

Curriculum at LAB University of Applied Sciences 2025-2026

Bachelor of Engineering, Electrical and Automation Engineering (in Finnish) 25S, full-time studies, Lappeenranta

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TLPRSAT25S-1001 CORE COMPETENCE						185
TLPRSAT25S-1019 Common Studies						5
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
TLPRSAT25S-1016 Language and Communication Studies						15
KS00DD59	Expert Communication Skills	5				5
KE00DD60	English for Engineering	5				5
KR00DD61	Swedish for Work, Written		2			2
KR00BU42	Swedish for Work, Spoken		1			1
KE00DD58	Intercultural Competence		2			2
TLPRSAT25S-1021 Professional Core Competence						120
TLPRSAT25S-1022 Basic Studies in Mathematics and Physics						21
AT00DC94	Basics of Algebra	3				3
AT00DE39	Basic studies in mathematics for electrical engineering	3				3
AT00DE40	Mathematics 1 for electrical engineering	3				3
AT00DE41	Mathematics 2 for electrical engineering		3			3
AT00DE34	Mathematics 3 for electrical engineering		3			3
AT00BT70	Basic studies in physics	3				3
AT00CU21	Physics for electrical engineering	3				3
TLPRSAT25S-1040 Basic Studies in Machinery						15
AT00CV93	Technical documentation and modeling	5				5
AT00BV38	Pneumatics and Hydraulics	5				5
AT00CV78	Manufacturing Technologies 1	5				5
TLPRSAT25S-1041 Basics of Electrical Engineering						15
AT00DE37	Basics of Electrical Engineering	3				3
AT00DE33	Basics of Electricity	4				4
AT00DE36	Electric Circuits	3				3
AT00CT56	Electrical Engineering Laboratory Work 1	5				5
TLPRSAT25S-1042 Electric Drives and Power Electronics						15

AT00CT60	Electrical Machines		5		5
AT00CT61	Electric drives		5		5
AT00CT59	Electrical Engineering Laboratory Work 2		5		5

TLPRSAT25S-1043 Applications of Electrical Engineering and Automation 12

AT00DA05	Basics of Programming	3			3
AT00DG90	Basics of JavaScript	3			3
AT00CV89	Electrical engineering applications		6		6

TLPRSAT25S-1044 Electrical Design 12

AT00CT64	Electrical design in industrial installations		5		5
AT00DE38	Electrical design project work			5	5
AT00CW53	Preparation for the electrical safety examination (S1)			2	2

TLPRSAT25S-1045 Programmable Logics 15

AT00BX17	Basics of Programmable Logic		5		5
AT00BX19	Operation Panels		5		5
AT00BX18	Applications of Programmable Logic		5		5

TLPRSAT25S-1046 PC Programming 15

AT00BX20	PC-logics		5		5
AT00BX21	User interface and controls		5		5
AT00BX22	Automation Project			5	5

TLPRSAT25S-1012 Practical Training 30

HA00CD55	Practical Training	5	5		10
HA00BU60	Practical Training 2		5	5	10
HA00BU61	Practical Training 3			5	5

TLPRSAT25S-1013 Thesis 15

AO00BU62	Thesis Planning			5	5
AO00BU63	Thesis Project			5	5
AO00BU64	Thesis Report			5	5

TLPRSAT25S-1030 COMPLEMENTARY COMPETENCE 55

TLPRSAT25S-1031 Leadership 15

AY00CU42	Leadership as a profession			3	3
AY00CU16	Entrepreneurship			2	2
AL00CI98	Manager's Toolkit			5	5
AL00CJ00	Leadership Trends			5	5

TLPRSAT25S-1047 Software Engineering 15

AT00BY07	Software engineering and architecture			5	5
AT00DG92	Basics of embedded programming			4	4
AT00DG93	Applications of IoT			3	3
AT00BY10	Software maintenance and testing			3	3

TLPRSAT25S-1048 Process Automation 15

AT00CT68	Process Automation Systems			5		5
AT00CT69	Process Automation Project				5	5
AT00CT67	Basics of control engineering		5			5
TLPRSAT25S-1039 Elective Studies						10

TLPRSAT25S-1001 CORE COMPETENCE: 185 ECTS

TLPRSAT25S-1019 Common Studies: 5 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 competencies during 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

TLPRSAT25S-1016 Language and Communication Studies: 15 ECTS

KS00DD59 Expert Communication Skills: 5 ECTS

Learning outcomes

The student is able to

- identify and assess their communication skills and give, receive and use feedback to develop their communication skills
- act purposefully, appropriately and skilfully in communication and interaction situations in work life and in his/her professional field (text, presentation and group communication skills)
- take into account the requirements of the recipient/interaction partner, the situation and the field in which they are communicating
- communicate in a structured, understandable and convincing way
- develop their Finnish language and communication skills as part of their expertise and professional competence (willingness and motivation to continuously learn and develop communication skills).

