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
MEC21SLPR-1001	**Core Competences**					**15**
AY00CE71	Developing Professional Competences 1	3				3
AY00CE72	Developing Professional Competences 2		1			1
AY00CE73	Developing Professional Competences 3			1		1
A300CJ89	Orientation to Sustainability Thinking	2				2
KE00CE74	Intercultural Awareness	3				3
KE00CE75	English for Professional Communication	5				5
MEC21SLPR-1002	**Professional Core Competences**					**135**
MEC21SLPR-1007	**Transferable competences**					**6**
KS00BT59	Expert Communication Skills	4				4
K200CE69	Finnish 1	3				3
K200CE70	Finnish 2	3				3
KR00BU42	Swedish for work, spoken	1				1
KR00BU43	Swedish for work, written	1				1
MEC21SLPR-1006	**Basics of mathematics and physics**					**15**
AT00CH47	Basic studies in mathematics	3				3
AT00CH48	Mathematics in Technology 1	3				3
AT00CH49	Mathematics in Technology 2	3				3
AT00CH50	Basic studies in physics	3				3
AT00CH71	Advanced studies in physics of mechanical engineering		3			3
MEC21SLPR-1012	**Engineering studies**					**114**
AT00CH51	Basics of Mechanical Engineering	15				15
AT00CH52	Design and Manufacturing Project 1	12				12
AT00CH53	Design and Manufacturing		20			20
AT00CH54	Design and Manufacturing Project 2		10			10
AT00CH55	Basics of Automation		15			15
AT00CH56	Automation Project		15			15
AT00CH73	Machine Design & Elements			15		15
AT00CH76	Design and Manufacturing Project 3			12		12
MEC21SLPR-1003	**Complementary Competences**					**45**
AT00CH75	Robotics			15		15

AT00CH74	Programmable Logics and Operation Panels				15	15
AT00CH72	Project in Company Co-Operation					0
MEC21SLPR-1009 Exchange Studies						**0**
MEC21SLPR-1010 LUT University Studies						**0**
MEC21SLPR-1011 Studies IIT / SSE Program						**0**
MEC21SLPR-1004 Practical Training						**30**
HA00CE82	Practical Training					0
HA00CE83	Practical Training 2					0
HA00CE84	Practical Training 3					0
MEC21SLPR-1005 Thesis						**15**
AO00CE85	Thesis planning					0
AO00CE86	Thesis research and writing					0
AO00CE87	Thesis publication					0

MEC21SLPR-1001 Core Competences: 15 ECTS

AY00CE71 Developing Professional Competences 1: 3 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 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

AY00CE72 Developing Professional Competences 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

AY00CE73 Developing Professional Competences 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

A300CJ89 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

KE00CE74 Intercultural Awareness: 3 ECTS

Learning outcomes
Students are able to
-understand cultural similarities and differences
-work effectively with international partners
-analyze business and work life cultures including Finland using different cultural frameworks
-understand culture adaptation and adjustment.

KE00CE75 English for Professional Communication: 5 ECTS

Learning outcomes
A student is able to
- identify the characteristics of academic texts and to apply academic conventions to their writing
- demonstrate critical thinking and find, evaluate and use information effectively
- communicate clearly and effectively in different generic and field-specific workplace situations both orally and in writing
- function collaboratively in contemporary working environments in English.

MEC21SLPR-1002 Professional Core Competences: 135 ECTS

MEC21SLPR-1007 Transferable competences: 6 ECTS

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.

K200CE69 Finnish 1: 3 ECTS

Learning outcomes
The student is able to
- identify and use the course vocabulary and phrases for common everyday situations
- tell about oneself and understand basic questions
- read and write simple sentences related to the course topics.

K200CE70 Finnish 2: 3 ECTS

Learning outcomes
The student is able to
- communicate in most common everyday situations
- understand slowly and clearly spoken Finnish when the topic and the vocabulary are familiar
- understand and write a simple message or text
- use the basic vocabulary and some grammatical structures of Finnish.

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.

MEC21SLPR-1006 Basics of mathematics and physics: 15 ECTS

AT00CH47 Basic studies in mathematics: 3 ECTS

Learning outcomes
Student is able to

- calculate and simulate mathematical expressions
- solve geometric and trigonometric problems

AT00CH48 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

AT00CH49 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

AT00CH50 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

AT00CH71 Advanced studies in physics of mechanical engineering: 3 ECTS

MEC21SLPR-1012 Engineering studies: 114 ECTS

AT00CH51 Basics of Mechanical Engineering: 15 ECTS

Learning outcomes
The student
- understands the importance of the systematic product development process (including sustainability).
- recognizes the most common basic mechanical standard parts.
- understands the basic rules of technical drawing.
- understands the basic concepts of mechanics.
- knows the most common materials and manufacturing methods.

