simulations.

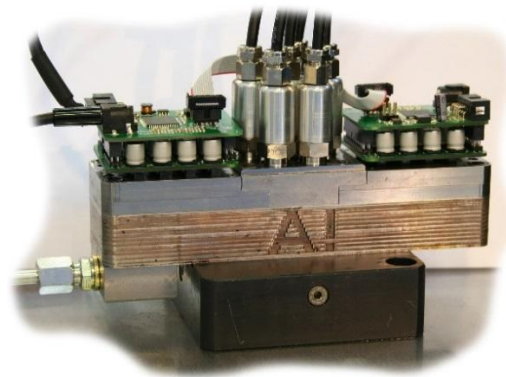
Studies

To support the Fluid Power studies, the students are advised to take courses in control technology, modeling and simulation, and measurement technology. An example of recommended courses for Fluid Power study path is shown to the right. The path can be modified and supplemented according to student's personal interests and ambition.

In Fluid Power the mainly used teaching methods are theoretical and hands-on exercises, research and design assignments, laboratory experiments and project works.

Work environment

Since fluid power systems are used in vast variety of applications, also the work environments of fluid power specialists vary widely. However, the graduates from this discipline typically begin their professional career in tasks of an expert, e.g., as system designer, product developer or research engineer in the service of a component manufacturer, an engineering office or a research institute. After a few years, with accumulated experience, they typically move over to more challenging duties of design, research or management in the service of industry or academia.



Courses

Recommended Common Studies (30 cr)

MEC-E1001 Mechanical Engineering in Society
 MEC-E1070 Selection of Engineering Materials
 MEC-E1003 Machine Design Project
 MEC-E1060 Machine Design
 MEC-E1080 Production Engineering
 MEC-E1090 Quality Management and Metrology

Recommended Advanced Studies (30 cr)

MEC-E5003 Fluid Power Basics
 MEC-E5004 Fluid Power Systems
 MEC-E5005 Fluid Power Dynamics
 MEC-E5001 Mechatronic Machine Design
 ELEC-E8101 Digital and Optimal Control
 ELEC-E8103 Modeling, Estimation and Dynamic Systems

Recommended Elective Studies (select 30 cr)

MEC-E1020 Fluid Dynamics
 MEC-E1040 Dynamics of Structures
 MEC-E5006 Vehicle Mechatronics
 MEC-E5002 Mechatronics Project
 ELEC-E5710 Sensors and measurement methods
 ELEC-E5720 Virtual instrumentation