

LAUREA UNIVERSITY OF APPLIED SCIENCES

Complementary competence (bachelor's studies), Information and Communication Technologies, TON218SY

Operating environment

COMPLEMENTARY COMPETENCE IN BACHELOR'S DEGREE PROGRAMMES

Elective studies compiled into modules

Elective studies are a part of completing a university of applied sciences degree. Complementary modules make it possible to deepen or extend your knowledge. The modules being offered at each campus are listed separately.

The modules comprise competence areas. A module typically includes at least two study units, but alternatively competence can also be developed in projects. Credits can also be gained through recognition of prior learning or demonstrations.

Complementary competence modules are also well-suited for further education for those students, who have completed a degree. Graduates can enrol in them as students of the Open University of Applied Sciences.

Modules further competency in a subject area

The scope of a module is 15 - 30 credits. Complementary competence modules support individual study paths and competence. Complementary competence modules that are compatible with the student's professional goals can include in his/her degree. The compatibility of the elective studies with the degree will be subject to prior agreement with the teacher tutor.

Learning is made relevant to workplace development and the student's personal goals. The learning outcomes specified for the modules build on future workplace needs and Laurea's focus areas.

Completion of studies

Campus-specific offering describes what studies the campus has planned to offer over the course of a degree programme. Not all courses are held every year, rather a new list of available courses is planned and published each academic year according to demand.

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits. The study unit implementation plans specify the objectives, content and implementation form of the studies. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case.

The modules have been designed so that they can mainly be completed in the course of one or two semesters. Studies can be implemented either in Finnish or in English. The language of the implementation is decided for each semester and is visible in the study unit/project offer.

In order for a student to further their competency, we recommend that the student selects entire modules, but it is also possible for a student to select individual study units or projects from modules.

Flexible Possibilities for Completing Attainments and Specialising

Any studies in an institution of higher education can be counted as advanced competency. In addition to complementary competence studies presented in the curriculum the student can for example

- select complementary competence studies offered on Laurea's different campuses
- select a core competence module in another degree programme as their advance competency
- select studies from the common study offering gathered by Laurea, Haaga-Helia UAS and Metropolia UAS

Curriculum Development

The offering of the complementary modules is constantly under development to match the requirements of the working life and thus the offering may change during the studies. Up to date plans on the available advanced competency modules will be published each academic year.

1. year

Y	CORE COMPETENCE	
T	COMPLEMENTARY COMPETENCE	190
A923	LEARNING LANE: WEB AND MOBILE APP DEVELOPMENT	
R057	WEB DEVELOPMENT	
R0330	Web Content Management Systems	5
R0331	Dynamic Web Applications with Javascript	5
R0314	Web App Development with MEAN	5
R0315	Web App Development with PHP/SQL	5
R0332	Project: Web App Development with a PHP Framework	5
R0333	Project: Web App Development with a Javascript Framework	5
R058	MOBILE APPLICATION DEVELOPMENT	
R0334	Introduction to Mobile App Design and Development	5
R0316	Native Mobile Application Development	5
R0335	Building and Deploying Cross Platform Mobile Apps	5
R059	SOFTWARE PROGRAMMING	
R0317	Object-Oriented Programming with Java	5
R0337	Project: Developing an Application with an Object-Oriented Language	5
R0414	Programming with C	3
R0415	Programming with C#	3
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R0420	Object-oriented Programming with C++	3
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A924	LEARNING LANE: SECURE ICT INFRASTRUCTURE AND CYBER SECURITY	
A846	INFORMATION SECURITY MANAGEMENT	
R0318	Introduction to Information Security	5
R0319	Information Security Management	5
R0320	Information Security Development Project	5
A845	INFORMATION INFRASTRUCTURE AND SECURITY	
R0385	Internet Infrastructure and Security	5
A9185	Network Applications	5
R0386	Contemporary Issues in Networking and Network Security	5
R060	CYBERSECURITY TECHNOLOGIES	
R0321	Cybersecurity	5
R0322	Systems Security	5
R0323	Enterprise Applications Security	5
R0324	Network Security	5
R0325	Cybersecurity in Emerging Environments	5
R0326	Cybersecurity Applied Project	5

A925	LEARNING LANE: DEVELOPING DIGITAL SERVICES	
R061	DESIGN AND DEVELOPMENT OF DIGITAL SERVICES	
A9162	User-centered Design of Digital Services	5
R0328	Modelling of the Digital Service	5
A9165	Usability Testing and Evaluation	5
A9166	User Interface Design	5
E9967	Audiovisual Production	5
R0327	Planning and Implementation of Media Elements	5
R062	SOFTWARE DEVELOPMENT	
E9969	Software Testing	5
R0329	Defining and Designing a Software Product	5
E9955	Introduction to Linux Operating System	5
R020	OTHER COMPLEMENTARY COMPETENCES	
		190

A923 LEARNING LANE: WEB AND MOBILE APP DEVELOPMENT, 0 cr

Description:

See the modules below. Please note that not all are offered in English.

