10.12.2024

**Curriculum at LAB University of Applied Sciences**
**2025-2026**

# Bachelor of Engineering, Industrial Information Technology 25S, full-time studies, Lahti

| Code | Name | 1 y | 2 y | 3 y | 4 y | ECTS total |
|---|---|---|---|---|---|---|
| **TLTIIIT25S-1001** | **CORE COMPETENCE** | | | | | **180** |
| **TLTIIIT25S-1018** | **Common Studies** | | | | | **10** |
| AY00CE71 | Developing Professional Competences 1 | 3 | | | | 3 |
| AY00CE72 | Developing Professional Competences 2 | | 1 | | | 1 |
| AY00CE73 | Developing Professional Competences 3 | | | 1 | | 1 |
| A300CE13 | Orientation to Sustainability Thinking | 2 | | | | 2 |
| AT00DC20 | Principles of Sustainability and Circular Economy | | 3 | | | 3 |
| **TLTIIIT25S-1002** | **Language and Communication Studies for English Students** | | | | | **15** |
| K200CE69 | Finnish 1 | 3 | | | | 3 |
| K200CE70 | Finnish 2 | 3 | | | | 3 |
| K200DD57 | Finnish for Technology | 2 | | | | 2 |
| KE00CE75 | English for Professional Communication | 5 | | | | 5 |
| KE00DD58 | Intercultural Competence | 2 | | | | 2 |
| **TLTIIIT25S-1015** | **Language and Communication Studies for Finnish Students** | | | | | **15** |
| KS00DD59 | Expert Communication Skills | 5 | | | | 5 |
| KR00DD61 | Swedish for Work, Written | | 2 | | | 2 |
| KR00BU42 | Swedish for Work, Spoken | | 1 | | | 1 |
| KE00CE75 | English for Professional Communication | 5 | | | | 5 |
| KE00DD58 | Intercultural Competence | | 2 | | | 2 |
| **TLTIIIT25S-1003** | **Professional Core Competence** | | | | | **110** |
| **TLTIIIT25S-1017** | **Basics of STEM** | | | | | **25** |
| **TLTIIIT25S-1019** | **Industrial Physics** | | | | | **10** |
| AT00DF40 | Industrial Physics 1 | 5 | | | | 5 |
| AT00DF41 | Industrial Physics 2 | | 5 | | | 5 |
| **TLTIIIT25S-1020** | **Mathematics** | | | | | **15** |
| AT00DF42 | Mathematical Problem Solving Methods and Tools 1 | 5 | | | | 5 |
| AT00DF43 | Mathematical Problem Solving Methods and Tools 2 | 5 | | | | 5 |
| AT00DF44 | Mathematical Problem Solving Methods and Tools 3 | | 5 | | | 5 |
| **TLTIIIT25S-1006** | **Engineering Studies** | | | | | **85** |
| AT00DF54 | Introduction to Industrial ICT Engineering | 15 | | | | 15 |

| | | | | | | |
|---|---|---|---|---|---|---|
| AT00DF53 | Embedded Systems | | 10 | | | 10 |
| AT00DF55 | Designing and Implementing Data Pipeline | 5 | 15 | 10 | | 30 |
| AT00CK37 | DevOps Engineering | | 10 | 5 | | 15 |
| AT00CK38 | Virtualization: Networks and Security | | | 10 | | 10 |
| **TLTIIIT25S-1007** | **Practical Training** | | | | | **30** |
| HA00CE82 | Practical Training | 5 | 5 | | | 10 |
| HA00CE83 | Practical Training 2 | | 5 | 5 | | 10 |
| HA00CE84 | Practical Training 3 | | | 5 | 5 | 10 |
| **TLTIIIT25S-1008** | **Thesis** | | | | | **15** |
| AO00CE85 | Thesis Planning | | | 5 | | 5 |
| AO00CE86 | Thesis Research and Writing | | | 2,5 | 2,5 | 5 |
| AO00CE87 | Thesis Publication | | | | 5 | 5 |
| **TLTIIIT25S-1009** | **COMPLEMENTARY COMPETENCE** | | | | | **60** |
| AT00CH72 | Project in Company Co-Operation | | | 15 | | 15 |
| **TLTIIIT25S-1021** | **Sustainable Solutions Engineering Program Studies** | | | | | **30** |
| **TLTIIIT25S-1012** | **LUT University Studies** | | | | | **0** |
| **TLTIIIT25S-1013** | **Technology Studies** | | | | | **0** |
| **TLTIIIT25S-1011** | **Exchange Studies** | | | | | **0** |
| **TLTIIIT25S-1010** | **Finnish as a Second Language** | | | | | **0** |
| K200CH62 | Finnish 3 | 3 | | | | 3 |
| K200CH63 | Finnish 4 | 3 | | | | 3 |
| K200CP87 | Finnish Conversation 1 | 3 | | | | 3 |
| K200CL50 | Finnish for Work 1 | | 5 | | | 5 |
| K200CG35 | Finnish for Work 2 | | 5 | | | 5 |
| K200CP88 | Finnish Conversation 2 | | 3 | | | 3 |
| K200CP86 | Finnish for Work 3 | | | 5 | | 5 |
| **TLTIIIT25S-1022** | **Circular Economy and Engineering** | | | | | **0** |
| AT00DC35 | Environmental and Technical Cycles | | | | | 0 |
| AT00DC36 | Water, Waste, and Material Management | | | | | 0 |
| AT00DC37 | Digital tools for Circular Economy | | | | | 0 |
| AT00DC38 | Advanced Green Technologies | | | | | 0 |

