11.08.2023

Curriculum at LAB University of Applied Sciences
2022-2023

Bachelor of Engineering, Information and Communications Technology 22S, part-time studies, online studies

Code	Name	1 y	2 y	3 y	4 y	ECTS total
TLTITVT22SV-1001	**CORE COMPETENCE**					**195**
TLTITVT22SV-1002	**Common Core Competence**					**15**
A300CE13	Orientation to Sustainability Thinking		2			2
AY00BT88	Developing Professional Competence 1	1				1
AY00BT89	Developing professional competence 2	1				1
AY00BT90	Developing Professional Competence 3		1			1
KS00BT59	Expert Communication Skills	4				4
KE00BT61	English for Work	4				4
KR00BU42	Swedish for Work, Spoken		1			1
KR00BU43	Swedish for Work, Written		1			1
TLTITVT22SV-1003	**Professional Core Competence**					**180**
TLTITVT22SV-1004	**Common Professional Core Competence**					**76**
TLTITVT22SV-1005	**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
AT00BT71	Physics in Information Technologies	3				3
TLTITVT22SV-1006	**Digitalization**					**15**
AT00BT72	Basics of Digitalization	5				5
AT00BT73	STEM of ICT	5				5
AT00BT74	IoT Basics		5			5
TLTITVT22SV-1007	**Basic of ICT**					**16**
AT00BT76	Basics of WWW design	5				5
AT00BT77	Telecommuncations and security basics	5				5
CT00CL97	Fundamentals of Programming	6				6
TLTITVT22SV-1008	**ICT and applications**					**15**
AT00BT78	Objects and databases	5				5
AT00BT79	Web and interactivity	3				3
AT00BT80	Server and workstation virtualization	4				4
AT00BT81	Basics of Project work	3				3

TLTITVT22SV-1009	**RDI and entrepreneurship**					**15**
AT00BY44	Research Seminar			5		5
AT00BY45	Entrepreneurship and Innovation			5		5
AT00BY46	Working Skills			5		5
TLTITVT22SV-1010	**Profiling Professional Core Competence**					**60**
TLTITVT22SV-1011	**Web and game technologies**					**15**
AT00BX89	Web and Game technologies basics		5			5
AT00BX90	Web and Game design		5			5
AT00BX91	Application of web and game technologies		5			5
TLTITVT22SV-1012	**IoT and embedded systems**					**15**
AT00BX92	IoT and embedded systems basics		5			5
AT00BY05	IoT and embedded systems design		5			5
AT00BY06	Applications of IoT and embedded systems		5			5
TLTITVT22SV-1013	**Software engineering**					**15**
AT00BY07	Software engineering and architecture		5			5
AT00BY08	Data structures and algorythms		3			3
AT00BY09	Programming languages		4			4
AT00BY10	Software maintenance and testing		3			3
TLTITVT22SV-1014	**Tele communication**					**15**
AT00CY67	LAN basics and redudancy		5			5
AT00CY68	Network monitoring and security		5			5
AT00BY13	Client-driven data networks		5			5
TLTITVT22SV-1015	**Media technology**					**15**
AT00BY14	Modelling		5			5
AT00BY15	Game design basics		5			5
AT00BY16	Audiovisual technologies		5			5
TLTITVT22SV-1016	**Digital technology**					**15**
AT00BY17	Embedded computers		5			5
AT00BY18	Electronics		5			5
AT00BY19	Digital technologies workshop		5			5
TLTITVT22SV-1017	**Web services**					**15**
AT00BY20	Javascript platforms			4		4
AT00BY21	Server technologies			4		4
AT00BY22	Frameworks			3		3
AT00BY23	Cloud computing			4		4
TLTITVT22SV-1018	**Mobile and game programming**					**15**
AT00BY24	Hybrid mobile programming			5		5
AT00BY25	Native mobile programming			5		5
AT00BY26	Advanced game programming			5		5
TLTITVT22SV-1019	**Visual design**					**15**