R057 WEB DEVELOPMENT, 30 cr

Description:

During this module, the student will learn and apply technologies and tools needed in the development of advanced websites and web based applications.

After completing this module, the student will be able to identify the role of advanced web development technologies and explain how they deliver value. The student will learn how to develop websites and web applications using technologies and tools that are currently adopted in the ICT field.

Responsible persons:

Not known; the module is not offered yet

R0330 Web Content Management Systems, 5 cr

The student is able to:

The student is able to

- identify the role of advanced web content management systems and explain how they deliver value
- compare the features, benefits and applicability of major web content management systems available in the market
- set up a development environment associated with a selected web content management system
- design, develop and implement websites using a selected web content management system

R0331 Dynamic Web Applications with Javascript, 5 cr

The student is able to:

The student is able to

- identify the role of client-side web technologies and explain how they deliver value
- compare the features, benefits and applicability of major client-side web technologies available in the market
- set up a development environment for implementing Javascript based web applications
- design, develop and implement dynamic and interactive web applications using Javascript based technologies

R0314 Web App Development with MEAN, 5 cr

The student is able to:

The student is able to

- describe the fundamentals of MEAN stack and how web developers can benefit from it
- install and configure a MEAN stack development environment
- design, develop and implement Node.js web applications
- implement server-side web scripts using Express.js framework
- implement server-side web scripts that interact with a relational and/or NoSQL database

R0315 Web App Development with PHP/SQL, 5 cr

The student is able to:

The student is able to

- develop and implement interactive web applications using PHP and relational databases
- use the PHP programming language to implement server-side scripts that interact with a relational database
- use online collaborative tools to build and deploy PHP based web applications
- manage the deployment process of PHP based web applications

R0332 Project: Web App Development with a PHP Framework, 5 cr

The student is able to:

The student is able to

- develop and implement interactive web applications using a PHP based development framework
- use current tools available in the market to build, deploy, and maintain a web application implemented with a PHP based framework

R0333 Project: Web App Development with a Javascript Framework, 5 cr

The student is able to:

The student is able to

- develop and implement interactive web applications using a Javascript based development framework
- use current tools available in the market to build, deploy, and maintain a web application implemented with a Javascript based framework

R058 MOBILE APPLICATION DEVELOPMENT, 15 cr

Description:

During this module, the student will learn design principles, technologies and tools needed for designing and developing mobile applications.

After completing this module, the student will be able to describe and apply key design and development frameworks for different mobile platforms. The student will be able to install and configure a development environment for a chosen mobile platform. S/he will be able to plan the design and implementation process of mobile applications.

Responsible persons:

Not known; the module is not offered yet

R0334 Introduction to Mobile App Design and Development, 5 cr

The student is able to:

The student is able to

- differentiate the app ecosystem and their pros and cons
- be able to describe the key technologies to develop applications for the major mobile platforms
- identify and apply a systematic approach for mobile app design
- implement app ideas with design principles: user experience (UX), user-centered design and mobile constraints
- work in a team to generate mobile app wireframe and paper prototype
- configure and use a development environment for a chosen mobile platform
- develop a simple mobile application prototype

R0316 Native Mobile Application Development, 5 cr

The student is able to:

The student is able to

- set up and use a development environment for Android
- understand the application structure
- design and implement user interfaces for mobile devices
- store data using local files and databases
- create responsive user interfaces that work across a variety of screen sizes
- utilize services provided by devices (Location data, camera etc.)
- build, test and deploy apps on Android devices

R0335 Building and Deploying Cross Platform Mobile Apps, 5 cr

The student is able to:

The student is able to

- plan and document the complete development process of a mobile application
- apply appropriate methods and technologies to build and deploy cross platform mobile apps
- apply collaborative development with online tools (Github) and version control
- differentiate production and maintenance process of Web and Mobile apps
- learn and describe monetizing with mobile and web apps

R059 SOFTWARE PROGRAMMING, 15 cr

Description:

In this module students will extend their skills in software development and programming skills. Students will learn the Object-Oriented programming paradigm, which is the foundation used in modern web and mobile development frameworks. Student will also be able to learn programming languages currently used in the job market, and apply their skills in development projects.