KE00DD60 English for Engineering: 5 ECTS

Learning outcomes

The student is able to

- perform effectively and professionally when applying for a job
- read and process basic texts from their field
- use and find vocabulary from their field
- communicate successfully and professionally about basic topics from their field
- communicate and work in an international environment

KR00DD61 Swedish for Work, Written: 2 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.

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.

KE00DD58 Intercultural Competence: 2 ECTS

Learning outcomes

The student is able to

- understand cultural similarities and differences using theoretical frameworks
- has skills and competences to develop their intercultural sensitivity
- understand culture adaptation and adjustment.

TLPRSAT25S-1021 Professional Core Competence: 120 ECTS

TLPRSAT25S-1022 Basic Studies in Mathematics and Physics: 21 ECTS

AT00DC94 Basics of Algebra: 3 ECTS

Learning outcomes

The student is able to

- simplify and handle mathematical expressions
- solve basic equations and system of two linear equations
- basics of percentage calculation

AT00DE39 Basic studies in mathematics for electrical engineering: 3 ECTS

Learning outcomes

Student is able to

- solve equations and simultaneous equations
- solve the angles and sides of different types of triangles and use similarity
- solve trigonometrical problems

AT00DE40 Mathematics 1 for electrical engineering: 3 ECTS

Learning outcomes

Student is able to

- recognize different polynomial equations and polynomial graphs
- solve inequalities
- solve basic derivation functions and utilize derivation in practice

AT00DE41 Mathematics 2 for electrical engineering: 3 ECTS

Learning outcomes

Student is able to

- solve integrated polynomial functions and utilize integration in practice
- solve geometric problems
- knows basics of vectors in plane and space
- basic concepts of matrices and solving matrices with software

AT00DE34 Mathematics 3 for electrical engineering: 3 ECTS**Learning outcomes**

Student is able to

- solve derivation and integration of trigonometric and exponential functions
- basics of differential equations
- principles of complex number calculations
- basics of series theory

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

AT00CU21 Physics for electrical engineering: 3 ECTS**Learning outcomes**

The student is able to

- Perform physical measurements and write a proper report of the results
- Process measurement results, make graphical representations thereof, and perform error evaluation
- Perform calculations related to electric charge and magnetism
- Describe the electromagnetic behaviour of electric devices

Prerequisites

AT00CH50 Basic Studies in Physics or AT00BT70 Tekniikan fysiikan perusteet should be studied before, or some other course about basics in physics.

TLPRSAT25S-1040 Basic Studies in Machinery: 15 ECTS**AT00CV93 Technical documentation and modeling: 5 ECTS****Learning outcomes**

The student is able to

- interpret technical drawings
- create simple technical drawings using computer aided design

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

AT00CV78 Manufacturing Technologies 1: 5 ECTS**Learning outcomes**

The student is able to

- work safely in a metal workshop / laboratory
- identify and name the basic components and standard parts of mechanical engineering
- uses tools and measuring instruments
- includes basic terminology related to mechanical engineering.

TLPRSAT25S-1041 Basics of Electrical Engineering: 15 ECTS**AT00DE37 Basics of Electrical Engineering: 3 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

AT00DE33 Basics of Electricity: 4 ECTS**Learning outcomes**

The student is able to

- describe electrical phenomena behind technological development
- mathematically solve problems related to electricity and the decibel scale
- perform calculations related to electric charge and magnetism
- apply digitalisation in the processing of results

AT00DE36 Electric Circuits: 3 ECTS**Learning outcomes**

Student is able to

- solve simple AC and DC circuits
- utilise phasors
- describe the properties and some of the uses of most common semiconductor components
- use simulation software

AT00CT56 Electrical Engineering Laboratory Work 1: 5 ECTS**Learning outcomes**

Student is able to

- use basic electrical measuring equipment
- plan and report laboratory work

TLPRSAT25S-1042 Electric Drives and Power Electronics: 15 ECTS**AT00CT60 Electrical Machines: 5 ECTS****Learning outcomes**

The student is able to

- describe the working principle, properties, and typical applications of the most common electric machine types
- form a single-phase equivalent circuit of an electric machine
- state the most important selection and dimensioning principles of electric machines in industrial applications

AT00CT61 Electric drives: 5 ECTS**Learning outcomes**

The student is able to

- design and dimension the contactor controls of a direct-on-line electric drive
- design the safety circuit of an electric drive
- dimension the protective devices and cabling of an electric drive
- dimension and parameterise a frequency converter controlled electric motor drive
- describe the possibilities of connecting a frequency converter to the automation system

AT00CT59 Electrical Engineering Laboratory Work 2: 5 ECTS**Learning outcomes**

The student is able to

- work safely in the laboratory at low voltage (< 1000 VAC)
- plan and implement electric setups in the laboratory
- perform electrical measurements, analyze and report results thereof, and write a report

TLPRSAT25S-1043 Applications of Electrical Engineering and Automation: 12 ECTS**AT00DA05 Basics of Programming: 3 ECTS****Learning outcomes**

The student is able to:

- perform tasks on a computer through programming

- utilize and process data programmatically
- understand common programming structures
- understand the syntax of a programming language.
- implement small programs in the Python programming language

AT00DG90 Basics of JavaScript: 3 ECTS

Learning outcomes

The student is able to

- utilize JavaScript language to create dynamic web content
- utilize open source JavaScript libraries
- create functional user interfaces that utilize the JavaScript language, for example, in input validation

AT00CV89 Electrical engineering applications: 6 ECTS

Learning outcomes

The student is able to

- describe the structure of electrical transmission and distribution networks and their essential design principles
- describe the essential design principles related to high voltage systems and their protective equipment
- utilize the decrees and guidelines related to electric installations in buildings

TLPRSAT25S-1044 Electrical Design: 12 ECTS

AT00CT64 Electrical design in industrial installations: 5 ECTS

Learning outcomes

The student is able to

- utilise CAD software as a tool in electric design
- read and create technical documentation related to electric design
- design an electric cabinet, select and dimension its components
- dimension and select cables
- design overload and short circuit protection

AT00DE38 Electrical design project work: 5 ECTS

Learning outcomes

Student:

- Be able to work in a project work environment and in a project.
- Can understand the different phases of a project and the principles of planning, management and control.
- Can report on the progress of a project at different stages.
- Can receive and give suggestions for improvement and feedback in project management tasks.
- Can evaluate the success of a project.

AT00CW53 Preparation for the electrical safety examination (S1): 2 ECTS**Learning outcomes**

The student is able to:

- master the subject matter of the national electrical safety examination (S1)

TLPRSAT25S-1045 Programmable Logics: 15 ECTS**AT00BX17 Basics of Programmable Logic: 5 ECTS****Learning outcomes**

Student is able to

- recognize basic constructure of the logic program
- use TIA-portal
- use basic commands
- use data in programming
- carry out logic sequences using LD

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

AT00BX18 Applications of Programmable Logic: 5 ECTS**Learning outcomes**

Student is able to

- describe 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

TLPRSAT25S-1046 PC Programming: 15 ECTS**AT00BX20 PC-logics: 5 ECTS****Learning outcomes**

Student is able to

- describe 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

- recognize 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

TLPRSAT25S-1012 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 into 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 into 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 into the work done in practical training

TLPRSAT25S-1013 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.

TLPRSAT25S-1030 COMPLEMENTARY COMPETENCE: 55 ECTS**TLPRSAT25S-1031 Leadership: 15 ECTS****AY00CU42 Leadership as a profession: 3 ECTS****Learning outcomes**

Students know:

- the characteristics of contemporary leadership and the importance of the organization of the work

community.

- the diverse field of responsibilities of leaders and their own role in it.
- basics of labor law

AY00CU16 Entrepreneurship: 2 ECTS

Learning outcomes

Student is able to

- understand entrepreneurship through personal development
- find and utilize different customer oriented business opportunities.

AL00CI98 Manager's Toolkit: 5 ECTS

Learning outcomes

The student is able to

- select and exploit a variety of managerial tools in order to support the development of the team, as well as their own work
- reflect upon their own well-being and boost it
- assess and develop their communication and interpersonal skills.

AL00CJ00 Leadership Trends: 5 ECTS

Learning outcomes

The student is able to

- critically examine trends in a variety of leadership and management theories
- develop their own leadership thinking
- apply management and leadership in different situations

TLPRSAT25S-1047 Software Engineering: 15 ECTS

AT00BY07 Software engineering and architecture: 5 ECTS

Learning outcomes

The student is able to

- explain different methods of software engineering
- use agile methods in software projects
- act as a software developer in multidisciplinary projects
- describe different software architectures and use them in development

AT00DG92 Basics of embedded programming: 4 ECTS

Learning outcomes

The student is able to

- explain the basics of operating systems in terms of software development
- implement an embedded system that utilizes a real-time operating system
- analyze the advantages and disadvantages of embedded programming

AT00DG93 Applications of IoT: 3 ECTS**Learning outcomes**

Student can

- Design and implement embedded IoT device using standard data transfer protocols
- Implement IoT hub as cloud service with simple data analysis and visualization application
- utilize unit testing tools to guarantee software quality
- work as a leading software specialist in IoT development project

AT00BY10 Software maintenance and testing: 3 ECTS**Learning outcomes**

The student is able to

- design and use basic software testing methods
- use software maintenance systems
- design the software to be maintained

TLPRSAT25S-1048 Process Automation: 15 ECTS**AT00CT68 Process Automation Systems: 5 ECTS****Learning outcomes**

The student is able to

- create an overall picture of automation systems in process industry
- apply the basic elements of automation process industry applications

AT00CT69 Process Automation Project: 5 ECTS**AT00CT67 Basics of control engineering: 5 ECTS****Learning outcomes**

The student is able to

- Model simple continuous-time dynamic systems
- Design a PID controller and simulate its behaviour

TLPRSAT25S-1039 Elective Studies: 10 ECTS