AT00BY27	User Interfaces and usability			5		5
AT00BY28	Web game environments			5		5
AT00BY29	Graphics communication			5		5
TLTITVT22SV-1020	**Game technology**					**15**
AT00BY30	Game modelling			5		5
AT00BY26	Advanced game programming			5		5
AT00BY32	New technologies			5		5
TLTITVT22SV-1021	**Data centers and server systems**					**15**
AT00BY33	Virtualization and Cloud services			5		5
AT00BY34	Servers and services			5		5
AT00BY35	Implementation of the service			5		5
TLTITVT22SV-1022	**Embedded programming**					**15**
AT00BY36	Basics of embedded programming				5	5
AT00BY37	Distributed Systems				5	5
AT00BY38	Applications of IoT				5	5
TLTITVT22SV-1023	**IoT systems and solutions**					**15**
AT00BY50	IoT development environments and systems			5		5
AT00BY51	IoT communication systems and monitoring			5		5
AT00BY52	IoT service client project			5		5
TLTITVT22SV-1024	**Embedded devices**					**15**
AT00BY39	IoT devices			5		5
AT00BY40	IoT and data transfer			5		5
AT00BY41	IoT Workshop			5		5
TLTITVT22SV-1025	**Practical Training**					**30**
HA00BU59	Practical Training 1	1,5	3	3	3	10
HA00BU60	Practical Training 2		2	4	4	10
HA00BU61	Practical Training 3			3,5	6,5	10
TLTITVT22SV-1026	**Thesis**					**15**
AO00BU62	Thesis Planning			2,5	2,5	5
AO00BU63	Thesis Project				5	5
AO00BU64	Thesis Report				5	5
TLTITVT22SV-1027	**COMPLEMENTARY COMPETENCE**					**45**
TLTITVT22SV-1028	**From data to machine learning**					**15**
AT00BY42	Data analysis and visualization			5	5	10
AT00BY43	Machine Learning			2,5	2,5	5

TLTITVT22SV-1001 CORE COMPETENCE: 195 ECTS

TLTITVT22SV-1002 Common Core Competence: 15 ECTS

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

AY00BT88 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 career path observing them
- act as a group member
- operate in the learning environments of LAB University of Applied Sciences
- picture their own field of studies and its future skills
- give feedback on tuition and services and thus participate in the development of education

AY00BT89 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

AY00BT90 Developing Professional Competence 3: 1 ECTS

Learning outcomes
The student is able to
- identify themselves as a learner and develop their own learning skills
- evaluate innovative or alternative future competences required in their own field
- recognize and aim their own competences to be in level with the future career requirements
- masters the professional concepts of their own field and is able to point out their competencies during job recruitment processes
- give feedback on tuition and services and thus participate in the development of education

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.

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.

TLTITVT22SV-1003 Professional Core Competence: 180 ECTS

TLTITVT22SV-1004 Common Professional Core Competence: 76 ECTS

TLTITVT22SV-1005 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

AT00BT71 Physics in Information Technologies: 3 ECTS

Learning outcomes
Student can
- explain thermal transfer methods and utilize them in ICT
- Evaluate wave motion and calculate with wave motion related quantities
- Analyze different ac-signals

TLTITVT22SV-1006 Digitalization: 15 ECTS

AT00BT72 Basics of Digitalization: 5 ECTS

Learning outcomes
The student is able to
- produce documents (word processing, spreadsheets and presentation) according to the needs of the activity
- configures computer's operating environment and basic settings
- connect a computer to a network and use it with security in mind
- utilize the mathematical operations and representations required in ICT environments

AT00BT73 STEM of ICT: 5 ECTS

Learning outcomes
Student can
- basics of electrical engineering and components
- basics of analogue and digital electronics
- utilize basics of statistics and probability in ICT

AT00BT74 IoT Basics: 5 ECTS

Learning outcomes
The student is able to
- work in a simple IoT development project
- design and implement a simple embedded IoT device
- explain the basics of the IoT pipeline

