29.08.2022

Curriculum at LAB University of Applied Sciences
2022-2023

Bachelor of Engineering, Infrastructure Engineering 22S, full-time studies, Lappeenranta

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TLPRINFRA22S-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
TLPRINFRA22S-1002	**Professional Core Competence**					**120**
TLPRINFRA22S-1006	**Basics of 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
AT00BZ69	Basic physics in building	3				3
TLPRINFRA22S-1007	**Basics of construction**					**30**
AT00CB13	Construction materials	5				5
AT00CB14	Concrete technics I	4				4
AT00CB15	Basics of Building Engineering	5				5
AT00CB16	Basics of Civil Engineering	5				5
AT00CB17	Basics of Surveying Technique	3				3
AT00CB18	Geotechnics		3			3
AT00CB19	Earthwork Engineering and Rock Excavation		5			5
TLPRINFRA22S-1008	**Mechanics and building physics**					**15**
AT00CB20	Basics od statics	3				3
AT00CB21	Basics of strenght of materials		3			3
AT00CB22	Structural mechanics I		4			4
AT00CB23	Building physics		5			5
TLPRINFRA22S-1009	**Structural engineering I**					**30**
AT00CB24	Concrete technics II		4			4

AT00CB25	Basics of Construction Planning		3			3
AT00CB26	Basics of Concrete Structures		5			5
AT00CB27	Basics of structural steelwork		5			5
AT00CB28	Foundation engineering			5		5
AT00CB29	Foundation Engineering of Infrastructure			4		4
AT00CB30	Foundation engineering of building structures				4	4
TLPRINFRA22S-1010	**Construction production**					**15**
AT00CB31	Fundamentals of construction economy	3				3
AT00CB32	Site technologies	3				3
AT00CB33	Production planning			5		5
AT00CB34	Basics of cost evaluation methods			4		4
TLPRINFRA22S-1011	**Construction project**					**15**
AT00CB35	Building information model	3				3
AT00CB36	Management and Leadership		3			3
AT00CB37	Construction contracting			3		3
AT00CB38	Project work				6	6
TLPRINFRA22S-1003	**Complementary Competence**					**60**
TLPRINFRA22S-1012	**Civil engineering I**					**15**
AT00CD32	Basics of road engineering		4			4
AT00CD33	Design of Street Structures			5		5
AT00CD34	InfraCAD and BIM		3			3
AT00CD35	Basics of Railway Engineering			3		3
TLPRINFRA22S-1014	**Civil engineering II**					**15**
AT00CD36	Hydrology and Hydraulic Engineering			3		3
AT00CD37	Design of roads			4		4
AT00CD38	Network Engineering			3		3
AT00CD39	Network design				5	5
TLPRINFRA22S-1013	**Civil engineering III**					**15**
AT00CD40	Intersections and Transportation Systems			3		3
AT00CD41	Environmental Geotechnology				3	3
AT00CD42	Maintenance of Infrastructure			3		3
AT00CD43	Surveying Technology and Automative Machinery			3		3
KTE2190	Basics of Bridges Engineering			3		3
TLPRINFRA22S-1015	**Optional module**					**15**
TLPRINFRA22S-1004	**Practical Training**					**30**
HA00CD55	Practical Training		10			10
HA00BU60	Practical Training 2			10		10
HA00BU61	Practical Training 3				10	10
TLPRINFRA22S-1005	**Thesis**					**15**
AO00BU62	Thesis Planning				5	5

AO00BU63	Thesis Project				5	5
AO00BU64	Thesis Report				5	5

TLPRINFRA22S-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.

TLPRINFRA22S-1002 Professional Core Competence: 120 ECTS

TLPRINFRA22S-1006 Basics of 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

AT00BZ69 Basic physics in building: 3 ECTS

Learning outcomes
The student knows the basics of hydrostatics, hydrodynamics, wave theory and electrical engineering required for professional studies in construction technology.

TLPRINFRA22S-1007 Basics of construction: 30 ECTS

AT00CB13 Construction materials: 5 ECTS

Learning outcomes
The student identifies the basic materials, basic characteristics and uses of building construction and infrastructure construction.
The student understands the effects of the properties and uses of building materials in construction and is able to utilise what they have learned in new situations. The student understands the basic concepts of chemistry related to building materials and the chemical phenomena that describe them. The student acquaints themselves with the usefulness of construction waste materials from the point of view of chemistry. The student recognises the principles of sustainable development.

