08.02.2022

Curriculum at LAB University of Applied Sciences
2021-2022

Bachelor of Engineering, Mechanical Engineering 21S, full-time studies, Lappeenranta

Code	Name	1 y	2 y	3 y	4 y	ECTS total
KONE21SLPR-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
KONE21SLPR-1002	**Professional Core Competence**					**150**
KONE21SLPR-1003	**Common Core Competence**					**120**
KONE21SLPR-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
KONE21SLPR-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
KONE21SLPR-1006	**Basic studies in machinery**					**15**
AT00BV35	Basics of Machine Drawing	5				5
AT00BV36	Maintenance technology	5				5
AT00BV37	Material's Structure and Properties	5				5
KONE21SLPR-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
AT00BX12	Basics of Machine Elements		3			3

KONE21SLPR-1008	**Mechanical engineering**					**15**
AT00BW72	Mechanics		5			5
AT00BW73	Statistics		5			5
AT00BX13	Strength of Materials		5			5
KONE21SLPR-1009	**Basics in automation**					**15**
AT00BV38	Pneumatics and Hydraulics		5			5
AT00BV39	Basics of Electrical planning		5			5
AT00BV40	Robotics			5		5
KONE21SLPR-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
KONE21SLPR-1011	**Advanced studies in mechanical engineering**					**15**
AT00BX23	Strength of Materials in practice			5		5
AT00BX24	Machine Dynamics			5		5
AT00BX25	Machine parts			5		5
KONE21SLPR-1012	**Complementary Common Core Competence**					**30**
KONE21SLPR-1013	**Advanced studies in machinery**					**15**
AT00BX29	Finite Element Method				5	5
AT00BX30	Product Development and Innovations				5	5
AT00BX31	Virtual Design Project				5	5
KONE21SLPR-1014	**Advanced studies in machinery**					**15**
AT00BX26	Mechanical Engineering Large Scale Project			5		5
AT00BX27	Steel Structures			5		5
AT00BX28	Mechanical Vibrations			5		5
KONE21SLPR-1015	**Business and production economy**					**15**
AT00BZ37	Business and Marketing			5		5
AT00BZ38	Management and Quality			5		5
AT00BZ39	Operations Control			5		5
KONE21SLPR-1016	**Programmable logics**					**15**
AT00BX17	Basics of Programmable Logic				5	5
AT00BX18	Applications of Programmable Logic				5	5
AT00BX19	Operation Panels				5	5
KONE21SLPR-1017	**Complementary Competence**					**30**
KONE21SLPR-1018	**Business and production economy**					**15**
AT00BZ37	Business and Marketing			5		5
AT00BZ38	Management and Quality			5		5
AT00BZ39	Operations Control			5		5
KONE21SLPR-1019	**Programmable logics**					**15**
AT00BX17	Basics of Programmable Logic			5		5

AT00BX18	Applications of Programmable Logic			5		5
AT00BX19	Operation Panels			5		5
KONE21SLPR-1020	**PC programming**					**15**
AT00BX20	PC-logics				5	5
AT00BX21	User interface and controls				5	5
AT00BX22	Automation Project				5	5
KONE21SLPR-1021	**Diversed studies**					**30**
AT00CB83	Project Learning in Enterprises			15		15
KONE21SLPR-1022	**Practical Training**					**30**
HA00CD55	Practical Training					0
HA00BU60	Practical Training 2			10		10
HA00BU61	Practical Training 3				10	10
KONE21SLPR-1023	**Thesis**					**15**
AO00BU62	Thesis Planning				5	5
AO00BU63	Thesis Project				5	5
AO00BU64	Thesis Report				5	5

KONE21SLPR-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.

KONE21SLPR-1002 Professional Core Competence: 150 ECTS

KONE21SLPR-1003 Common Core Competence: 120 ECTS

KONE21SLPR-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
Student is able to
- solve mathematical tasks in heat transfer
- solve mathematical tasks in wave motion
- carry out and report physical measurements

KONE21SLPR-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

KONE21SLPR-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

AT00BV36 Maintenance technology: 5 ECTS

Learning outcomes
Student master
- principles and use of maintenance tools
- systematic use of maintenance methods
- various failure mechanisms and their prevention

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

KONE21SLPR-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

KONE21SLPR-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

KONE21SLPR-1009 Basics in automation: 15 ECTS

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

AT00BV39 Basics of Electrical planning: 5 ECTS

Learning outcomes
Student is able to
- recognize basic process of the automation planning
- plan simple electrical device
- define basic sensors
- define electrical motor

AT00BV40 Robotics: 5 ECTS

Learning outcomes
Student is able to
- regognize different types of robots
- program robots in basic level
- build up simple robotic cell

KONE21SLPR-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

KONE21SLPR-1011 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

KONE21SLPR-1012 Complementary Common Core Competence: 30 ECTS

KONE21SLPR-1013 Advanced studies in machinery: 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

KONE21SLPR-1014 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

KONE21SLPR-1015 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

KONE21SLPR-1016 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 frequency controls 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

KONE21SLPR-1017 Complementary Competence: 30 ECTS

KONE21SLPR-1018 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

KONE21SLPR-1019 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 frequency controls 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

KONE21SLPR-1020 PC programming: 15 ECTS

AT00BX20 PC-logics: 5 ECTS

Learning outcomes
Student is able to
- descripe differences between PC and PLC controls
- use PC-control fieldbus
- use PC-control software
- program PC-controls

AT00BX21 User interface and controls: 5 ECTS

Learning outcomes
Student is able to
- regognize the basics of user interface
- program alarms
- transfer user interface for PC control
- animate production lines
- create a control system for simple production line

AT00BX22 Automation Project: 5 ECTS

Learning outcomes
Student is able to
- carry out automation system for production line
- carry out fieldbus and PC-control
- carry out control panel

KONE21SLPR-1021 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

KONE21SLPR-1022 Practical Training: 30 ECTS

HA00CD55 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

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

KONE21SLPR-1023 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.