TLTITVT22SV-1007 Basic of ICT: 16 ECTS

AT00BT76 Basics of WWW design: 5 ECTS

Learning outcomes
Student is able to:
- describe meaning of markup languages and how thye work in www environment
- describe the most important web protocols
- create and publish responsive web page which is done by using HTML and CSS languages
- use basic techniques of image processing
- utiiize images on web pages and documentation

AT00BT77 Telecommuncations and security basics: 5 ECTS

Learning outcomes
The student is able to
- explain “how the Internet works” and describe the central services and their effects on the usability of the services provided by the Internet
- explain what components form Local Area Network (LAN) and what factors most affect its capacity and performance
- plan, implement, and test the most used services of a LAN and be able to connect the local area network to the Internet
- explain the functions and differences of a routers and switches and describe the content and

structures of packets, frames and other data network messages
- describe and take into account the risks and security threats connected to data communications and explain how a firewall works

CT00CL97 Fundamentals of Programming: 6 ECTS

Learning outcomes
On completion of this course student should:
- be able to use standard Python.
- be able to develop simple algorithms and implement them using the standard control structures.
- be able to use existing libraries and user defined functions when writing programs
- be able to write programs that promote code reuse.
- be able to write programs that correctly manipulate standard data and text files
- be able to handle exceptions thrown and writing own exception classes.
- be able to develop python programs that can read and update CSV files, for data analytics-based tasks at basic level.
- follow good coding guidelinesdevise strategies to test the programs developed.

TLTITVT22SV-1008 ICT and applications: 15 ECTS

AT00BT78 Objects and databases: 5 ECTS

Learning outcomes
The student is able to
- identify the object paradigm and its basic concepts
- design and implement applications in object-oriented language
- operate effectively in a modern software development environment
- organize the application structure to be maintained
- use files and databases to store application data
- perform database queries and data updates using databases

AT00BT79 Web and interactivity: 3 ECTS

Learning outcomes
A student can:
- utilize JavaScript language to create dynamic web content
- utilize open source JavaScript libraries
- use css-preprocessor in creation and modification of css files

AT00BT80 Server and workstation virtualization: 4 ECTS

Learning outcomes
The student is able to
· utilize their virtualization environment in software testing and in producing digital services.
· explain the strengths and weaknesses of the most common virtualization tools, and understands the differences between having a data center or using a public cloud computing services
· recognize the risks and security threats associated with using a data center or public cloud

computing services and explain the most common solutions used to minimize these problems
· plan, implement, and test the implementation and use of a software in a virtualized environment

AT00BT81 Basics of Project work: 3 ECTS

Learning outcomes
The student is able to
- describe the models, key concepts and stages of project activities
- document the project according to general practices
- work as a member of the project team

TLTITVT22SV-1009 RDI and entrepreneurship: 15 ECTS

AT00BY44 Research Seminar: 5 ECTS

Learning outcomes
The student is able to
- obtain information independently
- do research work using project work methods
- utilize the knowledge and skills gained in a practical project in the research work
- apply research information in practical projects
- write a written report and a seminar presentation
- critically examine professional texts and presentations
- use statistical and probabilistic mathematical methods

AT00BY45 Entrepreneurship and Innovation: 5 ECTS

Learning outcomes
The student knows how to:
- describe the foundations of internal, voluntary, and external entrepreneurship
- evaluate the business idea and its chances of success
- assess the strategic importance of innovation and innovation
- use different brainstorming methods
- analyze different innovation processes

AT00BY46 Working Skills: 5 ECTS

Learning outcomes
The student is able to
- define most important competences needed in work life
- act as an expert in different jobs
- define future work skills and challenges in work life
- categorize rules in work life
- interpret work life economy, human resources and leadership
- act actively in international IT-environments

