27.02.2023

**Curriculum at LAB University of Applied Sciences**
**2023-2024**

# Bachelor of Engineering, Wood Technology 23S, full-time studies, Lahti

| Code | Name | 1 y | 2 y | 3 y | 4 y | ECTS total |
|---|---|---|---|---|---|---|
| **TLTIPUU23S-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 |
| **TLTIPUU23S-1002** | **Professional Core Competence** | | | | | **135** |
| **TLTIPUU23S-1003** | **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 |
| AT00BZ00 | Wood technology physics | | 3 | | | 3 |
| **TLTIPUU23S-1004** | **Basic studies in Wood Engineering** | | | | | **15** |
| AT00BZ02 | Forest and Raw Materials | 5 | | | | 5 |
| AT00BZ03 | Wood Processing | 5 | | | | 5 |
| AT00BZ01 | Helth and Safety in Wood Laboratory Environment | 5 | | | | 5 |
| **TLTIPUU23S-1005** | **Wood material technologies** | | | | | **15** |
| AT00BZ04 | Glueing | 5 | | | | 5 |
| AT00BZ05 | Surface Treatment | 5 | | | | 5 |
| AT00BZ06 | Wood Construction | 5 | | | | 5 |
| **TLTIPUU23S-1006** | **Digital Tools** | | | | | **15** |
| AT00BV34 | Digital Tools | 5 | | | | 5 |
| AT00BZ07 | Machine Drawing and 3D Design | 5 | | | | 5 |
| AT00BZ08 | CAD/CAM and 3D printing | | 5 | | | 5 |
| **TLTIPUU23S-1007** | **Sawmill industry** | | | | | **15** |
| AT00BZ09 | Sawn timber production and processes | | 5 | | | 5 |
| AT00BZ10 | Timber based products | | 5 | | | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| AT00BZ11 | Drying and thermal modification | | 5 | | | 5 |
| **TLTIPUU23S-1008** | **Wood-based Panels Industry** | | | | | **15** |
| AT00BZ12 | Plywood and LVL technology | | | 5 | | 5 |
| AT00BZ13 | Particle board, MDF, OSB and other wood-based panels | | | 5 | | 5 |
| AT00BZ14 | R&D Project | | | 5 | | 5 |
| **TLTIPUU23S-1009** | **Furniture Industry** | | | | | **15** |
| AT00BZ15 | Furniture Industry | | 5 | | | 5 |
| AT00BZ16 | Industrial Processes and Production | | 5 | | | 5 |
| AT00BZ17 | Product Development Project | | 5 | | | 5 |
| **TLTIPUU23S-1010** | **Business and Economics** | | | | | **15** |
| AT00BZ18 | Sales and Marketing | | | 5 | | 5 |
| AT00BZ19 | Business economics | | | 5 | | 5 |
| AT00BZ20 | Research Seminar | | | 5 | | 5 |
| **TLTIPUU23S-1011** | **Production Automation and Management** | | | | | **15** |
| AT00CG68 | IoT principles in different sectors | | 5 | | | 5 |
| AT00BZ23 | Automation and Digitalisation | | 5 | | | 5 |
| AL00CD63 | Management and Leadership | | 5 | | | 5 |
| **TLTIPUU23S-1012** | **Complementary Competence** | | | | | **45** |
| AT00CV47 | Wood tecnology chemistry and statistical mathematics | 5 | | | | 5 |
| **TLTIPUU23S-1013** | **Wood product industry** | | | | | **15** |
| AT00BZ24 | Wood product in building industry | | | 5 | | 5 |
| AT00CU23 | Global wood business | | | 5 | | 5 |
| AT00CU24 | Wood architecture | | | 5 | | 5 |
| **TLTIPUU23S-1014** | **CNC technology in wood industries** | | | | | **15** |
| AT00CT27 | CNC programming basics | | | 5 | | 5 |
| AT00CT28 | CNC programming advanced | | | 5 | | 5 |
| AT00CT29 | CNC project | | | 5 | | 5 |
| **TLTIPUU23S-1015** | **Production economy** | | | | | **15** |
| AT00BZ30 | LEAN and 5S | | | | 5 | 5 |
| AL00CE39 | Logistics and Supply Chain Management | | | | 5 | 5 |
| AT00CT26 | Production Management | | | | 5 | 5 |
| **TLTIPUU23S-1016** | **Studio studies** | | | | | **20** |
| **TLTIPUU23S-1017** | **Versatile Studies** | | | | | **0** |
| AT00CB83 | Project Learning in Enterprises | | | | | 0 |
| **TLTIPUU23S-1018** | **Practical Training** | | | | | **30** |
| HA00CD55 | Practical Training | | | | | 0 |
| HA00BU60 | Practical Training 2 | | | 10 | | 10 |
| HA00BU61 | Practical Training 3 | | | | 10 | 10 |
| **TLTIPUU23S-1019** | **Thesis** | | | | | **15** |
| AO00BU62 | Thesis Planning | | | | 5 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| AO00BU63 | Thesis Project | | | | 5 | 5 |
| AO00BU64 | Thesis Report | | | | 5 | 5 |

