11.11.2022

Curriculum at LAB University of Applied Sciences
2022-2023

Bachelor of Engineering, Mechanical Engineering 22S, full-time studies, Lahti

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TLTIKONE22S-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
TLTIKONE22S-1002	**Professional Core Competence**					**120**
TLTIKONE22S-1003	**Common Core Competence**					**120**
TLTIKONE22S-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
TLTIKONE22S-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
TLTIKONE22S-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
TLTIKONE22S-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
TLTIKONE22S-1008	**Mechanical engineering**					**15**
AT00BW72	Mechanics		5			5
AT00BW73	Statistics		5			5
AT00BX13	Strength of Materials		5			5
TLTIKONE22S-1009	**Basics in automation**					**15**
AT00CU99	Basics of Electrical Engineering	5				5
AT00CN61	Basics in automation	5				5
AT00CT11	Robotics		5			5
TLTIKONE22S-1010	**Mechanical design**					**15**
AT00BX14	Machine Drawing in Practice	5				5
AT00BX15	Mechanical Device and Product Design		5			5
AT00CR29	Machine Design Project		5			5
TLTIKONE22S-1011	**Programmable logics**					**15**
AT00BX17	Basics of Programmable Logic		5			5
AT00BX18	Applications of Programmable Logic		5			5
AT00BX19	Operation Panels		5			5
TLTIKONE22S-1012	**Complementary Competence**					**60**
TLTIKONE22S-1013	**Business and production economy**					**15**
AT00BZ37	Business and Marketing			5		5
AT00BZ38	Management and Quality			5		5
AT00BZ39	Operations Control			5		5
TLTIKONE22S-1014	**Advanced studies in mechanical engineering**					**15**
AT00BX23	Strength of Materials in practice			5		5
AT00BX24	Machine Dynamics			5		5
AT00BX25	Machine parts			5		5
TLTIKONE22S-1015	**Advanced studies in machinery**					**15**
AT00BX26	Mechanical Engineering Large Scale Project				5	5
AT00BX27	Steel Structures				5	5
AT00BX28	Mechanical Vibrations				5	5
TLTIKONE22S-1016	**Mechanical engineering applications**					**15**
AT00BX29	Finite Element Method				5	5
AT00BX30	Product Development and Innovations				5	5
AT00BX31	Virtual Design Project				5	5
TLTIKONE22S-1017	**PC programming**					**15**
AT00BX20	PC-logics			5		5
AT00BX21	User interface and controls			5		5
AT00BX22	Automation Project			5		5
TLTIKONE22S-1019	**Robotics**					**15**
AT00CG92	Advanced Robotics			5		5

AT00CG93	Production Robotics			5		5
AT00CG94	Robotics Project				5	5
TLTIKONE22S-1020	**Production simulation**					**15**
AT00CG95	Production Simulation			5		5
AT00CG96	Automation of Production Cells			5		5
AT00CS53	Digital Twin principles in different sectors			5		5
TLTIKONE22S-1021	**Smart production**					**15**
AT00CG68	IoT principles in different sectors		5			5
AT00CG99	Industrial programming			5		5
AT00CH00	Project			5		5
TLTIKONE22S-1022	**Individual learning path**					**15**
AT00CB83	Project Learning in Enterprises					0
TLTIKONE22S-1023	**Practical Training**					**30**
HA00CD55	Practical Training		10			10
HA00BU60	Practical Training 2			10		10
HA00BU61	Practical Training 3				10	10
TLTIKONE22S-1024	**Thesis**					**15**
AO00BU62	Thesis Planning				5	5
AO00BU63	Thesis Project				5	5
AO00BU64	Thesis Report				5	5

TLTIKONE22S-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.

TLTIKONE22S-1002 Professional Core Competence: 120 ECTS

TLTIKONE22S-1003 Common Core Competence: 120 ECTS

TLTIKONE22S-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

TLTIKONE22S-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

TLTIKONE22S-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

TLTIKONE22S-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

TLTIKONE22S-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

TLTIKONE22S-1009 Basics in automation: 15 ECTS

AT00CU99 Basics of Electrical Engineering: 5 ECTS

Learning outcomes
The student is able to
- recognize the fundamental electrical quantities and their interrelations
- solve simple DC and AC circuits
- explain the principle of a three-phase system and three-phase power
- describe the most common applications of electrical engineering

AT00CN61 Basics of Automation: 5 ECTS

Learning outcomes
Student is able to
- descripe 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

TLTIKONE22S-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

AT00CR29 Machine Design Project: 5 ECTS

Learning outcomes
Student is able to
- plan and deliver machine design project
- deliver machine design project based on initial data
- work as a member in a project team

TLTIKONE22S-1011 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

TLTIKONE22S-1012 Complementary Competence: 60 ECTS

TLTIKONE22S-1013 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

TLTIKONE22S-1014 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

TLTIKONE22S-1015 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

TLTIKONE22S-1016 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

TLTIKONE22S-1017 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

TLTIKONE22S-1019 Robotics: 15 ECTS

AT00CG92 Advanced Robotics: 5 ECTS

Learning outcomes
Student is able to
- use robotics in different applications

AT00CG93 Production Robotics: 5 ECTS

Learning outcomes
Student is able to
- design and build robot cell
- regognize a robot as a part of the production line

AT00CG94 Robotics Project: 5 ECTS

Learning outcomes
Student is able to
- program robot application

TLTIKONE22S-1020 Production simulation: 15 ECTS

AT00CG95 Production Simulation: 5 ECTS

Learning outcomes
Student is able to
- simulate a machine
- simulate a production line

AT00CG96 Automation of Production Cells: 5 ECTS

Learning outcomes
The student is able to
- simulate the operation of a manufacturing cell
- select automation components for a manufacturing cell
- apply bus technology in the data transfer of automation systems

AT00CS53 Digital Twin principles in different sectors: 5 ECTS

Learning outcomes
Student is able to
- descripe a structure of the Digital Twin-system
- create overall view of Digital Twin technology possibilities
- compare simulation and Digital Twin technologies
- describe requirements for Digital Twin application
- use Digital Twin in business

TLTIKONE22S-1021 Smart production: 15 ECTS

AT00CG68 IoT principles in different sectors: 5 ECTS

Learning outcomes

Student is able to
- describe a structure of the IoT-system
- knowledge basics of sensors and data collection in IoT systems
- compare IoT cloud environments
- describe requirements for IoT mobile software
- use IoT in business

AT00CG99 Industrial programming: 5 ECTS

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

AT00CH00 Project: 5 ECTS

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

TLTIKONE22S-1022 Individual learning path: 15 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

TLTIKONE22S-1023 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

TLTIKONE22S-1024 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.