TLTITVT22SV-1010 Profiling Professional Core Competence: 60 ECTS

TLTITVT22SV-1011 Web and game technologies: 15 ECTS

AT00BX89 Web and Game technologies basics: 5 ECTS

Learning outcomes
The student is able to
- evaluate the impact of network topology and technology on data transmission performance
- utilize LAN services in their own work (DHCP, VLAN, ARP)
- master the basics and maintaining of operating systems (Linux / Windows)
- explain the basic structures of a web application

AT00BX90 Web and Game design: 5 ECTS

Learning outcomes
The student is able to
- describe the importance of the visual user experience in applications
- Design and implement a simple modern web application
- apply image processing methods in the design of user interfaces
- Design and program a simple game

AT00BX91 Application of web and game technologies: 5 ECTS

Learning outcomes
The student is able to
- act as an expert in a small group and solve tasks together
- act as part of a project using agile project methods
- design web and game interfaces
- design and implement game environments

TLTITVT22SV-1012 IoT and embedded systems: 15 ECTS

AT00BX92 IoT and embedded systems basics: 5 ECTS

Learning outcomes
The student is able to
- work in a small team and solve tasks together
- generalize basics of embedded design
- explain OS basics and structure
- explain microprocessor architectures and types
- explain basic data transfer methods
- evaluate simple schematics and electronics' documents
- categorize IoT and embedded systems

AT00BY05 IoT and embedded systems design: 5 ECTS

Learning outcomes
The student is able to
- document basic circuits in electronics
- design a simple IoT solution
- design a simple embedded system program with an appropriate programming language
- design a simple application using standard system calls
- analyze and categorize IoT and embedded system design

AT00BY06 Applications of IoT and embedded systems: 5 ECTS

Learning outcomes
The student is able to
- design and implement basic electronic circuits
- implement a simple IoT solution
- implement a simple embedded system program with an appropriate programming language
- implement simple application using standand system calls
- expond an IoT and embedded system use in different applications

TLTITVT22SV-1013 Software engineering: 15 ECTS

AT00BY07 Software engineering and architecture: 5 ECTS

Learning outcomes
The student is able to
- explain different methods of software engineering
- use agile methods in software projects
- act as a software developer in multidisciplinary projects
- describe different software architectures and use them in development

AT00BY08 Data structures and algorythms: 3 ECTS

Learning outcomes
The student is able to
- justify the use of different basic data structures and algorithms in programming
- use basic data structures and algorithms in software design and implementation

AT00BY09 Programming languages: 4 ECTS

Learning outcomes
The student is able
- explains the object paradigm
- use different programming languages ??in the development of an object-based application
- use collection classes and their algorithms in different programming languages ??and apply them in different environments

AT00BY10 Software maintenance and testing: 3 ECTS

Learning outcomes
The student is able to
- design and use basic software testing methods
- use software maintenance systems
- design the software to be maintained

TLTITVT22SV-1014 Tele communication: 15 ECTS

AT00CY67 LAN basics and redudancy: 5 ECTS

Learning outcomes
The student is able to
- explain the impact of network topology and technology on the efficiency of data transfer
- utilize local area network services in their own work
- use the network analyzation tools and verify the networking protocols operation
- manage a workstation/server specific firewall, and understands the basics of packet filtering

AT00CY68 Network monitoring and security: 5 ECTS

Learning outcomes
The student is able to
- interconnect different parts of the data networks, and understands the differences between solutions and their impacts on performance as well as information security
- implement and connect a fault tolerant local area network into the Internet
- understand the most significant differences between different firewall technologies
- implement protection to the different network connected devices
- use network monitoring system to manage larger network entities

AT00BY13 Client-driven data networks: 5 ECTS

Learning outcomes
The student is able to
- act as a member of the project team as a data network expert
- guide and lead other specialist when it comes to their own area of expertise
- make conclusions based on the success of the client project

TLTITVT22SV-1015 Media technology: 15 ECTS

AT00BY14 Modelling: 5 ECTS

Learning outcomes
The student knows how
- explain the basic structure of 3D models
- preferably 3D models for different uses
- Create and edit 3D models with different techniques
- create and edit 3D model materials

- use the basic features of the 3D modeling program
- create digital visualizations