## TLTIPUU23S-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.

## TLTIPUU23S-1002 Professional Core Competence: 135 ECTS

## TLTIPUU23S-1003 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

## AT00BZ00 Wood technology physics: 3 ECTS

**Learning outcomes**
Student is able to:
- describe the electronic phenomena behind the development of technology
- solve mathematical problems in electrical sciences
- conduct physical measurements and draft a proper report on their findings
- apply digitalisation in the processing of results

## TLTIPUU23S-1004 Basic studies in Wood Engineering: 15 ECTS

## AT00BZ02 Forest and Raw Materials: 5 ECTS

**Learning outcomes**
The student is able to:
-basics related to tree growth and harvesting
-evaluate the use of wood as a renewable natural material
-evaluate the ecological impact of wood use
-Describe the basic structure of the tree
-describe the structure of a tree at the cellular level

## AT00BZ03 Wood Processing: 5 ECTS

**Learning outcomes**
Student is able to:
- describe the basics related to woodworking
- discuss woodworking blades and blade materials with the blade supplier
- make choices about woodworking methods with the goal of profitable business and high-quality woodworking results
- describe the machines and equipment used for woodworking
- select suitable woodworking methods for the various stages of manufacturing a product

## AT00BZ01 Helth and Safety in Wood Laboratory Environment: 5 ECTS

**Learning outcomes**
The student is able to:
- use laboratory machines in accordance with safety regulations
- operate in accordance with the organisation's safety instructions in the laboratory facilities
- describe issues related to occupational safety about the safety and health of the working environment
- search for and use safety data sheets for harmful and dangerous substances
- describe the principles of occupational safety and health in the workplace

## TLTIPUU23S-1005 Wood material technologies: 15 ECTS

## AT00BZ04 Glueing: 5 ECTS

**Learning outcomes**
The student is able to:
- describe the basic phenomena (chemistry) affecting wood gluing
- define the factors influencing gluing
- compare the properties of the most common wood glues
- choose a suitable adhesive for different applications

## AT00BZ05 Surface Treatment: 5 ECTS

**Learning outcomes**
The student is able to:
- describe basic phenomena related to wood surface treatment (chemistry)
- pre-treat the wood surface
- compare the properties of surface treatment agents and application and drying methods
- taking into account environmental and occupational safety aspects
- use film coating methods

## AT00BZ06 Wood Construction: 5 ECTS

**Learning outcomes**
Student is able to:
-describe the structure of wood at the level of cell wall
-describe specific features of the interaction between wood and moisture
-describe how the structure of wood affects its properties
-take special characteristics of the wood into consideration in its various uses
-manage the basics of the manufacturing processes of the most common wood products

## TLTIPUU23S-1006 Digital Tools: 15 ECTS

## 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

## AT00BZ07 Machine Drawing and 3D Design: 5 ECTS

**Learning outcomes**
The student is able to:
- basics of technical drawing
- Basics of CAD drawing
- read, edit and create technical 2D drawings
- Basics of 3D modeling
- create technical drawings in a 3D environment and visualize 3D assemblies

## AT00BZ08 CAD/CAM and 3D printing: 5 ECTS

**Learning outcomes**
The student is able to:
- Key concepts and features of CNC technology
- Basics of CAD / CAM technology
- create CNC toolpaths using CAM software

- machine the planned toolpath with a CNC milling machine
- model the plan as a 3D model and print the model on a 3D printer.