## TLTIIIT25S-1001 CORE COMPETENCE: 180 ECTS

## TLTIIIT25S-1018 Common Studies: 10 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

## 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

## AT00DC20 Principles of Sustainability and Circular Economy: 3 ECTS

**Learning outcomes**
Students will become familiar with the three pillars of Sustainable Solutions Engineering
- resource efficiency
- principles of circular economy
- basics of sustainable development.

By the end, they should understand the close relationship between the driving forces of sustainable development and future economic growth.

## TLTIIIT25S-1002 Language and Communication Studies for English Students: 15 ECTS

## 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.

Proficiency level: A1

## 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.

Proficiency level: A1

**Prerequisites**
Finnish 1 or similar skills

## K200DD57 Finnish for Technology: 2 ECTS

**Learning outcomes**
The student is able to
- use previously learned structures and words
- use some presentation phrases
- describe some processes in their field in simple terms

Proficiency level: A1

## KE00CE75 English for Professional Communication: 5 ECTS

**Learning outcomes**
Proficiency level: B2

The 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.

## 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.

## TLTIIIT25S-1015 Language and Communication Studies for Finnish Students: 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).

## 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.

## KE00CE75 English for Professional Communication: 5 ECTS

**Learning outcomes**
Proficiency level: B2

The 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.

## 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.

## TLTIIIT25S-1003 Professional Core Competence: 110 ECTS

## TLTIIIT25S-1017 Basics of STEM: 25 ECTS

## TLTIIIT25S-1019 Industrial Physics: 10 ECTS

## AT00DF40 Industrial Physics 1: 5 ECTS

**Learning outcomes**
The student
- is able to design simple electric circuits
- understands electricity as phenomenon
- understands heat tranfer methods

## AT00DF41 Industrial Physics 2: 5 ECTS

**Learning outcomes**
The student
- is able to design digital circuits
- understands quantum computing basics

## TLTIIIT25S-1020 Mathematics: 15 ECTS

## AT00DF42 Mathematical Problem Solving Methods and Tools 1: 5 ECTS

**Learning outcomes**
The student is able to
- understand the problem-solving cycle presented during the course and effectively apply it to course tasks
- understand and apply selected topics in geometry, and trigonometry to solve problems related to Information and Communication Technology (ICT)
- understand and apply selected topics in discrete mathematics to solve problems related to Information and Communication Technology (ICT)

## AT00DF43 Mathematical Problem Solving Methods and Tools 2: 5 ECTS

**Learning outcomes**
The student is able to
- recognize and leverage the benefits of a top-down, system-oriented approach in problem-solving
- understand and apply selected topics in calculus to probability calculations and machine learning
- understand and apply selected topics in statistics to solve problems related to Information and Communication Technology (ICT)

## AT00DF44 Mathematical Problem Solving Methods and Tools 3: 5 ECTS

**Learning outcomes**
The student is able to
- understand and apply selected topics in linear algebra related to ICT, such as computer graphics
- understand and apply selected topics in linear algebra related to ICT, such as machine learning
- understand and apply basic mathematical concepts in the context of neural networks

## TLTIIIT25S-1006 Engineering Studies: 85 ECTS

## AT00DF54 Introduction to Industrial ICT Engineering: 15 ECTS

**Learning outcomes**
The student is able to
- understand the role of ICT in engineering and its applications in automation and industrial systems
- create a program using structured programming language
- utilize common digital documentation and communication tools, and understand project-based teamwork methods
- grasp the basics of HTML, CSS, statistical thinking, and user interface principles
- comprehend operating systems, the role of cloud platforms, and the structure of IoT data pipelines
- understand the role of machine learning and artificial intelligence
- recognize the importance of sensor data in the data value chain

