17.02.2025

Curriculum at LAB University of Applied Sciences
2025-2026

Bachelor of Engineering, Biomaterials and Food Technology (in Finnish) 25S, full-time studies, Lahti

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TLTIBET25S-1039	**CORE COMPETENCE**					**195**
TLTIBET25S-1053	**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
TLTIBET25S-1042	**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
TLTIBET25S-1002	**Professional Core Competence**					**175**
TLTIBET25S-1052	**Mathematics**					**15**
AT00DC94	Basics of Algebra	3				3
AT00DD73	Geometry and Vectors	3				3
AT00DC97	Functions and Equations		3			3
AT00DF33	Derivation and Integration		3			3
AT00DC99	Statistical Mathematics			3		3
TLTIBET25S-1043	**Physics and Chemistry**					**10**
AT00BT70	Basic studies in physics	3				3
AT00DD01	Physics of Enviromental Engineering		3			3
AT00DD02	Basic Chemistry	4				4
TLTIBET25S-1028	**Introduction to Bio-Based Solutions**					**15**
AT00DF59	Food System as an Operating Environment	5				5
AT00DD82	Basics of Biochemistry and Microbiology	5				5
AT00DF60	Basics of Nutrition and Food Knowledge	5				5
TLTIBET25S-1054	**Basics of Process and Food Technology**					**15**
AT00DE65	Introduction to Process Engineering	5				5
AT00DF65	Basics of Food and Packaging Technology	5				5
AT00DF66	Food Hygiene, Safety, and Control	5				5

TLTIBET25S-1044 Multipurpose Biomaterials						**15**
AT00DF62	Introduction to Biomaterials		5			5
AT00DF61	Bioproducts and their Manufacturing		5			5
AT00DD27	Utilization of Side Streams and Waste Prevention		5			5
TLTIBET25S-1055 Beverage Processes						**15**
AT00DF67	Water and Beverages		5			5
AT00DF68	Advanced Beverage Technology		5			5
AT00DF69	Food Chemistry and Analytics		5			5
TLTIBET25S-1045 Grain Processes						**15**
AT00DF63	Grain Crops and Cereal Products			5		5
AT00DF64	Advanced Grain Technology			5		5
AT00DD88	Sensory Analysis			5		5
TLTIBET25S-1033 Consumer-Driven Product Development						**15**
AT00DE63	Product and Business Idea Design			5		5
AT00DF58	Innovation and Product Development Project			5		5
AT00DF93	Research Methods and Reporting			5		5
TLTIBET25S-1061 Automation and Mechanical Engineering						**15**
TLTIBET25S-1009 Practical Training						**30**
HA00CD55	Practical Training		10			10
HA00BU60	Practical Training 2		5	5		10
HA00BU61	Practical Training 3			10		10
TLTIBET25S-1010 Thesis						**15**
AO00BU62	Thesis Planning				5	5
AO00BU63	Thesis Project				5	5
AO00BU64	Thesis Report				5	5
TLTIBET25S-1011 COMPLEMENTARY COMPETENCE						**45**
TLTIBET25S-1064 Project Studies						**15**
AT00DG13	Project Studies					0
AT00DG14	Project Studies 2					0
AT00DG15	Project Studies 3					0
TLTIBET25S-1062 Production Economy						**15**
TLTIBET25S-1066 Sustainable Forestry						**5**
AT00DE87	Wood-based Material Flows					0
TLTIBET25S-1065 Digital Applications						**5**
AT00DE77	CAD and 3D Modelling					0
TLTIBET25S-1056 Introduction to Sustainable Solutions Engineering						**15**
AT00CH98	Climate Change and Sustainability					0
AT00DE62	Environmental Cycles and Sustainable Bioeconomy					0
AT00DE78	Technical Cycles					0
TLTIBET25S-1057 Sustainable Material Management						**15**