AT00CB14 Concrete technics I: 4 ECTS

Learning outcomes
The student is able to design the composition of conventional concrete so that it meets the requirements for fresh and hardened concrete. Can produce conventional concrete according to plans. Can test the quality properties of concrete and evaluate the suitability of concrete mass. Understand the effect of different factors on the properties of concrete mass and hardened concrete. Understands the principles of concrete mass adjustment.

AT00CB15 Basics of Building Engineering: 5 ECTS

Learning outcomes
The student understands the whole of the parts of a building and their main functions. The student is familiar with the options for the outer shell, surfaces and non-load-bearing structures as well as the complementary building components. The student understands the most important concepts of fire safety in buildings and the principles of moisture insulation. The student is familiar with the most common markings and permit practices in the construction industry. The student knows the basics of computer-aided designing.

AT00CB16 Basics of Civil Engineering: 5 ECTS

Learning outcomes
The student knows the different elements of the built environment, the related research and how they relate to each other. The student knows the different stages of zoning and understands the importance of zoning as the basis for all construction. The student is familiar with environmental problems and related legislation. The student is able to take into account the principles of sustainable development in the design and implementation of the built environment. The student gets acquainted with BIM + CAD-based design software.

AT00CB17 Basics of Surveying Technique: 3 ECTS

Learning outcomes
The student knows the basics of geometric measurements in construction and the processes of building measurements, and is familiar with the most common measuring instruments. The student masters the practice of mapping and marking measurement. The student is able to process measurement data.

AT00CB18 Geotechnics: 3 ECTS

Learning outcomes
The student knows the typical geological soil layers and how they are created. The student can name the soil types according to both the geotechnical soil classification and the Eurocodes.
The student knows the concepts and phenomena as well as copes with simple calculations related to soil types,structural properties, hydraulic properties, groundwater and other moisture, frost and frosting.
The student knows the most common soil and laboratory studies and identifies the initial data needed in geotechnical design.

AT00CB19 Earthwork Engineering and Rock Excavation: 5 ECTS

Learning outcomes
The student knows the machines and methods used in construction work as well as the requirements for construction structures. The student is able to plan machine combinations for different work sites.
The student understands and is able to plan the implementation of opencast mining and knows the legislation and safety instructions related to mining.

TLPRINFRA22S-1008 Mechanics and building physics: 15 ECTS

AT00CB20 Basics od statics: 3 ECTS

Learning outcomes
The student understands the basic concepts of statics, masters the equilibrium considerations of structures and is able to solve stress distributions of simple statically determined bar structures.

AT00CB21 Basics of strenght of materials: 3 ECTS

Learning outcomes
The student is able to apply the theory of strength based on elasticity as a basis for the design of load-bearing structures and understand the basics of plasticity theory and stability phenomena and the solution principles of statically indeterminate structures.

AT00CB22 Structural mechanics I: 4 ECTS

Learning outcomes
The student is able to solve the force quantities and displacements of statically determined bar structures, understands the effect of static indeterminacy on the operation of a structure under loads, understands the principles of solving statically indeterminate structures and their basic operation, is able to solve force quantities of simple statically indeterminate bar structures by force method, and is able to use computer programmes to solve force quantities and displacements

AT00CB23 Building physics: 5 ECTS

Learning outcomes
The student is able to calculate heat transfer and factors affecting the energy efficiency of buildings and structures, moisture loads in buildings and structures and look at moisture transfer in structures, knows the process of humidity control, understands the basics of thermal and humidity engineering and design of infrastructure and sound technology, knows the basics of indoor air quality management and building physical measurements.

TLPRINFRA22S-1009 Structural engineering I: 30 ECTS

AT00CB24 Concrete technics II: 4 ECTS

Learning outcomes
The student is able to apply the knowledge of concrete technology to the planning and management of concrete work.
The student is able to describe the stages and working methods of concrete work both on site and in an element factory. The student supplements their ability to work as a supervisor of concrete building.

AT00CB25 Basics of Construction Planning: 3 ECTS

Learning outcomes
The student knows the design principles of load-bearing structures, is able to determine the loads on buildings and structures, is able to evaluate alternative load-bearing structural systems suitable for a building and calculate the loads on structural components. The student knows the principles of norm control in structural design. The student knows the basics of limit state analysis.

