Curriculum at LAB University of Applied Sciences
2019-2020

Bachelor of Engineering, Mechanical Engineering, Lahti

In Mechanical Engineering, all students will study 180 credits of core studies. For additional 60 credits, you can choose from complementary curriculum.

Basic studies include mathematics, physics and mechanics as well as languages. The engineering studies contains mechanics and automation, material and manufacturing technology, actuator selection and dimensioning, and logic control. Complementary studies include advanced courses in mechanical engineering, automation design, material and manufacturing engineering, and manufacturing economics and environmental efficiency.

In each year of study, you will work as a team member for a projects. The first and second year of the project will be done by the institution in the laboratory, the third and fourth year of the project will be carried out by the company or RDI-projects. Especially in these projects, you will get an idea of ??what kind of working life skills are required from an engineer. The scope of the project is about seven credits.

The essential parts of the studies are internship and a thesis. During internships, you are familiar with the company's activities and practical work. In the thesis, you will focus on the task of studying and planning an interesting work-oriented topic.

The studies of each LAMK student include a certain amount of general and professional core competence and complementary competence studies. The core competence of the degree forms the basis of your knowledge and guarantees expertise. With complementary expertise, you will in turn be able to deepen or expand your skills in the direction you want and build your own, the most appropriate, individual degree.

You can complement your skills not only from your own training provider, but also from the entire LAMK joint training offering in the fields, and study in different ways in different learning environments.

Our new Niemi-Campus has Europe's most advanced learning environments, where you study with new, future-oriented methods and equipment. There are facilities for Niemi-Campus for various needs such as workshops, quiet working, laboratory work, co-working, theory teaching and presentations.

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TEKTT19S-1019	**CORE COMPETENCE**					**180**
TEKTT19S-1020	**Common Core Competence**					**25**
LA00BE73	English for Work	3				3
LA00BE74	Swedish language, Oral Communication		1			1
LA00BE75	Swedish language¸ Written Communication		2			2
LA00BE76	Professional communication	4				4

LA00BE77	Developing professional competence 1	2				2
LA00BQ87	Developing professional competence 2		2			2
LA00BQ88	Developing professional competence 3			1		1
LA00BE78	Research and Development			5		5
LA00BE79	Anticipating Future Trends			5		5
TEKTT19S-1021	**Professional Core Competence**					**155**
TEKTT19S-1022	**Digitalisation**					**10**
TE00BH08	Digitalisation of the Future	3				3
TE00BH09	Networks, Data Security and Cloud Services	3				3
TE00BH10	Digital Tools	4				4
TEKTT19S-1023	**Mekaniikka**					**10**
TE00BH11	Mathematical tools	5				5
TE00BH12	Mechanical Applications	5				5
TEKTT19S-1024	**Electricity, Heat and Energy**					**15**
TE00BH13	Electricity		6			6
TE00BH14	Heat and Energy		6			6
TE00BH15	English for Engineers		3			3
TEKTT19S-1025	**Mechanics and Automation 1**					**15**
TE00BF61	Basics of Mechanics	5				5
TE00BF62	Basics of Automation	5				5
TE00BF63	Workshop	5				5
TEKTT19S-1026	**Mechanics and Automation 2**					**25**
TE00BM77	Mechanical Parts and Design	3				3
TE00BM78	Electric Motor Drives	7				7
TE00BG56	Mechanical Parts and Design	7				7
TE00BG57	Electric Motor Drives	3				3
TE00BG58	Project 1	2,5	2,5			5
TEKTT19S-1027	**Mechanics and Automation 3**					**15**
TE00BG59	Design and Modelling		7			7
TE00BG60	Pneumatics and Hydraulics		5			5
TE00BG61	Project 2.1		3			3
TEKTT19S-1028	**Mechanics and Automation 4**					**15**
TE00BG62	Mechanisation		8			8
TE00BG63	Robotics		5			5
TE00BG64	Project 2.2		2			2
TEKTT19S-1029	**Industrial Engineering and Management**					**15**
TE00BG67	Business and Marketing			5		5
TE00BG68	Management and Quality			5		5
TE00BG69	Operations Control			5		5
TEKTT19S-1038	**Materiaalit ja valmistustekniikat**					**15**