AT00DE75	Waste Management, Recycling and Circular Economy					0
AT00DE80	Material Efficiency and Sustainable Materials					0
AT00DE81	Sustainable Life Cycle of Product					0
TLTIBET25S-1058	**Environmental, Quality and Project Management**					**15**
AT00DF38	Quality Management systems, Standards and Auditing					0
AT00DF39	Sustainability Reporting					0
AT00DF04	Project Management					0
TLTIBET25S-1059	**Sustainable Water Management**					**15**
AT00DF09	Water Quality Management					0
AT00DF10	Wastewater Management					0
AT00DF11	Industrial and Urban Water Management					0
TLTIBET25S-1060	**Manufacturing Technologies for Food Product Groups**					**30**

TLTIBET25S-1039 CORE COMPETENCE: 195 ECTS

TLTIBET25S-1053 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 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

TLTIBET25S-1042 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.

TLTIBET25S-1002 Professional Core Competence: 175 ECTS

TLTIBET25S-1052 Mathematics: 15 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

AT00DD73 Geometry and Vectors: 3 ECTS

Learning outcomes
The student is able to
- solve the angles and sides of different types of triangles and use similarity
- solve geometric problems
- knows basics of vectors in plane and space

AT00DC97 Functions and Equations: 3 ECTS

Learning outcomes
The student is able to
- identify different types of functions and their graphs
- methods for solving inequalities and special equations
- system of equations and matrices

AT00DF33 Derivation and Integration: 3 ECTS

Learning outcomes
The student is able to
- basics of derivation and applied in optimization
- basics of integrals and apply integration to calculate areas and volumes

AT00DC99 Statistical Mathematics: 3 ECTS

Learning outcomes
The student is able to
- basics of probability calculation and statistical mathematics
- use the software as a data analysis tool

TLTIBET25S-1043 Physics and Chemistry: 10 ECTS

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

AT00DD01 Physics of Enviromental Engineering: 3 ECTS

Learning outcomes
The student is able to
- describe the electronic phenomena behind the development of technology
- solve mathematical problems in electrical sciences, hydrostatics, hydrodynamics and thermodynamics
- conduct physical measurements and draft a proper report on their findings
- apply digitalisation in the processing of results

AT00DD02 Basic Chemistry: 4 ECTS

Learning outcomes
The student is able to
- to understand the meaning of the chemistry as an essential part of engineering
- to know the atomic structure and chemical bonds
- to describe and identify common inorganic compounds as well as the groups and structures of organic compounds.
- to use the basic chemical equations and reactions
- use the electrochemical series of metals
- to compute acid and base calculations s and explain the basics related to acid-base titration

TLTIBET25S-1028 Introduction to Bio-Based Solutions: 15 ECTS

AT00DF59 Food System as an Operating Environment: 5 ECTS

Learning outcomes
The student is able to
- describe the actors, functions, and significance of the Finnish food system
- perceive the Finnish food system as part of the circular bioeconomy and the global food system
- explain the fundamentals and differences of various production methods (such as conventional and organic) from the perspective of different stakeholders in the food system
- search for information on production volumes in primary production and the food industry, food consumption, as well as imports and exports
- describe the major sustainability challenges of the food system and assess the possibilities of its actors to respond to these challenges

AT00DD82 Basics of Biochemistry and Microbiology: 5 ECTS

Learning outcomes
The student is able to
- describe the basic structures and roles of the most essential biochemical compounds
- explain the basic principles of the structure and function of eukaryotic and prokaryotic cells as well as viruses, and identify their distinctive characteristics
- describe the key biochemical reactions relevant to food and biomaterials
- describe the fundamentals of taxonomy, structure, function, and application of the key microbes relevant to food and biomaterials
- describe the fundamentals of microbial growth and the principles of influencing it

