31.05.2022

**Curriculum at LAB University of Applied Sciences**
**2022-2023**

# Bachelor of Engineering, Mechanical Engineering 22K, part-time studies, Lahti

| Code | Name | 1 y | 2 y | 3 y | 4 y | ECTS total |
|---|---|---|---|---|---|---|
| **KONE22KMLTI-1001** | **Common Studies** | | | | | **15** |
| AY00BU56 | Developing professional competence 1 | 1 | | | | 1 |
| AY00BU57 | Developing professional competence 2 | | 1 | | | 1 |
| AY00BU58 | Developing professional competence 3 | | | 1 | | 1 |
| A300CE13 | Orientation to Sustainability Thinking | 2 | | | | 2 |
| KE00BT61 | English for Work | 4 | | | | 4 |
| KR00BU42 | Swedish for Work, Spoken | | 1 | | | 1 |
| KR00BU43 | Swedish for Work, Written | | 1 | | | 1 |
| KS00BT59 | Expert Communication Skills | 4 | | | | 4 |
| **KONE22KMLTI-1002** | **Professional Core Competence** | | | | | **150** |
| **KONE22KMLTI-1003** | **Common Core Competence** | | | | | **150** |
| **KONE22KMLTI-1004** | **Basic studies in mathematics and physics** | | | | | **15** |
| AT00BT67 | Basic studies in mathematics | 3 | | | | 3 |
| AT00BT68 | Mathematics in Technology 1 | 3 | | | | 3 |
| AT00BT69 | Mathematics in Technology 2 | | 3 | | | 3 |
| AT00BT70 | Basic studies in physics | 3 | | | | 3 |
| AT00BU66 | Advanced studies in physics of mechanical engineering | 3 | | | | 3 |
| **KONE22KMLTI-1005** | **Basic studies in mechanical engineering** | | | | | **15** |
| AT00BV33 | Basics of Manufacturing Methods | 5 | | | | 5 |
| AT00BZ36 | Basics of mechanical engineering | 5 | | | | 5 |
| AT00BV34 | Digital Tools | 5 | | | | 5 |
| **KONE22KMLTI-1006** | **Basic studies in machinery** | | | | | **15** |
| AT00BV35 | Basics of Machine Drawing | 5 | | | | 5 |
| AT00BV37 | Material's Structure and Properties | 5 | | | | 5 |
| AT00BV38 | Pneumatics and Hydraulics | | 5 | | | 5 |
| **KONE22KMLTI-1007** | **Production technology** | | | | | **15** |
| AT00BV43 | Production Technology | | 3 | | | 3 |
| AT00BV44 | Welding and Metal Sheet Technology | | 3 | | | 3 |
| AT00BV45 | Machining | | 3 | | | 3 |
| AT00BX11 | Production Technology Project | | 3 | | | 3 |