TE00BR88	Construction materials			5		5
TE00BR89	CAM/CAE			5		5
TE00BR90	Machining, welding and sheet metal technology			5		5
TEKTT19S-1030	**Application softwares and IoT**					**0**
TE00CF99	Softwares in industrial automation					0
TE00CG00	Industrial IoT					0
TE00CG01	Automation project					0
TEKTT19S-1031	**Automation 1**					**15**
TE00BM23	Control Systems		7			7
TE00BG60	Pneumatics and Hydraulics		5			5
TE00BG61	Project 2.1		3			3
TEKTT19S-1032	**Automation 2**					**15**
TE00BM24	Automation Systems		8			8
TE00BG63	Robotics		5			5
TE00BG64	Project 2.2		2			2
TEKTT19S-1033	**Plastic Materials**					**15**
TE00BH17	Basics of Plastics Engineering			5		5
TE00BH18	Structure and Strength of Plastics			5		5
TE00BH19	Properties and Testing of Plastics			5		5
TEKTT19S-1035	**Practical Training**					**30**
LA00BO03	Practical Training	2,5	2,5	2,5	2,5	10
LA00BO04	Practical Training 2	2,5	2,5	2,5	2,5	10
LA00BO05	Practical Training 3	2,5	2,5	2,5	2,5	10
TEKTT19S-1036	**Thesis**					**15**
LA00BN99	Thesis planning			2,5	2,5	5
LA00BO00	Thesis research and writing			2,5	2,5	5
LA00BO01	Thesis publication			2,5	2,5	5
TEKTT19S-1037	**COMPLEMENTARY COMPETENCE**					**60**

TEKTT19S-1019 CORE COMPETENCE: 180 ECTS

TEKTT19S-1020 Common Core Competence: 25 ECTS

LA00BE73 English for Work: 3 ECTS

Learning outcomes
The student is able to
- recognise the different sources and tools to help them improve their English skills
- gain confidence and manage in written and oral communication situations required in professional studies and in the work life
- describe their education and qualifications

- understand the terminology and concepts of their own field

LA00BE74 Swedish language, Oral Communication: 1 ECTS

Learning outcomes
The student is able to
- express and justify their opinions
- use the key terminology of their own field
- tell about their education, work experience and duties e.g. in job-seeking situations
- present a company of their own trade

LA00BE75 Swedish language¸ Written Communication: 2 ECTS

Learning outcomes
The student is able to
- use the key terminology of their own field
- tell about their education, work experience and duties e.g. in job-seeking situations
- write a job application
- obtain information related to their own field of studies in Swedish e.g. on the Internet
- use online dictionaries

LA00BE76 Professional communication: 4 ECTS

Learning outcomes
The student is able to
- plan and produce grammatically correct texts
- write an article or an essay that fulfils the criteria of a scientific text related to their own field of studies
- perform actively in professional group communication situations
- retrieve information from a variety of sources and evaluate it critically

LA00BE77 Developing professional competence 1: 2 ECTS

Learning outcomes
The student is able to
- plan their own learning and cooperate in situations related to their own field of studies
- recognize their own competence and the needs to develop them further and to plan their career path observing them
- act as a group member
- operate in the learning environments of Lahti UAS
- picture their own field of studies and its future skills
- give feedback on tuition and services and thus participate in the development of education

LA00BQ87 Developing professional competence 2: 2 ECTS

Learning outcomes
The student is able to

- utilize various learning opportunities in curriculum
- recognize and aim their own competences to be in level with the future career requirements
- create a study plan that supports the future career goal
- give feedback on tuition and services and thus participate in the development of education

LA00BQ88 Developing professional competence 3: 1 ECTS

Learning outcomes
The student is able to
- identify themselves as a learner and develop their own learning skills
- evaluate innovative or alternative future competences required in their own field
- recognize and aim their own competences to be in level with the future career requirements
- masters the professional concepts of their own field and is able to point out their competencies during job recruitment processes
- give feedback on tuition and services and thus participate in the development of education

LA00BE78 Research and Development: 5 ECTS

Learning outcomes
The student is able to
- obtain, utilise and assess R&D-related information and their sources critically
- follow the rules of ethical principles applied in all research activities
- use the most typical research and development methods of their own field
- write a scientific report and is familiar with the requirements for language and style and how to document the sources

LA00BE79 Anticipating Future Trends: 5 ECTS

Learning outcomes
The student is able to
- anticipate the changes in their own operational environment
- utilise the futures research materials produced by national and international societies in their own field of studies
- use the terminology and methods of futures research in the research and development of their own field