AT00BY15 Game design basics: 5 ECTS

Learning outcomes
The student knows how
- explain the basic principles of game design
- make use of playfulness in different contexts
- describe the importance of game testing in game development
- design a game design work process

AT00BY16 Audiovisual technologies: 5 ECTS

Learning outcomes
The student knows how
- produce and edit videos
- produce and edit audio
- produces post-production of audiovisual output
- analyze and categorize media distribution

TLTITVT22SV-1016 Digital technology: 15 ECTS

AT00BY17 Embedded computers: 5 ECTS

Learning outcomes
Student can
- Explain microprocessor circuits
- Choose microcontroller for different applications
- Put into use a microcontroller
- Make conclusions about embedded systems

AT00BY18 Electronics: 5 ECTS

Learning outcomes
Student can
- Define and name peripheral electronics
- Connect analogue and digital components
- Evaluate digital and analogue electronics from EMC and PCB design perspective
- Interpret peripheral electronics in different applications

AT00BY19 Digital technologies workshop: 5 ECTS

Learning outcomes
Student can
- Design embedded computer

- Implement embedded computer
- Analyze and interpret embedded computer design process and its outcome

TLTITVT22SV-1017 Web services: 15 ECTS

AT00BY20 Javascript platforms: 4 ECTS

Learning outcomes
The student is able to
- design an adaptive web interface
- implement a javascript based application on different implementation platforms
- expound the usability of the user interface

AT00BY21 Server technologies: 4 ECTS

Learning outcomes
The student is able to
- compare browser and server technologies
- implement a database-based server application
- work as a leading software expert in multidisciplinary web development projects

AT00BY22 Frameworks: 3 ECTS

Learning outcomes
Student is able to
- design and implement a modern web-application
- implement an asynchronous web-application
- use modern frameworks in implementing the web-application

AT00BY23 Cloud computing: 4 ECTS

Learning outcomes
Student is able to
- design and use document databases
- design and implement API interfaces using a programming language
- design and implement a scaleable microservice

TLTITVT22SV-1018 Mobile and game programming: 15 ECTS

AT00BY24 Hybrid mobile programming: 5 ECTS

Learning outcomes
The student is able to
- Act as a leading software expert in multidisciplinary game and mobile development projects
- Design and implement a hybrid mobile application
- design and implement responsive Mobile first and SPA applications

AT00BY25 Native mobile programming: 5 ECTS

Learning outcomes
The student is able to
- design a native mobile application
- implement a native mobile application
- compare the differences between hybrid and native mobile applications

AT00BY26 Advanced game programming: 5 ECTS

Learning outcomes
The student knows how
- design and implement 2D and 3D games for different game platforms
- take advantage of the physics of game engines
- make use of mathematics and physics to implement game dynamics

TLTITVT22SV-1019 Visual design: 15 ECTS

AT00BY27 User Interfaces and usability: 5 ECTS

Learning outcomes
The student knows how
- explain the meaning of the user experience
- design visual content for the web environment
- create user-friendly interfaces

AT00BY28 Web game environments: 5 ECTS

Learning outcomes
The student knows how
- Design content for the web game environment
- Implement a we-play environment
- compare and interpret technologies in the web gaming environment

AT00BY29 Graphics communication: 5 ECTS

Learning outcomes
The student knows how
- explain the importance of graphic communication in communication
- design content through graphic communication
- implement content through graphical communication

TLTITVT22SV-1020 Game technology: 15 ECTS

AT00BY30 Game modelling: 5 ECTS

Learning outcomes
The student knows how
- utilizes modelling in different environments
- take advantage of the advanced features of game engines
- Use new technologies in gaming and augmented reality applications

AT00BY26 Advanced game programming: 5 ECTS

Learning outcomes
The student knows how
- design and implement 2D and 3D games for different game platforms
- take advantage of the physics of game engines
- make use of mathematics and physics to implement game dynamics