AT00CB26 Basics of Concrete Structures: 5 ECTS

Learning outcomes
The student
- knows the design principles and dimensioning practices of reinforced concrete building components and reinforcements
- is able to plan concrete structures for building and infrastructure construction
The course prepares students for in-depth studies in the design of concrete structures.

AT00CB27 Basics of structural steelwork: 5 ECTS

Learning outcomes
The student knows the material properties of typical structural steel, typical steel products and is able to dimension conventional load-bearing steel structures.

AT00CB28 Foundation engineering: 5 ECTS

Learning outcomes
The student is familiar with the stages of foundation engineering and is able to plan the key foundation structures and foundation works of the standard class of building construction in a

supervised manner, and identifies the most common risks in foundation work and knows the basics of quality control.
The student is able to calculate the bearing strength and depression of the ground.
The student knows the concept of ground pressure and is able to calculate the earth pressure at rest.
The student is familiar with pile types and different piling methods.

AT00CB29 Foundation Engineering of Infrastructure: 4 ECTS

Learning outcomes
The student becomes acquainted with soft soil construction and infrastructure substructures.
The student becomes acquainted with the geotechnical tasks of spatial planning as well as traffic routes and network geotechnics.
The student is familiar with the most common foundation reinforcement methods and their dimensioning criteria.
The student delves into the principles of stability and deflection calculations.

AT00CB30 Foundation engineering of building structures: 4 ECTS

Learning outcomes
The student increases their expertise in the geotechnical bearing capacity of eccentrically loaded foundations, pile driving, large and special piling, and supplements their skills in the dimensioning of ramped and supported excavations and retaining walls.
The student knows the principles of foundation alteration and repair work and is able to make a conventional yard surface water plan.
The student supplements their skills for demanding structural design tasks.

TLPRINFRA22S-1010 Construction production: 15 ECTS

AT00CB31 Fundamentals of construction economy: 3 ECTS

Learning outcomes
The student knows the life cycle of different construction projects, knows the parties to the construction project and their tasks and responsibilities, knows the planning stages, and knows the site forms and levels.
The student is familiar with the key regulations concerning occupational safety in the construction industry. The student knows the responsibilities and tasks of different parties.
The student understands construction as part of the functioning of society.

AT00CB32 Site technologies: 3 ECTS

Learning outcomes
The aim of the course is to understand the work stages by type of work, work methods, the establishment of a construction site, preparation of an area plan and preparation of a task plan.

AT00CB33 Production planning: 5 ECTS

Learning outcomes
The student knows the production control methods of a construction project at the project and task level.
The student is able to make task plans and resource calculations. The student is familiar with different schedule formats and understands the necessity of planning a construction project in time. The student understands the importance of both construction and operational quality, and is able to draw up a site quality plan. The student knows the methods of managing the quantities of a construction project, risk management, information, etc. and their significance for the construction project.
The student is familiar with the concepts of occupational safety legislation and the subject area.

AT00CB34 Basics of cost evaluation methods: 4 ECTS

Learning outcomes
The student knows the cost control methods of the planning and implementation phase. The student masters the basics of cost calculation of a construction project, tasks and factors influencing costs, knows the basics of quantity and cost calculation, is able to prepare a cost calculation and offer for a construction or building project. The student is familiar with the cost control and post-calculation procedures during construction.

TLPRINFRA22S-1011 Construction project: 15 ECTS

AT00CB35 Building information model: 3 ECTS

Learning outcomes
The student knows the basic concepts of data modelling and the principles of the data model-based construction process, and knows the basic use of data model-based design programs and model review programs.

AT00CB36 Management and Leadership: 3 ECTS

Learning outcomes
The student understands the basic principles of supervision and knows what requirements are set for the cooperation between a supervisor and a subordinate. The student knows the duties and responsibilities of a supervisor in compliance with labour legislation and occupational safety issues. The student gains the ability to develop their own leadership skills.

AT00CB37 Construction contracting: 3 ECTS

Learning outcomes
The student knows the tasks of construction, documents related to construction and tendering, design and implementation contracts and construction project principles
in standard contracts. The student is familiar with the types of contracts used in the construction industry and related procedures and is able to assess their suitability. The student knows the duties of a builder and a site supervisor, as well as responsibility issues.

AT00CB38 Project work: 6 ECTS

Learning outcomes
Building technology:
The student understands the different stages of the process of a data model-based building project and is able to draw up data model-based plans and utilise models in different phases of the project.
The student understands the whole formed by the different phases of a building project.
The student has the presentation and representation skills needed in the engineering profession as well as research
The student has the presentation and representation skills needed in the engineering profession as well as research reporting.
Project work can be carried out as applicable work assignments.