TEKTT19S-1021 Professional Core Competence: 155 ECTS

TEKTT19S-1022 Digitalisation: 10 ECTS

TE00BH08 Digitalisation of the Future: 3 ECTS

Learning outcomes
The student is able to
- describe the significance of digitalisation in the work life and its changes
- utilise digital data storages and social media in professional contexts
- utilise the field's new technologies, such as IoT, big data, GIS, robotics and AI

TE00BH09 Networks, Data Security and Cloud Services: 3 ECTS

Learning outcomes
The student is able to
- operate in digital environments in a responsible way, taking data security into account
- describe the basic structure and operation of the Internet
- describe the principles of IP addresses and sub-networking
- implement a secure data network (SOHO) and connect it to an operator network
- utilise cloud services in their own work

TE00BH10 Digital Tools: 4 ECTS

Learning outcomes
The student is able to
- make reports and analyses with the help of wordprocessing and spreadheet calculation software
- make a presentation of a practical project where they utilise elements of digital media
- carry out electronic publishing

TEKTT19S-1023 Mekaniikka: 10 ECTS

TE00BH11 Mathematical tools: 5 ECTS

Learning outcomes
The student
- has the basic mathematical skills needed in engineering
- is able to describe the mechanical phenomena behind the developments in technology
- can solve mechanical problems using mathematics

TE00BH12 Mechanical Applications: 5 ECTS

Learning outcomes
The student is able to
- apply mechanics in practice
- apply digitalisation in mechanical phenomena
- apply vector mathematics in mechanical phenomena

TEKTT19S-1024 Electricity, Heat and Energy: 15 ECTS

TE00BH13 Electricity: 6 ECTS

Learning outcomes
The student is able to
- describe the electrical phenomena behind developments in technology
- solve electricity-related problems using mathematics
- apply electrical phenomena in practice

- apply digitalisation in electricity-related phenomena

TE00BH14 Heat and Energy: 6 ECTS

Learning outcomes
The student is able to
- describe the significance of heat behind the development of technology
- solve heat- and energy-related problems using mathematics
- apply heat phenomena in practice

TE00BH15 English for Engineers: 3 ECTS

Learning outcomes
The students is able to
- use the terminology of their field and understand professional texts
- discuss topics related with their field
- communicate in job application situations
- present their own project orally and in writing
- write a professional report and a thesis abstract

TEKTT19S-1025 Mechanics and Automation 1: 15 ECTS

TE00BF61 Basics of Mechanics: 5 ECTS

Learning outcomes
The student is able to
- apply a design method in the design of a device
- model the mechanical parts of a simple device
- design the parts of the device that are under tensile or compression stress

TE00BF62 Basics of Automation: 5 ECTS

Learning outcomes
The student
- is able to make performance specifications and a functional diagram for a device
- is able to plan the electric control of an automated device
- is able to select sensors, electrical components and actuators suitable for the device
- has a basic knowledge of the structure of a control unit

TE00BF63 Workshop: 5 ECTS

Learning outcomes
The student
- is able to operate safely in the mechanical and electrical workshops
- knows the basics of machining and welding
- knows the basics of electrical engineering and electronics

- is able to carry out the practical tasks required by a project

TEKTT19S-1026 Mechanics and Automation 2: 25 ECTS

TE00BM77 Mechanical Parts and Design: 3 ECTS

Learning outcomes
The student is able to
- select and design mechanical parts according to standards
- model the mechanical parts of a device
- design parts under bending and torsional stress
- select suitable materials and mechnical components for a device

TE00BM78 Electric Motor Drives: 7 ECTS

Learning outcomes
The student
- is able to design and dimension a simple electric motor drive in positioning applications
- is able to plan and implement a simple motor control cabinet
- is able to apply the mathematics of linear movement in motor drive dimentioning
- can make the basic motor connections
- can choose the components of the electric motor drive

TE00BG56 Mechanical Parts and Design: 7 ECTS

Learning outcomes
The student is able to
- select and design mechanical parts according to standards
- model the mechanical parts of a device
- design parts under bending and torsional stress
- select suitable materials and mechnical components for a device

TE00BG57 Electric Motor Drives: 3 ECTS

Learning outcomes
The student
- is able to select and design an electric motor drive
- knows the basics of electrical and machine safety

TE00BG58 Project 1: 5 ECTS

Learning outcomes
The student is able to
- act in different roles in a project
- make a project plan
- design and build a mechanical device in a team