Learning process:

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits.

In the projects you participate in the development work of domestic or international businesses and communities and in project work. The language used in the project can be either Finnish or English. Projects can also focus on developing the student's own business. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case. The competences generated in the projects can partly be included in the learning outcomes of some other module(s) and thus the credits can be divided between several modules.

Responsible persons:

Not known; the module is not offered yet

R0317 Object-Oriented Programming with Java, 5 cr

The student is able to:

The student is able to

- apply the principles of Object-Orientation programming
- design Object-Oriented applications using standard modeling methods
- use functionality from off-the-shelf libraries when developing an own application

R0337 Project: Developing an Application with an Object-Oriented Language, 5 cr

The student is able to:

The student is able to

- develop and implement desktop applications using a Object-Oriented programming language

- use current tools available in the market to build, deploy, and maintain a desktop application implemented with a Object-Oriented programming language

R0414 Programming with C, 3 cr

The student is able to:

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0415 Programming with C#, 3 cr

The student is able to:

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0416 Programming with Python, 3 cr

The student is able to:

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0417 Programming with PHP, 3 cr

The student is able to:

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0418 Programming with Ruby, 3 cr

The student is able to:

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0419 Basics of Programming with C++, 3 cr

The student is able to:

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0420 Object-oriented Programming with C++, 3 cr

The student is able to:

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0421 Programming with Python, 3 cr**The student is able to:**

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0422 Programming with C, 3 cr**The student is able to:**

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

R0423 Programming with C++, 3 cr**The student is able to:**

The student is able to

- use the fundamental syntax and building blocks of the given programming language
- plan, implement and test small-scale programs with the given programming language

A924 LEARNING LANE: SECURE ICT INFRASTRUCTURE AND CYBER SECURITY, 0 cr**Description:**

See the modules below. Please note that not all are offered in English.

A846 INFORMATION SECURITY MANAGEMENT, 15 cr**Description:**

The objective of the module is to understand, plan and implement information security management in an organization. The module will also enable the student to plan a comprehensive information security strategy and risk management system for an organization. The content of this module will provide the knowledge and skills to apply the basic principles of information security management, risk management, safeguarding and formulating continuity plans. The acquired knowledge and skills will be applied in a project concentrating on substance covered in the module.

Learning process:

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits.

In the projects you participate in the development work of domestic or international businesses and communities and in project work. The language used in the project can be either Finnish or English. Projects can also focus on developing the student's own business. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case. The competences generated in the projects can partly be included in the learning outcomes of some other

module(s) and thus the credits can be divided between several modules.

Responsible persons:

Leppävaara: Pasi Kämppe

R0318 Introduction to Information Security, 5 cr

The student is able to:

The student is able to

- use relevant concepts related to information security
- evaluate the importance of information security as a part of an organization's operations and the effect of information risks on an organization
- protect organizations against information security threats
- evaluate an organization's operations with regard to information security related legislation and standards

R0319 Information Security Management, 5 cr

The student is able to:

The student is able to

- evaluate the significance of different roles and the information security organization for the implementation of information security
- evaluate information risks directed at organizations systematically and apply risk management practices
- design an information security management system for an organization
- identify the essential elements of the auditing process and evaluate the possibilities of auditing to develop information security in an organization
- apply standards in the development of information security in an organization
- draw contingency plans for information systems

R0320 Information Security Development Project, 5 cr

The student is able to:

The student is able to

- recognize the need to develop information security
- plan, implement and document an information security development project for an organization
- apply the practices and techniques of project management

A845 INFORMATION INFRASTRUCTURE AND SECURITY, 15 cr

Description:

The objective of the module is to gain understanding of the infrastructure of and the operations in modern communication networks. After completing this module student is able to configure basic network services in a secure way and anticipate future security threats based on structural vulnerabilities in IP networks.

Learning process:

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits.

In the projects you participate in the development work of domestic or international businesses and communities and in project work. The language used in the project can be either Finnish or English. Projects can also focus on developing the student's own business. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case. The competences generated in the projects can partly be included in the learning outcomes of some other module(s) and thus the credits can be divided between several modules.