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|---|---|---|---|---|---|---|
| AT00BX12 | Basics of Machine Elements | | 3 | | | 3 |
| **KONE22KMLTI-1008** | **Mechanical engineering** | | | | | **15** |
| AT00BW72 | Mechanics | | 5 | | | 5 |
| AT00BW73 | Statistics | | 5 | | | 5 |
| AT00BX13 | Strength of Materials | | 5 | | | 5 |
| **KONE22KMLTI-1009** | **Basics in automation** | | | | | **15** |
| AT00CN60 | Basics of Electrical Engineering | | | | | 0 |
| AT00CN61 | Basics in automation | | | | | 0 |
| AT00CT11 | Robotics | | 5 | | | 5 |
| **KONE22KMLTI-1010** | **Mechanical design** | | | | | **15** |
| AT00BX14 | Machine Drawing in Practice | | 5 | | | 5 |
| AT00BX15 | Mechanical Device and Product Design | | 5 | | | 5 |
| AT00BX16 | Simulations of Mechanical Engineering | | 5 | | | 5 |
| **KONE22KMLTI-1011** | **Business and production economy** | | | | | **15** |
| AT00BZ37 | Business and Marketing | | | 5 | | 5 |
| AT00BZ38 | Management and Quality | | | 5 | | 5 |
| AT00BZ39 | Operations Control | | | 5 | | 5 |
| **KONE22KMLTI-1023** | **Advanced studies in mechanical engineering** | | | | | **15** |
| AT00BX23 | Strength of Materials in practice | | | 5 | | 5 |
| AT00BX24 | Machine Dynamics | | | 5 | | 5 |
| AT00BX25 | Machine parts | | | 5 | | 5 |
| **KONE22KMLTI-1012** | **Programmable logics** | | | | | **15** |
| AT00BX17 | Basics of Programmable Logic | | | 5 | | 5 |
| AT00BX18 | Applications of Programmable Logic | | | 5 | | 5 |
| AT00BX19 | Operation Panels | | | 5 | | 5 |
| **KONE22KMLTI-1016** | **Complementary Competence** | | | | | **30** |
| **KONE22KMLTI-1017** | **Advanced studies in mechanical engineering** | | | | | **15** |
| AT00BX23 | Strength of Materials in practice | | | 5 | | 5 |
| AT00BX24 | Machine Dynamics | | | 5 | | 5 |
| AT00BX25 | Machine parts | | | 5 | | 5 |
| **KONE22KMLTI-1018** | **Advanced studies in machinery** | | | | | **15** |
| AT00BX26 | Mechanical Engineering Large Scale Project | | | | 5 | 5 |
| AT00BX27 | Steel Structures | | | | 5 | 5 |
| AT00BX28 | Mechanical Vibrations | | | | 5 | 5 |
| **KONE22KMLTI-1019** | **Mechanical engineering applications** | | | | | **15** |
| AT00BX29 | Finite Element Method | | | | 5 | 5 |
| AT00BX30 | Product Development and Innovations | | | | 5 | 5 |
| AT00BX31 | Virtual Design Project | | | | 5 | 5 |
| **KONE22KMLTI-1020** | **Diversed studies** | | | | | **30** |
| AT00CB83 | Project Learning in Enterprises | | | | 15 | 15 |

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|---|---|---|---|---|---|---|
| **KONE22KMLTI-1021** | **Practical Training** | | | | | **30** |
| HA00BU59 | Practical Training 1 | | 10 | | | 10 |
| HA00BU60 | Practical Training 2 | | | 10 | | 10 |
| HA00BU61 | Practical Training 3 | | | | 10 | 10 |
| **KONE22KMLTI-1022** | **Thesis** | | | | | **15** |
| AO00BU62 | Thesis Planning | | | | 5 | 5 |
| AO00BU63 | Thesis Project | | | | 5 | 5 |
| AO00BU64 | Thesis Report | | | | 5 | 5 |

## KONE22KMLTI-1001 Common Studies: 15 ECTS

## AY00BU56 Developing professional competence 1: 1 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 careerpath observing them
- act as a group member
- operate in the learning environments of LAB University of Applied Sciences
- picture their own field of studies and its future skills- give feedback on tuition and services and thus participate in the development of education

## AY00BU57 Developing professional competence 2: 1 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

## AY00BU58 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 competenciesduring job recruitment processes
- give feedback on tuition and services and thus participate in the development of education

## A300CE13 Orientation to Sustainability Thinking: 2 ECTS

**Learning outcomes**
Identify and define central concepts and frameworks related to sustainability. Recognize the interconnectedness of economic, social and environmental sustainability issues. Understand and develop own individual role in driving sustainability.

**Evaluation criterias**
**Level 1**

Pass-Fail

## KE00BT61 English for Work: 4 ECTS

**Learning outcomes**
Proficiency level: B2

The student is able to
- communicate clearly and effectively in different generic and field-specific workplace situations both orally and in writing
- find, evaluate and use information effectively
- function collaboratively in international working environments.

## KR00BU42 Swedish for Work, Spoken: 1 ECTS

**Learning outcomes**
The student is able to
- convey and validate arguments
- use vital field-specific vocabulary
- communicate essential matters about their education, work experience and tasks
- present their field-specific operational environment
- communicate in various working life situations in Swedish.