TEKTT19S-1027 Mechanics and Automation 3: 15 ECTS

TE00BG59 Design and Modelling: 7 ECTS

Learning outcomes
The student is able to
- design parts that are under different types of stress
- select materials and mechanical components that are suitable for the device
- model components and assemblies in 3D

TE00BG60 Pneumatics and Hydraulics: 5 ECTS

Learning outcomes
The student is able to
- design a pneumatic drive
- design a hydraulic drive

TE00BG61 Project 2.1: 3 ECTS

Learning outcomes
The student is able to
- design and build a manipulator
- plan the schedule and required resources for a project

TEKTT19S-1028 Mechanics and Automation 4: 15 ECTS

TE00BG62 Mechanisation: 8 ECTS

Learning outcomes
The student
- is able to design trusses, frames and machines
- understands the theory of 3D printing and is able to produce 3D prints
- is able to implement mechanisation units in machine automation
- is able to choose suitable tolerances and surface quality for mechanical parts

TE00BG63 Robotics: 5 ECTS

Learning outcomes
The student
- understands positioning techniques
- is able to describe the use and structure of industrial robots
- is able to simulate the functioning of robots
- is able to make simple programs for robots
- is able to test programs of robots in a real environment

TE00BG64 Project 2.2: 2 ECTS

Learning outcomes
The student is able to
- design and produce a device for handling parts
- allocate and plan resources for a project

TEKTT19S-1029 Industrial Engineering and Management: 15 ECTS

TE00BG67 Business and Marketing: 5 ECTS

Learning outcomes
The student
- is able to define and understand the customer's needs
- is able to apply and execute different kinds of marketing methods
- knows the basics of the money transactions of a company and their significance in business

TE00BG68 Management and Quality: 5 ECTS

Learning outcomes
The student
- is able to evaluate different management methods and what their importance is for the whole company
- knows the basic concepts of labour legislation
- is able to evaluate factors influencing job satisfaction and motivation

TE00BG69 Operations Control: 5 ECTS

Learning outcomes
The student is able to
- analyse and develop internal logistics
- analyse and develop the components of the supply chain

TEKTT19S-1038 Materiaalit ja valmistustekniikat: 15 ECTS

TE00BR88 Construction materials: 5 ECTS

Learning outcomes
Student is able to:
- use metals and metal alloys, aluminum, plastic and composites for making components
- modify the heat treatment and other properties of materials to suit different uses

TE00BR89 CAM/CAE: 5 ECTS

Learning outcomes

Student is able to:
- model 3D surfaces
- produce tool paths for a machining centre
- make NC code from a surface model file of a machined piece
- use the program to simulate different machining methods

TE00BR90 Machining, welding and sheet metal technology: 5 ECTS

Learning outcomes
The student is able to:
- use the basic methods of machining, welding and sheet metal technology
- compare how different manufacturing methods affect the quality and cost level

TEKTT19S-1030 Application softwares and IoT: 0 ECTS

Courses included in the study module
Compulsory courses in the module
Introduction to Programming
Operating Systems and Hardware
Embedded Systems

TE00CF99 Softwares in industrial automation: 5 ECTS

Learning outcomes
Student is able to
- plan and program control systems
- program softwares
- descripe database usage and report principals
- define database sources
- plan a reporting system

TE00CG00 Industrial IoT: 5 ECTS

Learning outcomes
Student is able to
- define IoT structure
- descripe IoT process in general
- compare IoT platforms
- define required mobile soft
- use IoT solutions in business

TE00CG01 Automation project: 5 ECTS

Learning outcomes
Student is able to
- create a project plan
- implement a advanced automation software

- report results

TEKTT19S-1031 Automation 1: 15 ECTS

TE00BM23 Control Systems: 7 ECTS

Learning outcomes
The student
- knows the basics of PLC programming (logical circuits, programming methods)
- knows the structure of modular PLC and can do the hardware configuration
- can plan and implement a basic positioning program with modular PLC
- can do the wiring of PLC
- can plan and program the basic interface in modular PLC
- knows the basics of the industrial databuses

TE00BG60 Pneumatics and Hydraulics: 5 ECTS

Learning outcomes
The student is able to
- design a pneumatic drive
- design a hydraulic drive

TE00BG61 Project 2.1: 3 ECTS

Learning outcomes
The student is able to
- design and build a manipulator
- plan the schedule and required resources for a project