## TLTIPUU23S-1007 Sawmill industry: 15 ECTS

## AT00BZ09 Sawn timber production and processes: 5 ECTS

**Learning outcomes**
The student is able to:
- basics of the sawmill industry, Finnish forests and forestry
- basics of wood raw material and wood raw material procurement
- forest Certification in business (PEFC & FSC)
- sawn timber manufacturing: the production planning process
- sawing process and machinery
- further developed products, substitutes and competitors
- sales and marketing of wood products
- logistics and incoterms clauses
- R&D - development of wood products over the years
- use of wood in construction.

## AT00BZ10 Timber based products: 5 ECTS

**Learning outcomes**
The student is able to:
- recognises most important timber based building products
- recognises most importat timber based interior products
- understands the principles of timber based products’ design and planning, use, installation and maintenance
- see the differences in timber based products’ use in different geographic and cultural areas

## AT00BZ11 Drying and thermal modification: 5 ECTS

**Learning outcomes**
The student is able to:
- basics of wood drying
- Industrial wood drying and its processes
- firewood and its manufacturing process
- basic wood drying invoices
- targets for wood drying in different applications
- other methods of drying wood, drying defects

## TLTIPUU23S-1008 Wood-based Panels Industry: 15 ECTS

## AT00BZ12 Plywood and LVL technology: 5 ECTS

**Learning outcomes**
The student is able to:

- describe the manufacturing processes of plywood and LVL board products
- know the main end uses of both board type
- define the technical properties of both board types
- know the further processing possibilities of both board types
- produce plywood in laboratory environment and make standard quality tests

## AT00BZ13 Particle board, MDF, OSB and other wood-based panels: 5 ECTS

**Learning outcomes**
The student is able to:
- describe the manufacturing processes of particleboard, MDF and OSB board products
- know the main end uses of each board type
- define the technical properties of different board types
- know the further processing possibilities of different board types
- produce particleboard in laboratory environment and make standard quality tests

## AT00BZ14 R&D Project: 5 ECTS

**Learning outcomes**
The student is able to:
- make a project plan including time schedule, responsibilities and target setting
- learn customer communication
- search for professional literature to support the project
- report on the project results and analyse them
- make seminar presentation to customer

## TLTIPUU23S-1009 Furniture Industry: 15 ECTS

## AT00BZ15 Furniture Industry: 5 ECTS

**Learning outcomes**
Student is able to:
- describe the operating environment of the furniture industry
- evaluate the operational strategies of companies in the sector
- describe products and their production methods in the furniture industry
- name Finnish furniture designers and their products
- analyze the Finnish furniture industry and its future

## AT00BZ16 Industrial Processes and Production: 5 ECTS

**Learning outcomes**
Student is able to:
- name the various production processes of the furniture industry
- describe production planning and control methods
- discuss the importance of different factors of production as part of layout design
- describe the principles of lean thinking and activities
- describe the principles of investment accounting and its significance for the company's profitability

## AT00BZ17 Product Development Project: 5 ECTS

**Learning outcomes**
Student is able to:
- use brainstorming tools when designing the product development project
- utilise the product design process in his/her own project work
- use technical drawing tools in designing the product
- combine design and technical design
- work in a group and bring his/her expertise to the benefit of the design team

## TLTIPUU23S-1010 Business and Economics: 15 ECTS

## AT00BZ18 Sales and Marketing: 5 ECTS

**Learning outcomes**
The student is able to:
- basic concepts of sales and marketing
- understands the differences between B2B and B2C
- understands the concept of branding
- basics of advertising
- the importance of logistics to businesses

## AT00BZ19 Business economics: 5 ECTS

**Learning outcomes**
The student is able to:
- understand the basics of business mathematics
- price a product and understand the effects of different factors on price formation
- understand the importance of business economics for the success of a company
- assess a company's profitability, solvency and productivity in the light of key indicators

## AT00BZ20 Research Seminar: 5 ECTS

**Learning outcomes**
Student is able to:
- acquire and utilise research-related information and use sources appropriately
- follow ethical principles in research activities
- use the most typical research and development methods in his/her field
- write a scientific report with appropriate language, style and referencing