AT00DF60 Basics of Nutrition and Food Knowledge: 5 ECTS

Learning outcomes
The student is able to
- name the key nutrients and describe their absorption, physiological roles, and requirements
- describe the dietary intake of key nutrients from different food groups and among various population groups in Finland
- describe the basic principles of the Finnish national nutrition recommendations (2024).
- search for the nutritional values of foods from the Fineli database and food labeling, and based on this information and the recommendations, assess the nutritional quality of individual foods and diets
- describe the most common diets (including special diets) and food trends, and evaluate the

relationship between dietary choices, nutrition, and health (including disease risk)
- evaluate their own diet in relation to the nutrition recommendations

TLTIBET25S-1054 Basics of Process and Food Technology: 15 ECTS

AT00DE65 Introduction to Process Engineering: 5 ECTS

Learning outcomes
The student is able to
- interpret line and process diagrams
- conduct risk assessments, including HAZOP and HAZID
- implement design concepts from initiation through completion
- understand the role of predictive maintenance
- understand the principles of Lean Manufacturing, Green Engineering, and Best Available Techniques (BAT)
- understand how, especially SDGs 8, 9, 12 & 13, are linked to the course´s themes to promote more sustainable solutions

AT00DF65 Basics of Food and Packaging Technology: 5 ECTS

Learning outcomes
The student is able to
- describe the most typical unit processes used in food production
- outline the overall process required for the production of a selected food product
- evaluate the effects of key variables in a selected production process on the quality of the end product
- describe the properties and applications of the most common food packaging materials
- describe the basics of the recycling of food packaging and its environmental impacts
- describe the basics of legislation on food packaging labeling

AT00DF66 Food Hygiene, Safety, and Control: 5 ECTS

Learning outcomes
The student is able to
- identify the major chemical and microbiological risks in food safety
- explain how food safety is managed using the HACCP system
- describe the hygiene regulations and guidelines for different food groups (equivalent to the knowledge required for the hygiene passport)
- name the key microbes (bacteria, molds, and viruses) that cause food spoilage and foodborne illnesses and describe how they can be controlled
- describe the basics of legislation on food safety
- describe the basics of Finnish food control, including the self-monitoring system

TLTIBET25S-1044 Multipurpose Biomaterials: 15 ECTS

AT00DF62 Introduction to Biomaterials: 5 ECTS

Learning outcomes
The student is able to
- understand the fundamentals of the circular bioeconomy and recognize the potential of biomaterials from the perspectives of environmental impact and national economy
- identify key biobased raw materials and side streams, assess their quantities and availability, and describe the products manufactured from them
- describe the properties and characteristics of key biobased raw materials and side streams and their impacts on the production, use, and recycling of biomaterials
- assess the suitability of biobased raw materials and side streams for the production of various bioproducts

AT00DF61 Bioproducts and their Manufacturing: 5 ECTS

Learning outcomes
The student is able to
- identify key bioproducts and describe their properties, applications, and significance
- understand the fundamentals of physical and chemical unit processes used in bioproduct manufacturing
- describe the configuration and operation of common bioproduct plants (biorefineries)
- understand the principles of the selected bioproduct manufacturing process and analyze the factors affecting its profitability and environmental impact

AT00DD27 Utilization of Side Streams and Waste Prevention: 5 ECTS

Learning outcomes
The student is able to
- identify key side streams in the food system and forest industry, as well as the sources of loss
- analyze the suitability of side streams as raw materials for various low- and high-value-added products
- evaluate the economic benefits of side stream utilization and waste prevention (through profitability calculations) and the environmental benefits (through life cycle assessment).
- design a process or a study for the utilization of a selected side stream

TLTIBET25S-1055 Beverage Processes: 15 ECTS

AT00DF67 Water and Beverages: 5 ECTS

Learning outcomes
The student is able to
- explain the factors influencing the availability and quality of potable water used in food and beverage production
- explain the fundamentals of potable water treatment and hygiene
- explain the applications and importance of water in the food industry
- outline the process of manufacturing common industrial beverages, from raw materials to final products
- evaluate the effects of raw materials and processing parameters on beverage quality
- describe the basics of legislation related to potable water and beverages