## AT00DF53 Embedded Systems: 10 ECTS

**Learning outcomes**
The student is able to
- recognize the main components of an embedded system and understand the system architecture
- describe the properties of different electronics components and choose appropriate components for the application
- design and implement embedded software in the C programming language
- design and implement a simple embedded device

## AT00DF55 Designing and Implementing Data Pipeline: 30 ECTS

**Learning outcomes**
The student is able to
- design and use appropriate data structures and algorithms
- transfer data securely from IoT devices to the cloud using platform services
- use version control systems in software development
- design and evaluate machine learning (ML) and artificial intelligence (AI) algorithms
-create scalable RESTful API services
- develop programs using object-oriented programming languages
- apply database integration and cloud services
- work effectively as an active team member and leader in ICT projects

## AT00CK37 DevOps Engineering: 15 ECTS

**Learning outcomes**
The student is able to
- describe the roles and methods of agile software development environments
- understand software architecture importance and use std patterns
- develop front and backend services using Javascript (and Node)
- operate according to DevOps principles (CI/CD)

## AT00CK38 Virtualization: Networks and Security: 15 ECTS

**Learning outcomes**
The student is able to
- use containers and virtualization as a programming and production platform for software systems
- design, create and manage a virtualized environment for an application project
- compare different hypervisors and cloud services to identify the strengths and weaknesses relevant to the solution
- utilize and maintain different operating systems (Linux/Windows) efficiently in a virtualized environment
- manage (private) cloud platform efficiently and securely and understand private/public cloud notable differences

## TLTIIIT25S-1007 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

## TLTIIIT25S-1008 Thesis: 15 ECTS

## AO00CE85 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.

## AO00CE86 Thesis Research and Writing: 5 ECTS

**Learning outcomes**

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

## AO00CE87 Thesis Publication: 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.

## TLTIIIT25S-1009 COMPLEMENTARY COMPETENCE: 60 ECTS

## AT00CH72 Project in Company Co-Operation: 15 ECTS

**Learning outcomes**
Student is able to
- carry out a project in co-operation with the external customer

## TLTIIIT25S-1021 Sustainable Solutions Engineering Program Studies: 30 ECTS

## TLTIIIT25S-1012 LUT University Studies: 0 ECTS

## TLTIIIT25S-1013 Technology Studies: 0 ECTS

## TLTIIIT25S-1011 Exchange Studies: 0 ECTS

## TLTIIIT25S-1010 Finnish as a Second Language: 0 ECTS

## K200CH62 Finnish 3: 3 ECTS

**Learning outcomes**
The student is able to
- tell about their own housing and neigbourhood.
- understand and write simple messages and announcements related to housing.
- understand and speak words and expressions related to weather.
- ask questions in simple shopping and other situations (e.g., clothing and furniture stores and bus and railway stations).
- read short advertisements, announcements and other texts related to travelling (e.g., timetables).

Proficiency level: A1

## K200CH63 Finnish 4: 3 ECTS

**Learning outcomes**
The student is able to
- ask about the health and describe their own health.
- describe places, things and people.
- understand and write short messages about everyday life (e.g., invitations, requests, messages of absence).
- understand short messages and advertiments related to celebrations and events.
- tell about matters and events using the most common verbs in the past tense.

Proficiency level: A1

**Prerequisites**
Courses Finnish 1 - 3 or equivalent skills

## K200CP87 Finnish Conversation 1: 3 ECTS

**Learning outcomes**
The student is able to
- tell about themselves, close relations and everyday life
- act in the most common authentic spoken situations in Finnish
- start and finish a brief dialogue
- use basic vocabulary and common grammatical structures in speech
- understand simple speech on concrete topics.

Proficiency level: A1

## K200CL50 Finnish for Work 1: 5 ECTS

**Learning outcomes**
Proficiency level A2

The student
- is familiar with the main stages of the job search process in Finland
- is able to tell about his/her skills
- understands short texts related to job search
- is able to communicate in situations related to job search.

## K200CG35 Finnish for Work 2: 5 ECTS

**Learning outcomes**
Proficiency level A2
Student
- knows the main features of the Finnish working culture
- understands simple texts and instructions related to induction, workplace rules and safety at work
- can describe the working environment
- can communicate in informal situations in the workplace

## K200CP88 Finnish Conversation 2: 3 ECTS

**Learning outcomes**
The student is able to
- tell about themselves, their interests, and express opinions on various topics
- act in more versatile authentic spoken situations in Finnish
- follow conversations, start them, and take part in maintaining them
- understand and use various vocabulary and grammatical structures in speech.