AT00BY32 New technologies: 5 ECTS

Learning outcomes
A student can:
- describe different kind of new technologies
- compare suitability of technologies against own needs
- utilize some of new technologies presented on the course

TLTITVT22SV-1021 Data centers and server systems: 15 ECTS

AT00BY33 Virtualization and Cloud services: 5 ECTS

Learning outcomes
The student is able to
- describe and recognize the benefits of virtualization and cloud computing when it comes to improving the efficiency of ICT services
- plan and execute a digital service using virtualization and cloud computing in a chosen platform
- discuss and justify the choice of virtualization environment or cloud computing service as a platform for digital services

AT00BY34 Servers and services: 5 ECTS

Learning outcomes
The student is able to
- explain the possibilities of different server systems
- estimate the usability of different services
- design and implement various server systems with their services

AT00BY35 Implementation of the service: 5 ECTS

Learning outcomes
The student is able to
- act as an data network expert in a project
- direct other data network technology experts in his / her area of expertise
- direct other information technology project members in data network related questitions
- implement centralized online services in a customer-oriented and cost-conscious manner

TLTITVT22SV-1022 Embedded programming: 15 ECTS

AT00BY36 Basics of embedded programming: 5 ECTS

Learning outcomes
The student is able to
- explain the basics of operating systems in terms of software development
- implement an embedded system that utilizes a real-time operating system
- analyze the advantages and disadvantages of embedded programming

AT00BY37 Distributed Systems: 5 ECTS

Learning outcomes
Student is able to
- explain principles of distribution and data communications concerning distributed embedded systems
- explain the methods, communication protocols and implementation frameworks used in distributed systems
- design and implement an distributed application

AT00BY38 Applications of IoT: 5 ECTS

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

TLTITVT22SV-1023 IoT systems and solutions: 15 ECTS

AT00BY50 IoT development environments and systems: 5 ECTS

Learning outcomes
The student is able to
- explain IoT development environments and systems
- develop IoT systems
- analyze IoT development environments and systems

AT00BY51 IoT communication systems and monitoring: 5 ECTS

Learning outcomes
The student is able to
- explain IoT communication technologies
- describe IoT communication systems
- plan a secure IoT communication system
- have the knowledge and skills of Cisco CCNA (5 - 15 ects)

AT00BY52 IoT service client project: 5 ECTS

Learning outcomes
Student can
- act a specialist in a customer project
- lead a team in a customer project
- take into account the profitability of the project

TLTITVT22SV-1024 Embedded devices: 15 ECTS

AT00BY39 IoT devices: 5 ECTS

Learning outcomes
Student can
- Describe different memory types
- Design and implement simple IoT device
- Design I/O interface
- Make memory circuits with different types of memories

AT00BY40 IoT and data transfer: 5 ECTS

Learning outcomes
Student can
- Explain most common sensor types and busses
- Connect modules and memories
- Compare different data transfer methods and components

AT00BY41 IoT Workshop: 5 ECTS

Learning outcomes
Student can
- Design IoT application
- Implement a practical implementation of an IoT pipeline
- Analyze the outcome

TLTITVT22SV-1025 Practical Training: 30 ECTS

HA00BU59 Practical Training 1: 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

TLTITVT22SV-1026 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.

TLTITVT22SV-1027 COMPLEMENTARY COMPETENCE: 45 ECTS

TLTITVT22SV-1028 From data to machine learning: 15 ECTS

AT00BY42 Data analysis and visualization: 10 ECTS

Learning outcomes
The student is able to
- utilize mathematical methods to analyze and to predict phenomena
- utilize a modern statistical tool
- visualize data to identify its properties, analysis interpretation and to facilitate further processing

AT00BY43 Machine Learning: 5 ECTS

Learning outcomes
The student is able to
- take advantage of both supervised and unsupervised machine learning in an appropriate way
- implement the fitting of the machine learning model
- take advantage of the supply of cloud services
- take into account the ethical guidelines of the authorities and the technology industry
- make use of existing machine learning ecosystems and equipment