Infrastructure technology:
The student is able to prepare an extensive network project planning project or a study of a project entity to be
defined separately. The student is able to work in a multidisciplinary design team
as a member. The student is able to prepare a design work based on data models for contract calculation.
The student has the presentation and representation skills needed in the engineering profession as well as research reporting.
Project work can be carried out as applicable work assignments

TLPRINFRA22S-1003 Complementary Competence: 60 ECTS

TLPRINFRA22S-1012 Civil engineering I: 15 ECTS

AT00CD32 Basics of road engineering: 4 ECTS

Learning outcomes
The student is familiar with the road design stages and the legislation that applies to them. The student knows the principles of traffic engineering dimensioning and geometry design and is able to take into account the basics of sustainable development in their work.

AT00CD33 Design of Street Structures: 5 ECTS

Learning outcomes
The student understands the importance of zoning in street design and knows the street planning stages and related legislation. The student knows how to dimension the street and understands the principles of geometric design.

AT00CD34 InfraCAD and BIM: 3 ECTS

Learning outcomes
The student is able to produce a terrain model from the given data, design fairways
and water supply networks with software typically used in the field, and produce mass and volume data from the plans.

AT00CD35 Basics of Railway Engineering: 3 ECTS

Learning outcomes
The student has an overall understanding of railway-related elements, equipment, facilities and operating models and their relationship to the environment. The student is familiar with the technical railway regulations and instructions, on the basis of which they know the prerequisites for working in railway areas and railway-related planning, and is able to read track plans.

TLPRINFRA22S-1014 Civil engineering II: 15 ECTS

AT00CD36 Hydrology and Hydraulic Engineering: 3 ECTS

Learning outcomes
The student understands the quantities of hydrology and masters their measurement methods, is able to interpret observational data and acquire the initial data required for construction projects. The student understands the principles of hydrostatics and the dimensioning and calculation of losses in pipes and open streams, is able to perform simple dimensioning tasks and understands how discharge is conducted from openings and overflow dams.

AT00CD37 Design of roads: 4 ECTS

Learning outcomes
The student is able to plan the cross-section of a road, geometries, drainage, structures and the placement of road-related devices and equipment.

AT00CD38 Network Engineering: 3 ECTS

Learning outcomes
The student knows the methods of new construction and renovation of the water supply network and the materials used for them. The student is able to take into account the occupational safety aspects of building a water supply network.

AT00CD39 Network design: 5 ECTS

Learning outcomes
The student is able to design a simple water supply network and choose suitable devices and equipment for it, and is able to place structures in a design environment.

TLPRINFRA22S-1013 Civil engineering III: 15 ECTS

AT00CD40 Intersections and Transportation Systems: 3 ECTS

Learning outcomes
The student understands the connection between traffic and land use, the basics of traffic studies and the variations in traffic. He knows the factors that affect traffic safety as well as the basics of

traffic management. The student is familiar with the intersection types and is able to design an at-grade intersection.

AT00CD41 Environmental Geotechnology: 3 ECTS

Learning outcomes
The student develops geotechnical thinking and problem solving skills; adopts information retrieval methods and presentation skills in the field; knows the importance of the soil in zoning; adopts the basics of environmental geotechnical design and construction.

AT00CD42 Maintenance of Infrastructure: 3 ECTS

Learning outcomes
The student is familiar with the life cycle thinking of traffic routes and is able to apply it to traffic route maintenance. The student knows the mechanisms of damage to superstructures and the main principles of care and renovation.

AT00CD43 Surveying Technology and Automative Machinery: 3 ECTS

Learning outcomes
The student knows the main regulations and instructions for infrastructure measurement as well as typical site measurements. The student knows the basics of machine control modelling and laser scanning.

KTE2190 Basics of Bridges Engineering: 3 ECTS

Learning outcomes
.The student knows the different types of bridges and their applications: they can use tables to dimension bridge loads, are able to draft a general drawing of a bridge, they identify bridge construction methods and and are able to formwork, construct scaffolding and conduct reinforcement work, they know the quality requirements of bridges and master maintenance and repair work.

TLPRINFRA22S-1015 Optional module: 15 ECTS

TLPRINFRA22S-1004 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

TLPRINFRA22S-1005 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.