The student completes the Public Administration Language Test in Swedish.

## KR00BU43 Swedish for Work, Written: 1 ECTS

**Learning outcomes**
The student is able to
- use vital field-specific vocabulary
- communicate essential matters about their education, work experience and tasks
- understand and produce various short texts related to studies and working life
- acquire information on their field in Swedish
-use online dictionaries.

The student completes the Public Administration Language Test in Swedish.

## KS00BT59 Expert Communication Skills: 4 ECTS

**Learning outcomes**
Proficiency level: C2

The student masters Finnish language as a mother tongue in all professional spoken and written communication situations.

## KONE22KMLTI-1002 Professional Core Competence: 150 ECTS

## KONE22KMLTI-1003 Common Core Competence: 150 ECTS

## KONE22KMLTI-1004 Basic studies in mathematics and physics: 15 ECTS

## AT00BT67 Basic studies in mathematics: 3 ECTS

**Learning outcomes**
Student is able to
- calculate and simulate mathematical expressions
- solve geometric and trigonometric problems

## AT00BT68 Mathematics in Technology 1: 3 ECTS

**Learning outcomes**
Student is able to:
- regognise different polynomial equations and polynomial graph
- solve inequalities
- solve simultaneous equations with the software
- solve basic space vectors
- utilise space vectors
- solve exponential and logarithm functions

## AT00BT69 Mathematics in Technology 2: 3 ECTS

**Learning outcomes**
Student is able to
- solve challenging functions
- solve basic derivation functions and utilise derivation in practice
- solve integrated polynomial functions and utilise integration in practice
- solve trigonometrical problems

## AT00BT70 Basic studies in physics: 3 ECTS

**Learning outcomes**
Student is able to
- understand the purpose of the physics in technology
- describe and utilize the SI-unit system and implement
- solve mathematical problems in kinematics, mechanics and thermodynamics
- utilize vectors

## AT00BU66 Advanced studies in physics of mechanical engineering: 3 ECTS

**Learning outcomes**
The student is able to
- solve mathematical tasks in heat transfer
- solve mathematical tasks in wave motion
- carry out and report physical measurements

## KONE22KMLTI-1005 Basic studies in mechanical engineering: 15 ECTS

## AT00BV33 Basics of Manufacturing Methods: 5 ECTS

**Learning outcomes**
Student is able to
- apply different manufacturing methods for different materials
- recognise common manufacturing methods

## AT00BZ36 Basics of mechanical engineering: 5 ECTS

**Learning outcomes**
Student is able to
- work safely in engineering environment
- regognize basic components and standard parts
- use basic tools

## AT00BV34 Digital Tools: 5 ECTS

**Learning outcomes**
Student is able to
- work in a virtual learning environment
- make reports and analyses with the help of wordprocessing and spreadheet calculation software
- use correct cloud environment individually and in a group
- carry out digital project presentation

## KONE22KMLTI-1006 Basic studies in machinery: 15 ECTS

## AT00BV35 Basics of Machine Drawing: 5 ECTS

**Learning outcomes**
Student is able to
- carry out standard drawings
- apply tolerances
- use correct drawing symbols
- apply matching software

## AT00BV37 Material's Structure and Properties: 5 ECTS

**Learning outcomes**
The student knows
- the structure of the material and its effect on the properties
- different methods of modifying properties
- various models for predicting behavior of materials

## AT00BV38 Pneumatics and Hydraulics: 5 ECTS

**Learning outcomes**
Student is able to
- use basic components in pneumatics and hydraulics
- design pneumatic application
- design hydraulic application

## KONE22KMLTI-1007 Production technology: 15 ECTS

## AT00BV43 Production Technology: 3 ECTS

**Learning outcomes**
Student is able to
- regognize the basics of different production types
- design simple production line mechanically