Responsible persons:

Leppävaara: Seppo Koponen

R0385 Internet Infrastructure and Security, 5 cr**The student is able to:**

The student is able to

- describe the operations and protocols in global IP networks
- calculate IP subnets and supernets
- describe security vulnerabilities in IP network infrastructure
- compare and contrast IPv6 to IPv4
- describe the functional concepts and security risks in wireless networking

A9185 Network Applications, 5 cr**The student is able to:**

The student is able to:

- develop and manage LAN services
- identify common network applications for companies and the security threats directed at them.

R0386 Contemporary Issues in Networking and Network Security, 5 cr**The student is able to:**

The student is able to

- study independently and in groups in a networks and security assignments
- present the results professionally in seminar meetings

R060 CYBERSECURITY TECHNOLOGIES, 30 cr**Description:**

The objective of the module is to learn and apply cybersecurity tools and techniques.

The students will learn important practices used to safeguard information and systems of companies in cyberspace. The students will gain knowledge and skills to manage vulnerabilities, threats and risks within organizations' information networks and cyberspace. The students can acquired knowledge and skills of cybersecurity technologies and current practices.

Learning process:

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits.

In the projects you participate in the development work of domestic or international businesses and communities and in project work. The language used in the project can be either Finnish or English. Projects can also focus on developing the student's own business. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case. The competences generated in the projects can partly be included in the learning outcomes of some other module(s) and thus the credits can be divided between several modules.

Responsible persons:

Not known; the module is not offered yet

R0321 Cybersecurity, 5 cr

The student is able to:

The student is able to

- describe the body of knowledge essential to cybersecurity
- take sole responsibility for running a cybersecurity project
- plan, implement, document and present a cybersecurity project

R0322 Systems Security, 5 cr

The student is able to:

The student is able to

- plan and apply the concepts of risk assessment, risk analysis and risk management
- apply a comprehensive and rigorous method for organisation's asset security
- identify threats, vulnerabilities and risks associated with organisation's systems
- protect and control information processing assets in centralized and distributed environments
- apply the Systems Development Life Cycle (SDLC) to security controls
- protect and control workstation and server environments

R0323 Enterprise Applications Security, 5 cr

The student is able to:

The student is able to

- protect information systems against malware and social engineering
- dissect and control sniffing, hijacking and denial-of-service (DoS) attacks
- identify threats, vulnerabilities and risks associated web applications and web servers
- protect and control web applications and web servers
- defend against SQL-injections and buffer overflow challenges

R0324 Network Security, 5 cr

The student is able to:

The student is able to

- plan and perform penetration testing
- apply covert techniques to scan and attack a network
- assess and prevent security gaps in a network infrastructure
- implement security controls to network security
- identify and apply tools and techniques used to evade IDS, firewalls, and honeypots

R0325 Cybersecurity in Emerging Environments, 5 cr

The student is able to:

The student is able to

- recognize current cybersecurity trends in emerging environments
- identify and analyze the opportunities and challenges of current cybersecurity tools and techniques
- plan, implement, document and present reasonable solutions for emerging cybersecurity challenge
- apply project management practices and techniques in selected cybersecurity topic

R0326 Cybersecurity Applied Project, 5 cr

The student is able to:

The student is able to

- identify and analyze the opportunities and challenges of current cybersecurity practices
- plan, implement, document and present reasonable solutions for cybersecurity challenges
- apply project management practices and techniques in selected cybersecurity topic

A925 LEARNING LANE: DEVELOPING DIGITAL SERVICES, 0 cr

Description:

See the modules below. Please note that not all are offered in English.

R061 DESIGN AND DEVELOPMENT OF DIGITAL SERVICES, 30 cr

Description:

The aim of the module is for students to learn about the design, implementation and development tasks associated with the digital service. The student works in accordance with the user-centred design process, making use of applied research and development.

Learning process:

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits.

In the projects you participate in the development work of domestic or international businesses and communities and in project work. The language used in the project can be either Finnish or English. Projects can also focus on developing the student's own business. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case. The competences generated in the projects can partly be included in the learning outcomes of some other module(s) and thus the credits can be divided between several modules.