AT00DF68 Advanced Beverage Technology: 5 ECTS

Learning outcomes
The student is able to
- calculate the required inputs per production unit for selected beverages
- produce various beverages on a laboratory or pilot scale
- determine the key quality characteristics of the produced beverages
- explain the specific characteristics of sanitation in beverage production
- apply quality management methods, including self-monitoring, in beverage production

AT00DF69 Food Chemistry and Analytics: 5 ECTS

Learning outcomes
The student is able to
- describe the basic structures and properties of key macro- and microcomponents in foods
- explain the basics of key reactions of food components (including oxidation, hydrolysis, and the Maillard reaction)
- explain the basic techniques of chemical analysis of foods
- work safely in a laboratory
- perform key compositional analyses of foods
- analyze and interpret results obtained from foods in the laboratory

TLTIBET25S-1045 Grain Processes: 15 ECTS

AT00DF63 Grain Crops and Cereal Products: 5 ECTS

Learning outcomes
The student is able to
- explain the characteristics and applications of major cereal and legume crops
- explain the fundamentals of common processing methods for cereals and legumes (including milling, fermentation, baking, and extrusion)
- identify the most important grain crops and cereal-derived products for Finland
- define the key physical and chemical phenomena related to cereal products (including starch gelatinization, protein denaturation, and enzymatic reactions)

AT00DF64 Advanced Grain Technology: 5 ECTS

Learning outcomes
The student is able to
- explain common processing methods for cereals and legumes at an advanced level
- identify the technological characteristics and potential of domestic cereals
- produce cereal and bakery products in practice
- perform compositional and structural analyses (e.g., viscosity, texture) of produced products in the laboratory, and analyze and interpret the results

AT00DD88 Sensory Analysis: 5 ECTS

Learning outcomes
The student is able to
- explain the basics of sensory perception, with a focus on the chemical senses (taste, smell, and chemesthesis)
- describe the foundations and characteristics of the main types of sensory evaluation techniques (analytical sensory tests and consumer sensory studies)
- explain the main sensory evaluation techniques
- determine a suitable sensory evaluation method and panel composition for various applications
- plan and conduct an analytical sensory study and a consumer sensory study
- analyze, interpret, and report the results of a sensory study

TLTIBET25S-1033 Consumer-Driven Product Development: 15 ECTS

AT00DE63 Product and Business Idea Design: 5 ECTS

Learning outcomes
The student is able to
- apply business idea, product development and innovation methods, incorporating Ecodesign principles and regulatory frameworks
- use the Business Model Canvas to develop and evaluate business models, including circular economy approaches
- create and deliver presentations on product concepts, receiving and incorporating feedback for improvement
- implement participatory design and co-creation methods to involve stakeholders in developing sustainable solutions
- analyse ethical considerations in innovation and leverage open innovation and crowdsourcing to support sustainable product and business development
- understand how, especially SDGs 8, 9, 12 & 17, are linked to the course´s themes to promote more sustainable solutions

AT00DF58 Innovation and Product Development Project: 5 ECTS

Learning outcomes
The student is able to
- outline the typical stages and working methods of the innovation process (including the product development process)
- explain the unique aspects of product development in food and biomaterials
- gather information about the needs and characteristics of different markets (domestic and export) and consumer segments, and apply this information to innovation
- conduct a practical innovation project on a selected topic and present the results

AT00DF93 Research Methods and Reporting: 5 ECTS

Learning outcomes
The student is able to
- recognize the phases of the thesis process and the structure of a research plan
- conduct information searches and critically evaluate sources
- describe the key research methods and the principles of research ethics applicable to their field of

study
- design and conduct a small-scale research exercise on a selected topic
- analyze the collected research data, assess the reliability of the results, and draw conclusions
- report the research exercise applying the thesis writing guidelines

TLTIBET25S-1061 Automation and Mechanical Engineering: 15 ECTS

TLTIBET25S-1009 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

TLTIBET25S-1010 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.