## AT00BV44 Welding and Metal Sheet Technology: 3 ECTS

**Learning outcomes**
Student is able to
- regognize basics in welding and sheet metal work
- control welding and sheet metal manufacturing quality
- use welding and sheet metal work in practice

## AT00BV45 Machining: 3 ECTS

**Learning outcomes**
Student is able to
- regognize basics in machining
- use NC programming in machining

## AT00BX11 Production Technology Project: 3 ECTS

**Learning outcomes**
Student is able to
- use maching, welding and sheet plate engineering in practice

## AT00BX12 Basics of Machine Elements: 3 ECTS

**Learning outcomes**
Student is able to
- regognize most common machine parts
- design machine part joints

## KONE22KMLTI-1008 Mechanical engineering: 15 ECTS

## AT00BW72 Mechanics: 5 ECTS

**Learning outcomes**
Student is able to
- regognize principles of basic mechanics
- calculate simple tasks of mechanical structures

## AT00BW73 Statistics: 5 ECTS

**Learning outcomes**
Student is able to
- define static structure
- calculate structure measurements
- calculate different forces

## AT00BX13 Strength of Materials: 5 ECTS

**Learning outcomes**
Student is able to
- calculate shear stresses
- calculate torsion and bending stresses
- calculate stresses under deformation

## KONE22KMLTI-1009 Basics in automation: 15 ECTS

## AT00CN60 Basics of Electrical Engineering: 5 ECTS

**Learning outcomes**
Student is able to
- basics of direct current
- basics of alternating current
- basics of combination logic

## AT00CN61 Basics of Automation: 5 ECTS

**Learning outcomes**

Student is able to
- describe basic automation process
- design simple electrical device
- choose sensors
- design basic electrical motor

## AT00CT11 Robotics: 5 ECTS

**Learning outcomes**
Student is able to
- understand the impact of robotics for society
- recognize the basics of service robotics
- describe basic operations of robotic process automation
- describe basics of industrial robotics
- understand possibilities of collaboration robotics
- describe basic utilizations of AI in robotics

## KONE22KMLTI-1010 Mechanical design: 15 ECTS

## AT00BX14 Machine Drawing in Practice: 5 ECTS

**Learning outcomes**
Student is able to
- regognize geometric tolerances in designing
- use required marking and notes in documents
- produce finished documents for production with selected software

## AT00BX15 Mechanical Device and Product Design: 5 ECTS

**Learning outcomes**
Student is able to
- carry design project
- calculate cost effects in design
- relate different design areas with a selected software
- use PDM system

## AT00BX16 Simulations of Mechanical Engineering: 5 ECTS

**Learning outcomes**
Student is able to
- choose different simulation softwares
- regognize the basics of simulation
- simulate simple applications

## KONE22KMLTI-1011 Business and production economy: 15 ECTS

## AT00BZ37 Business and Marketing: 5 ECTS

**Learning outcomes**
Student is able to
- regognize a meaning of cash flow in business
- define customer based products and services
- regognize the influence of different development work in cash flow

## AT00BZ38 Management and Quality: 5 ECTS

**Learning outcomes**
The student
- understands the agreements and regulations related to the running of a business
- evaluate various management methods and their significance
- understands the importance of quality

## AT00BZ39 Operations Control: 5 ECTS

**Learning outcomes**
Student is able to
- define most important development issues in business
- evaluate and develop internal logistics
- evaluate and develop issues in delivery chain

## KONE22KMLTI-1023 Advanced studies in mechanical engineering: 15 ECTS

## AT00BX23 Strength of Materials in practice: 5 ECTS

**Learning outcomes**
Student is able to
- regognize fatique strength in dimensioning
- regognize buckling in calculations
- calculate hyperstatic structures

## AT00BX24 Machine Dynamics: 5 ECTS

**Learning outcomes**
Student is able to
- calculate horisontal forces
- calculate rotate forces
- calculate angular momentum

## AT00BX25 Machine parts: 5 ECTS

**Learning outcomes**
Student is able to

- use machine parts widely in design
- calculate measurements of pressure vessels and pipelines