Responsible persons:

Not known; the module is not offered yet

A9162 User-centered Design of Digital Services , 5 cr

The student is able to:

The student is able to

- apply user-centered design principles and methodologies in the development of digital services
- analyse the opportunities of user-centered design and implementation processes in the development of digital services
- conduct end-user research according to the ethical norms of the field

R0328 Modelling of the Digital Service , 5 cr

The student is able to:

Students are able

- to employ the user-centric techniques and description methods for designing and modelling a digital service
- to model digital services
- to conceptualise and produce appropriate and viable prototypes with reference to the design documents for the digital service

A9165 Usability Testing and Evaluation , 5 cr

The student is able to:

The student is able to

- apply usability testing methods and techniques in the design and implementation of research and development projects that support product and service planning
- plan, organize, analyse and report a usability test
- explain the principles of attainability
- evaluate the usability of a digital media product

A9166 User Interface Design, 5 cr

The student is able to:

The student is able to

- understand the standards related to user interfaces
- understand the significance of usability in user interfaces
- design user interfaces according to the principles of visual design
- design and implement user interfaces for digital services
- understand the latest techniques and tools used in the implementation of user interfaces

E9967 Audiovisual Production , 5 cr

The student is able to:

The student is able to

- create, edit and save audiovisual material
- utilize common production devices
- recognize distribution requirements for audiovisual material using different media forms
- design and manuscript audiovisual production

R0327 Planning and Implementation of Media Elements, 5 cr

The student is able to:

The student is able to

- creatively implement media elements using digital image, audio and video
- create vector graphics and animation and make use of them in digital media
- attach functionality and interaction to animation
- use common tools and methods in production process
- utilize latest technologies in creating digital media

R062 SOFTWARE DEVELOPMENT, 15 cr

Description:

On completion of the module, students know how to perform the various roles associated with the software development process. Students are proficient in the key methods and tools used in software development design, implementation and testing.

Learning process:

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits.

In the projects you participate in the development work of domestic or international businesses and communities and in project work. The language used in the project can be either Finnish or English. Projects can also focus on

developing the student's own business. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case. The competences generated in the projects can partly be included in the learning outcomes of some other module(s) and thus the credits can be divided between several modules.

Responsible persons:

Not known; the module is not offered yet

E9969 Software Testing, 5 cr

The student is able to:

The student is able to

- explain basic concepts, principles and terms of testing
- design test cases in different testing environments
- run functional and non-functional testing
- apply different testing methods and techniques
- report the results of testing reasonably
- analyze the relevance of testing
- sort different roles and tasks in software testing and understand their meaning

R0329 Defining and Designing a Software Product, 5 cr

The student is able to:

The student is able

- to apply methods of software engineering
- to communicate with customers in order to map needs and determine user requirements
- to document software requirements
- to design web applications
- to work responsibly in a software development team

E9955 Introduction to Linux Operating System , 5 cr

The student is able to:

The student is able to

- install Linux operating system
- modify OS according to requirements
- use desktop and command line interface
- create, modify and delete files and folders
- create command line scripts
- automate and schedule scripts
- maintain the system and its data security

Study unit description:

Kurssilla perehdytään Linux-käyttöjärjestelmän rooliin sekä mahdollisuuksiin osana yritysten tietojärjestelmiä. Kurssin aikana opiskelija tutustuu Linux-pohjaisten työasemien ja palvelimien käyttöön ja hallintaan. Aiheita ovat mm. käyttöjärjestelmän asentaminen ja konfigurointi, erilaisten palveluiden/palvelimien asennus ja ylläpito, tavallisimpien sovellusten käyttö, varmuuskopiointi, tietoturva-asiat sekä yksinkertaisten komentoriviohjelmien tuottaminen.

R020 OTHER COMPLEMENTARY COMPETENCES, 15 cr

Description:

The aim of the studies offered in this module is to develop student's basic knowledge and skills. The studies will give

basic abilities for the student to be able to manage on his/her studies in his/her field of studies. The student will conduct the appropriate studies from this module according to the initial tests or his/her needs. After completing the studies the student will have gained basic knowledge and skills to develop his/her skills to apply these competences.

Also other studies which develop professional skills can be offered in this module. Studies completed elsewhere can always be placed in this module.

Learning process:

The competences described in the module can be developed either by participating in study units or working in projects. Please note that in some education forms projects are the primary way of gathering credits.

In the projects you participate in the development work of domestic or international businesses and communities and in project work. The language used in the project can be either Finnish or English. Projects can also focus on developing the student's own business. The topic of the project and the competences developed by participating in it will be clarified when the project is added to the study offer. The scope of the project will be agreed on in each case. The competences generated in the projects can partly be included in the learning outcomes of some other module(s) and thus the credits can be divided between several modules.

Responsible persons:

Hyvinkää, sote: Terhi Hautaviita

Lohja, sote: Anu Elorinne

Porvoo: Erja Annola

Tikkurila: Marja Vellonen