## TLTIPUU23S-1011 Production Automation and Management: 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

## AT00BZ23 Automation and Digitalisation: 5 ECTS

**Learning outcomes**
The student is able to:
- definition of automatic production machine or line
- production recipe and recipe processing for automation
- automatic product change on the production line
- benefits and requirements of automation
- the opportunities for digitalisation now and in the future

## AL00CD63 Management and Leadership: 5 ECTS

**Learning outcomes**
Students knows:
- key management & leadership models and methods.
- the characteristics of modern management & leadership and the importance of the organization of the work community.
- the diverse field of responsibilities of managers and their own role in it.
- basics of labor law

## TLTIPUU23S-1012 Complementary Competence: 45 ECTS

## AT00CV47 Wood tecnology chemistry and statistical mathematics: 5 ECTS

**Learning outcomes**
Student is able to
Chemistry
- basics of organic chemistry
- basics of the chemical composition of wood
Statistical mathematics
- basics of probability calculation and statistical mathematics and knows the most common probability distributions
- utilize statistical methods in data analysis and determining causality
- apply statistical methods in tasks related to their own field

## TLTIPUU23S-1013 Wood product industry: 15 ECTS

## AT00BZ24 Wood product in building industry: 5 ECTS

**Learning outcomes**

The student is able to:
- know the possibilities and limitations of LVL for building industry
- know the possibilities and limitations of plywood for building industry
- know the possibilities and limitations of CLT for building industry
- know the possibilities and limitations of gluelam for building industry
- overview of other Wood Products used in construction
- describe key production equipment and functions for different applications

## AT00CU23 Global wood business: 5 ECTS

**Learning outcomes**
Student understands
- the global nature of modern wood products business.
- the combination of local nature of production through raw materials against varying demands in different parts of the globe
- competitive product and service offerings
- logistic options and challenges
- future trends and possibilities for the industry

## AT00CU24 Wood architecture: 5 ECTS

**Learning outcomes**
The student is able to:
- history of wood in architecture
- regional differences
- future vision for use of wood and other natural material in architecture

## TLTIPUU23S-1014 CNC technology in wood industries: 15 ECTS

## AT00CT27 CNC programming basics: 5 ECTS

**Learning outcomes**
The student is able to:
- make and modify geometry
- define toolpaths (milling)
- make vertical and horizontal milling and drilling
- create and use variables
- create tools, tool values and specifications
- define workpiece mountings
- make simple CNC-programs

## AT00CT28 CNC programming advanced: 5 ECTS

**Learning outcomes**
The student is able to:
- set up and use automatic workflow and macros
- make use of 3D grafics

- use and make benefit of global variables
- make DXF and 3D-Solid import
- make parametric conditions and equations
- make parametric CNC-programs

## AT00CT29 CNC project: 5 ECTS

**Learning outcomes**
The student is able to:
- make a project plan including time schedule, responsibilities and target setting
- make 3D design of a product
- make CNC programming for selected product
- manufacture the product with CNC machine
- make project report and seminar presentation

## TLTIPUU23S-1015 Production economy: 15 ECTS

## AT00BZ30 LEAN and 5S: 5 ECTS

**Learning outcomes**
The student is able to:
- know LEAN and 5S principles
- define how to use LEAN and 5S in production management
- define production line information collection typically related to LEAN and 5S
- know LEAN and 5S tools
- know improvement possibilities in production line by LEAN and 5S

## AL00CE39 Logistics and Supply Chain Management: 5 ECTS

**Learning outcomes**
Student is able to

-use basic concepts of logistics and supply chain management.
- the principles of value chain formation.
- identify the impact of logistics and supply chains on the company's profitability and competitiveness.
- describe the importance of customer orientation and stakeholder cooperation throughout the supply chain.

## AT00CT26 Production Management: 5 ECTS

**Learning outcomes**
The student is able to:
- define key concepts and development methods related to production and production strategy
- development of production strategy and methods
- development of production infrastructure
- development a supply chain strategy

## TLTIPUU23S-1016 Studio studies: 20 ECTS

## TLTIPUU23S-1017 Versatile Studies: 0 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

## TLTIPUU23S-1018 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

## TLTIPUU23S-1019 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.