TLTIBET25S-1011 COMPLEMENTARY COMPETENCE: 45 ECTS

TLTIBET25S-1064 Project Studies: 15 ECTS

AT00DG13 Project Studies: 5 ECTS

Learning outcomes
For 1.-2. year students learning outcomes for early study phase are applied, and for 3.-4. year students learning outcomes for the graduation phase.

Early-skill stage/learning outcomes:
The student is able to
- use the concepts related to the project topic and theme and shows familiar with the paternity-related project data base
- discribe the rationale, needs and criteria for project activities
- work in projects in accordance with the administration
- apply professional methods and working practices related to the project topic
- operate safely, ethically and customer-oriented project
- action required by the project in interactive situations
- operate safely, ethically and customer-oriented project

Graduation competence/learning outcomes:
The student is able to
- use the concepts related to the project in a coherent and justify their actions on the basis of the

knowledge base
- find starting points, needs and criteria for project activities
- to act purposefully, to assess the activity and make suggestions for improvement
- applied to the project a variety of different techniques, methods and ways of working
- operate safely, ethically and customer-oriented
- to act responsibly and in a target group and as otherwise required by the project in interactive situations

AT00DG14 Project Studies 2: 5 ECTS

Learning outcomes
For 1.-2. year students learning outcomes for early study phase are applied, and for 3.-4. year students learning outcomes for the graduation phase.

Early-skill stage/learning outcomes:
The student is able to
- use the concepts related to the project topic and theme and shows familiar with the paternity-related project data base
- discribe the rationale, needs and criteria for project activities
- work in projects in accordance with the administration
- apply professional methods and working practices related to the project topic
- operate safely, ethically and customer-oriented project
- action required by the project in interactive situations
- operate safely, ethically and customer-oriented project

Graduation competence/learning outcomes:
The student is able to
- use the concepts related to the project in a coherent and justify their actions on the basis of the knowledge base
- find starting points, needs and criteria for project activities
- to act purposefully, to assess the activity and make suggestions for improvement
- applied to the project a variety of different techniques, methods and ways of working
- operate safely, ethically and customer-oriented
- to act responsibly and in a target group and as otherwise required by the project in interactive situations

AT00DG15 Project Studies 3: 5 ECTS

Learning outcomes
For 1.-2. year students learning outcomes for early study phase are applied, and for 3.-4. year students learning outcomes for the graduation phase.

Early-skill stage/learning outcomes:
The student is able to
- use the concepts related to the project topic and theme and shows familiar with the paternity-related project data base
- discribe the rationale, needs and criteria for project activities
- work in projects in accordance with the administration
- apply professional methods and working practices related to the project topic

- operate safely, ethically and customer-oriented project
- action required by the project in interactive situations
- operate safely, ethically and customer-oriented project

Graduation competence/learning outcomes:
The student is able to
- use the concepts related to the project in a coherent and justify their actions on the basis of the knowledge base
- find starting points, needs and criteria for project activities
- to act purposefully, to assess the activity and make suggestions for improvement
- applied to the project a variety of different techniques, methods and ways of working
- operate safely, ethically and customer-oriented
- to act responsibly and in a target group and as otherwise required by the project in interactive situations

TLTIBET25S-1062 Production Economy: 15 ECTS

TLTIBET25S-1066 Sustainable Forestry: 5 ECTS

AT00DE87 Wood-based Material Flows: 5 ECTS

Learning outcomes
The student is able to
- assess the efficient use of wood raw material in different production processes
- understand the properties and potential uses of wood in different areas of industry
- identify the key stages of the wood products industry, pulp and bioenergy production and understand
their significance in the industry
- identify new opportunities in the utilization of bio- and wood-based materials in different industries
- apply the principles of the circular economy in the development of wood-based products and assess
the impacts of material recycling
- analyse the origin and environmental impacts of materials in a consumer product
- describe the manufacturing processes of the wood products industry, pulp and paper and assess their
environmental impacts
- be familiar with bioenergy production technologies and assess their sustainability