## KONE22KMLTI-1012 Programmable logics: 15 ECTS

## AT00BX17 Basics of Programmable Logic: 5 ECTS

**Learning outcomes**
Student is able to
- regognize basic constructure of the logic program
- use TIA-portal
- use basic commands
- use data in programming
- carry out logic sequences using LD

## AT00BX18 Applications of Programmable Logic: 5 ECTS

**Learning outcomes**
Student is able to
- descripe principal structures of sensors and inverter in programmable logics
- design linearic drive
- design product control system in programmable logics
- design material handling logic control with TIA-portal

## AT00BX19 Operation Panels: 5 ECTS

**Learning outcomes**
Student is able to
- connect operation panel with programmable logic in TIA-portal
- design basic interface
- design optimal operation panel software
- use operation panel in production line control
- design compact data collection system in programmable logic

## KONE22KMLTI-1016 Complementary Competence: 30 ECTS

## KONE22KMLTI-1017 Advanced studies in mechanical engineering: 15 ECTS

## AT00BX23 Strength of Materials in practice: 5 ECTS

**Learning outcomes**
Student is able to
- regognize fatique strength in dimensioning
- regognize buckling in calculations
- calculate hyperstatic structures

## AT00BX24 Machine Dynamics: 5 ECTS

**Learning outcomes**
Student is able to
- calculate horisontal forces
- calculate rotate forces
- calculate angular momentum

## AT00BX25 Machine parts: 5 ECTS

**Learning outcomes**
Student is able to
- use machine parts widely in design
- calculate measurements of pressure vessels and pipelines

## KONE22KMLTI-1018 Advanced studies in machinery: 15 ECTS

## AT00BX26 Mechanical Engineering Large Scale Project: 5 ECTS

**Learning outcomes**
Student is able to
- relate different details of engineering in a project
- carry out practical tasks in mechanical engineering
- carry out documentation
- work different roles in a project

## AT00BX27 Steel Structures: 5 ECTS

**Learning outcomes**
Student is able to
- design demanding steel constructions
- use steel construction norms in designing
- produce documents with chosen application

## AT00BX28 Mechanical Vibrations: 5 ECTS

**Learning outcomes**
Student is able to
- regognize basic details of vibrations in machine design

## KONE22KMLTI-1019 Mechanical engineering applications: 15 ECTS

## AT00BX29 Finite Element Method: 5 ECTS

**Learning outcomes**

Student is able to
- regognize basic prinsiples of machine elements
- use chosen application softaware in element design and matrix calculations

## AT00BX30 Product Development and Innovations: 5 ECTS

**Learning outcomes**
Student is able to
- use product development methods in design
- use creative ideas in product development
- regognize IPR rights in designing

## AT00BX31 Virtual Design Project: 5 ECTS

**Learning outcomes**
Student is able to
- use simulation programs
- understand the possibilities of simulation softwares
- design and analyze moving structure

## KONE22KMLTI-1020 Diversed studies: 30 ECTS

## AT00CB83 Project Learning in Enterprises: 15 ECTS

**Learning outcomes**
Student is able to
- use professional competencies in expert and supervising duties
- document and report personal professional development

## KONE22KMLTI-1021 Practical Training: 30 ECTS

## HA00BU59 Practical Training 1: 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

## HA00BU60 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

## HA00BU61 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

## KONE22KMLTI-1022 Thesis: 15 ECTS

## AO00BU62 Thesis Planning: 5 ECTS

**Learning outcomes**
The student is able to:
- describe the objectives and core contents of their thesis
- plan and describe the stages of the thesis process
- take into account the possible research permit and copyright issues

## AO00BU63 Thesis Project: 5 ECTS

**Learning outcomes**
The student is able to:
- implement the thesis on the basis of an approved thesis plan.

## AO00BU64 Thesis Report: 5 ECTS

**Learning outcomes**
The student is able to:
- present the results or output of their thesis
- report on their thesis in writing in accordance with the thesis guidelines of LAB University of Applied Sciences
- write a maturity test.