TEKTT19S-1032 Automation 2: 15 ECTS

TE00BM24 Automation Systems: 8 ECTS

Learning outcomes
The student is able to
The student is able to
- use machine vision systems in product recognition
- make accurate position measurements with laser sensor technology
- read RFID-tags with PLC
- plan and implement automation system interface (PC)
- make a configuration of industrial databuses

TE00BG63 Robotics: 5 ECTS

Learning outcomes
The student

- understands positioning techniques
- is able to describe the use and structure of industrial robots
- is able to simulate the functioning of robots
- is able to make simple programs for robots
- is able to test programs of robots in a real environment

TE00BG64 Project 2.2: 2 ECTS

Learning outcomes
The student is able to
- design and produce a device for handling parts
- allocate and plan resources for a project

TEKTT19S-1033 Plastic Materials: 15 ECTS

TE00BH17 Basics of Plastics Engineering: 5 ECTS

Learning outcomes
The student is able to
- compare plastics based on their properties
- describe how the properties of plastics are dependent on time and temperature
- select materials for different end uses

TE00BH18 Structure and Strength of Plastics: 5 ECTS

Learning outcomes
The student
- knows the basics of designing components made of plastics and composites
- is able to design a plastic product that is under mechanical stress
- is able to describe fracture mechanisms in plastic components under stress
- is able to design composite products
- knows the stresses, stiffening and designing of injection-moulded components
- knows the databases dealing with the strength of composites

TE00BH19 Properties and Testing of Plastics: 5 ECTS

Learning outcomes
The student is able to
- identify the basic testing techniques used in polymer and fibre technology
- conduct tests on the properties of different materials and to write the relevant reports on those tests
- use the machines for processing plastics and fibres and the devices used to test polymer materials

TEKTT19S-1035 Practical Training: 30 ECTS

LA00BO03 Practical Training: 10 ECTS

Learning outcomes
The student is able to
- describe work-related phenomena and use related concepts
- act in a productive way, following the practices of the workplace and the ethical principles of the profession
- use the techniques, work methods, models and processes that they have learnt
- act in a customer-oriented way in interactive situations in the workplace and in the cooperation network
- evaluate and develop their own competence int the work done in practical training

LA00BO04 Practical Training 2: 10 ECTS

Learning outcomes
The student is able to
- describe work-related phenomena and use related concepts
- act in a productive way, following the practices of the workplace and the ethical principles of the profession
- use the techniques, work methods, models and processes that they have learnt
- act in a customer-oriented way in interactive situations in the workplace and in the cooperation network
- evaluate and develop their own competence int the work done in practical training

LA00BO05 Practical Training 3: 10 ECTS

Learning outcomes
The student is able to
- describe work-related phenomena and use related concepts
- act in a productive way, following the practices of the workplace and the ethical principles of the profession
- use the techniques, work methods, models and processes that they have learnt
- act in a customer-oriented way in interactive situations in the workplace and in the cooperation network
- evaluate and develop their own competence int the work done in practical training

TEKTT19S-1036 Thesis: 15 ECTS

LA00BN99 Thesis planning: 5 ECTS

Learning outcomes
The student is able to
- apply the acquired theoretical knowledge to the problems and phenomena of the working life
- solve problems, organise and perceive wholes
- work interactively, tenaciously and systematically
- work according to the practices of their own line of trade
- gather information and evaluate sources critically - report their work orally, in writing and visually

LA00BO00 Thesis research and writing: 5 ECTS

Learning outcomes
The student is able to
- apply the acquired theoretical knowledge to the problems and phenomena of the working life
- solve problems, organise and perceive wholes
- work interactively, tenaciously and systematically
- work according to the practices of their own line of trade
- gather information and evaluate sources critically - report their work orally, in writing and visually

LA00BO01 Thesis publication: 5 ECTS

Learning outcomes
The student is able to
- apply the acquired theoretical knowledge to the problems and phenomena of the working life
- solve problems, organise and perceive wholes
- work interactively, tenaciously and systematically
- work according to the practices of their own line of trade
- gather information and evaluate sources critically - report their work orally, in writing and visually

TEKTT19S-1037 COMPLEMENTARY COMPETENCE: 60 ECTS

Courses included in the study module
You can find Complementary Competence courses in a separate curriculum called "Complementary Competence Courses Taught in English, Bachelor's Degree, 17S-".
In addition, you can choose Professional Core Competence courses of other Bachelor's Degree Programmes as your Complementary Competence Courses.