TLTIBET25S-1065 Digital Applications: 5 ECTS

AT00DE77 CAD and 3D Modelling: 5 ECTS

Learning outcomes
The student is able to
- use CAD software to create basic technical drawings and models
- interpret and modify CAD files to meet specific design requirements
- create 3D models for product design, visualization, and analysis

- apply general 3D modelling techniques for prototyping and simulation purposes
- understand file formats, export models, and integrate with other design software
- understand how, especially SDGs 4,9 & 12, are linked to the course´s themes to promote more sustainable solutions

TLTIBET25S-1056 Introduction to Sustainable Solutions Engineering: 15 ECTS

AT00CH98 Climate Change and Sustainability: 5 ECTS

Learning outcomes
The student is able to
- explain key environmental cycles and assess bioeconomy strategies for sustainability
- describe the greenhouse effect and evaluate its role and impact on climate change
- summarize the history and impacts of climate change on human and ecological systems
- assess the environmental impacts of natural resource use and propose sustainable alternatives
- understand and apply strategies for carbon capture, storage, and climate adaptation across sectors
- understand how, especially SDGs 6,7,12,13 & 15, are linked to the course´s themes to promote more sustainable solutions

AT00DE62 Environmental Cycles and Sustainable Bioeconomy: 5 ECTS

Learning outcomes
The student is able to
- explain critical environmental cycles (carbon, nutrient, water, air) and assess their roles in planetary sustainability
- evaluate the importance of biodiversity and ecosystem services in supporting life and resilience
- explain human impacts on environmental cycles
- understand climate feedback loops and how changes in one cycle affect others
- know circular bioeconomy principles and sustainability metrics to support ecological resilience and carbon sequestration
- understand how, especially SDGs 6, 12, 13,14 & 15, are linked to the course´s themes to promote more sustainable solutions

AT00DE78 Technical Cycles: 5 ECTS

Learning outcomes
The student is able to
- explain the role of technical and material cycles in supporting a circular economy
- evaluate responsible production and consumption practices for resources
- assess the impacts of sustainable and non-sustainable production on issues like pollution, climate change, and resource and nature depletion
- apply principles of circular economy to product and process design, with examples of circular models
- identify key policies and regulations that drive circular business development in various industries
- understand how, especially SDGs 9,12,13 & 15, are linked to the course´s themes to promote more sustainable solutions

TLTIBET25S-1057 Sustainable Material Management: 15 ECTS

AT00DE75 Waste Management, Recycling and Circular Economy: 5 ECTS

Learning outcomes
The student is able to
- understand the basic principles and policies of waste management
- identify technologies that support the circular economy, especially in the field of waste and side stream management
- apply concepts of recycling and upcycling within the framework of industrial symbiosis
- implement design for disassembly and reuse techniques to facilitate recycling, refurbishment, and repurposing of products
- understand how, especially SDGs 9,11, 12 & 13, are linked to the course´s themes to promote more sustainable solutions

AT00DE80 Material Efficiency and Sustainable Materials: 5 ECTS

Learning outcomes
The student is able to
- apply material flow cost accounting (MFCA) and principles of material efficiency auditing
- identify and evaluate the properties and applications of bio-materials and other common industrial materials
- develop strategies for managing critical raw materials that have high environmental impacts or scarcity concerns
- assess the role of biodegradable and compostable materials within the circular economy
- study material substitutions and sustainable alternatives to reduce reliance on toxic, critical and non-renewable resources
- understand how, especially SDGs 8, 9, 12, 13 & 15, are linked to the course´s themes to promote more sustainable solutions