AT00CH52 Design and Manufacturing Project 1: 12 ECTS

Learning outcomes
The student
- is able to read and produce technical drawings.
- understands the main principles of 3D-modelling.
- Is able to use basic concepts related to mechanics of materials in the structural design process.
- knows some advanced manufacturing methods and modern materials.
- Is able to build scale model prototypes

AT00CH53 Design and Manufacturing: 20 ECTS

Learning outcomes
The student
- understands the meaning of tolerances and fits in mechanical engineering.
- knows the basic rules of designing products for manufacturing.
- is able to apply statics and mechanics of materials in the design and analysis of shafts, beams and columns.
- understands the role of dynamics and vibrations in mechanical engineering.
- Is able to use simulation software (FEM, Working Model)

AT00CH54 Design and Manufacturing Project 2: 10 ECTS

Learning outcomes
The student
- is able to apply more profoundly the acquired theoretical knowledge to real work life projects.
- understands the role of technical documentation and is also able to create documents according to standards.
- is able to design a load-carrying structure (including manufacturing), e.g. a Jib Crane.

AT00CH55 Basics of Automation: 15 ECTS

Learning outcomes
The student
- knows the main application areas of automation and understands the overview of the industry.
- is able to name different components of hydraulic and pneumatic systems.
- is able to make and connect hydraulic and pneumatic connections and design hydraulic and pneumatic circuits.
- is able to build and simulate a simple PLC based automation system.
- know the differences between automation solutions in different application areas of automation (especially process and piece goods automation) and the structures and main functions of automation systems.

AT00CH56 Automation Project: 15 ECTS

Learning outcomes
The student

- is able to apply more deeply acquired theoretical knowledge in real working life projects.
- understands the role of technical documentation and is also able to create documents according to standards.
- is able to design a PLC-based automation system, simulate its operation and select suitable components for the system.

AT00CH73 Machine Design & Elements: 15 ECTS

Learning outcomes
The student
- understands the basic principles and the main process of Finite Element Method (FEM).
- understands the function and the use of the most important machine elements.
- is able to carry out fundamental technical calculations related to machine elements.
- understands the importance of vibrations in machines and fatigue as a primary possible failure mode for a machine element.

AT00CH76 Design and Manufacturing Project 3: 12 ECTS

Learning outcomes
The student
- understands the holistic nature of a machine design project.
- is able to figure out and put into practice all the relevant information and knowledge needed to conduct a design project (e.g. a scissor lift).
- is able to use simulation software (e.g. FEM) when designing a load-carrying machine element or a whole structure.
- is able to produce a written report of a design project (including technical drawings, technical calculations and a manufacturing plan)

MEC21SLPR-1003 Complementary Competences: 45 ECTS

AT00CH75 Robotics: 15 ECTS

Learning outcomes
The student is able to
- different robot structures and their applications
- basics of robot programming
- build a simple robot cell

AT00CH74 Programmable Logics and Operation Panels: 15 ECTS

Learning outcomes
The student is able to
- connect the operator panel with programmable logic in the TIA Portal.
- basics of graphical user interface design.
- implements an optimal control panel application in terms of usability and ergonomics.
- perform manual operation of the production line via the control panel.
- make small-scale data collection based on sensor data in programmable logic and make trends

based on data collection.

AT00CH72 Project in Company Co-Operation: 15 ECTS

MEC21SLPR-1009 Exchange Studies: 0 ECTS

MEC21SLPR-1010 LUT University Studies: 0 ECTS

MEC21SLPR-1011 Studies IIT / SSE Program: 0 ECTS

MEC21SLPR-1004 Practical Training: 30 ECTS

HA00CE82 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

HA00CE83 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

HA00CE84 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

MEC21SLPR-1005 Thesis: 15 ECTS

AO00CE85 Thesis planning: 5 ECTS

Learning outcomes
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.

AO00CE86 Thesis research and writing: 5 ECTS

Learning outcomes
Student is able to
- implement the thesis on the basis of an approved thesis plan.

AO00CE87 Thesis publication: 5 ECTS

Learning outcomes
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.