Proficiency level A2

## K200CP86 Finnish for Work 3: 5 ECTS

**Learning outcomes**
Proficiency level B1

The student is able to
- communicate orally in different situations at the workplace
- use key telephone, customer service and meeting phrases
- write work-related e-mails

## TLTIIIT25S-1022 Circular Economy and Engineering: 0 ECTS

## AT00DC35 Environmental and Technical Cycles: 9 ECTS

**Learning outcomes**
Environmental Cycles & Sustainable Bioeconomy
Students will learn about
- critical Earth cycles and their impacts
- circular bioeconomy principles in action
- different technologies for circular bioeconomy
- the measurements used for sustainable development

Technical cycles
Students will learn about
- principles of a circular economy for technical materials
- policies and regulations driving development in key industries
- principles for circular business development
- circular and ecological design methodologies

Climate change
Students will learn about
- the history and reality of climate change-its impact on human systems
- climate change theory and climate science
- climate change as a sustainable development challenge
- knowledge and institutions for mitigating and adapting to climate change

**Prerequisites**
This course is designed in a way, that you don't need a background in SSE, in order to pass the course. However, this is the 2nd part of our goLAB course series, and we recommend that you complete part 1 first.

Part 1: AT00DC20 Principles of Sustainability and Circular Economy

## AT00DC36 Water, Waste, and Material Management: 9 ECTS

**Learning outcomes**
Sustainable Water Management
Students will learn about
- principles of a circular economy for water
- principles of a circular economy for water
- institutions and frameworks for water management
- popular and growing technologies in the field of water management
- the relationship between water management, climate change, and climate mitigation and adaptation

Sustainable waste management
Students will learn about
- the relationship between water management, climate change, and climate mitigation and adaptation
- basic principles of waste management
- policies for waste management and a digital circular economy
- technologies for enabling a circular economy

Material efficiency and sustainable materials
Students will learn about
- basics of material qualities
- principles of sustainable material selection
- secondary materials and their use
- circular and ecological design methodologies

**Prerequisites**
This course is designed in a way, that you don't need a background in SSE, in order to pass the course. However, this is the 3rd part of our goLAB course series, and we recommend that you complete parts 1 and 2 first.

Part 1: AT00DC20 Principles of Sustainability and Circular Economy
Part 2: AT00DC35 Environmental and Technical Cycles

## AT00DC37 Digital tools for Circular Economy: 9 ECTS

**Learning outcomes**
This course is divided into 3 major sections:
- Sustainability in Industry 4.0
- Digital tools & platforms
- Project management
Each of these will have its own theory sections, and then an exam at the end. The project management section also includes a special assignment, where the students need to create a project plan.

Completing all three segments will grant students 9 study credits for completing the full course

package.
Learning objectives:
Sustainability in Industry 4.0
Students will learn about:
- sustainable use of I4 technologies
- driving forces and policies behind the adoption of I4 technologies
- how to identify opportunities to improve sustainability
Digital tools & platforms
Students will learn about:
- principles for a digital circular economy
- the basics of data analysis and its role in the digital era
- data-driven applications and digital tools
- essentials of cloud services and the IoT stack
Project management
Students will learn about:
- projects and their parts
- how to make a simple project plan
- the role of project management and project managers
- communication, team skills, and digital skills
- different types of SSE projects

**Prerequisites**
This course is designed in a way, that you don't need a background in SSE, in order to pass the course. However, this is the 4th part of our goLAB course series, and we recommend that you complete parts 1-3 first.

Part 1: AT00DC20 Principles of Sustainability and Circular Economy
Part 2: AT00DC35 Environmental and Technical Cycles
Part 3: AT00DC36 Water, Waste, and Material Management

## AT00DC38 Advanced Green Technologies: 9 ECTS

**Learning outcomes**
This course is divided into 3 major sections:
• Best available techniques
• Finnish practices
• Company cases

Learning objectives:
Best available techniques
Students will learn about:
- The definition of BAT
- What opportunities and challenges are directly linked to BAT
- What techniques are utilized in different industries and how
- How have the EU, and different countries around the world tackled BAT
- What are the technologies that support these techniques

Finnish Practices
Students will learn about:
- The goals and values of Finland
- How does Finland manage its resources

- How does the Finnish infrastructure set it apart
- What are the largest industries in Finland
- How do different industries tackle environmental and social challenges

Company cases
Students will learn about:
- Businesses as a system, and how they can be unstable
- Circular economy and business models
- Sustainable company examples in key industries
- New innovations and techniques in key industries