AT00DE81 Sustainable Life Cycle of Product: 5 ECTS

Learning outcomes
The student is able to
- perform Life Cycle Assessment (LCA) calculations to evaluate the environmental impact of products
- understand and apply the basic principles of various LCA calculation tools
- use ISO 14040 standards to guide and structure LCA processes
- calculate and interpret carbon and material footprints as part of sustainability assessments
- present and analyse LCA results
- understand how, especially SDGs 9, 12, 13 & 15, are linked to the course´s themes to promote more sustainable solutions

TLTIBET25S-1058 Environmental, Quality and Project Management: 15 ECTS

AT00DF38 Quality Management systems, Standards and Auditing: 5 ECTS

Learning outcomes
The student is able to
- understand and explain key standard frameworks
- identify and interpret the requirements of quality management systems
- understand the requirements of relevant standards
- plan, conduct, and report audits
- understand how, especially SDGs 9, 12, 13 & 16, are linked to the course´s themes to promote more sustainable solutions

AT00DF39 Sustainability Reporting: 5 ECTS

Learning outcomes
The student is able to
- understand the fundamentals of Corporate Sustainability Reporting and the CSRD Directive
- apply the GRI standard for verifying sustainability reports and assess report accuracy
- explain the basics of the EU taxonomy, its reporting system, and its connection to sustainability reporting requirements
- analyse a company's CSR report and participate in a round table discussion to evaluate and discuss sustainability practices
- understand how, especially SDGs 8,9,12 & 16, are linked to the course´s themes to promote more sustainable solutions

AT00DF04 Project Management: 5 ECTS

Learning outcomes
The student is able to
- understand the role and importance of project management in achieving project goals
- create a basic project plan, outlining objectives, tasks, timelines, and resources
- implement and utilize essential project management tools to organize and track project progress
- demonstrate effective communication, teamwork, and digital skills within a project context
- identify and differentiate between various types of Sustainable Systems Engineering (SSE) projects
- understand how, especially SDGs 4. 8, 9 & 12, are linked to the course´s themes to promote more sustainable solutions

TLTIBET25S-1059 Sustainable Water Management: 15 ECTS

AT00DF09 Water Quality Management: 5 ECTS

Learning outcomes
The student is able to
- explain the structure and functions of aquatic ecosystems and assess their impacts on water supply
- analyse the hydrological cycle, including human impacts on water resources and flow patterns
- identify sources of potable water and evaluate methods for water treatment and purification
- understand and apply international laws, agreements, and water footprint assessment methods to manage water usage sustainably
- implement risk management principles and circular economy concepts for water, leveraging knowledge of water management institutions, frameworks, and emerging technologies
- understand how, especially SDGs 6, 12, 12, 14 & 15, are linked to the course´s themes to promote

more sustainable solutions

AT00DF10 Wastewater Management: 5 ECTS

Learning outcomes
The student is able to
- explain wastewater treatment methods and processes
- assess factors affecting wastewater treatment process
- describe sludge treatment methods and evaluate their role in wastewater management
- understand the dimensioning principles of wastewater treatment systems
- conduct laboratory experiments to analyse treatment processes, interpret results, and improve understanding of wastewater management techniques
- understand how, especially SDGs 6,12, 14 & 15, are linked to the course´s themes to promote more sustainable solutions

AT00DF11 Industrial and Urban Water Management: 5 ECTS

Learning outcomes
The student is able to
- perform calculations of water flows and water balance to support effective water management
- understand process water treatment methods to improve water quality in industrial systems
- assess stormwater management strategies, including the impacts of climate change on stormwater systems
- apply dimensioning calculations to design or evaluate water treatment and stormwater management solutions
- analyse the water-energy nexus, exploring how water and energy consumption are interdependent, and evaluate green infrastructure solutions like bioswales, rain gardens, and permeable pavements to manage stormwater sustainably
- understand how, especially SDGs 6,7,11,12 & 13, are linked to the course´s themes to promote more sustainable solutions

TLTIBET25S-1060 Manufacturing Technologies for Food Product Groups: 30 ECTS