

European Software
Skills Alliance.

Train the Trainer Programme

Annex II Developer EQF 6

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Train the Trainer Programme – Annex II – Developer EQF 6, 2023.

Deliverable 13: “ESSA Train the Trainer Programme & Materials”– Annex II

This document is a draft version and is subject to change after review coordinated by the European Education and Culture Executive Agency (EACEA).

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About ESSA

The European Software Skills Alliance (ESSA) is a four-year transnational project funded under the EU’s Erasmus+ programme. It ensures the skills needs of the rapidly evolving Software sector can be met — today and tomorrow.

ESSA provides current and future software professionals, learning providers and organisations with software needs with the educational and training instruments they need to meet the demand for software skills in Europe.

ESSA will develop a European Software Skills Strategy and learning programmes for Europe. It will address skill mismatches and shortages by analysing the sector in depth and delivering future-proof curricula and mobility solutions; tailored to the European software sector’s reality and needs.

Project partners

The ESSA consortium is led by DIGITALEUROPE. It is composed of academic and non-academic partners from the education, training, and software sectors.

View all project partners: [ESSA Partners](#) | [ESSA Associated Partners](#)

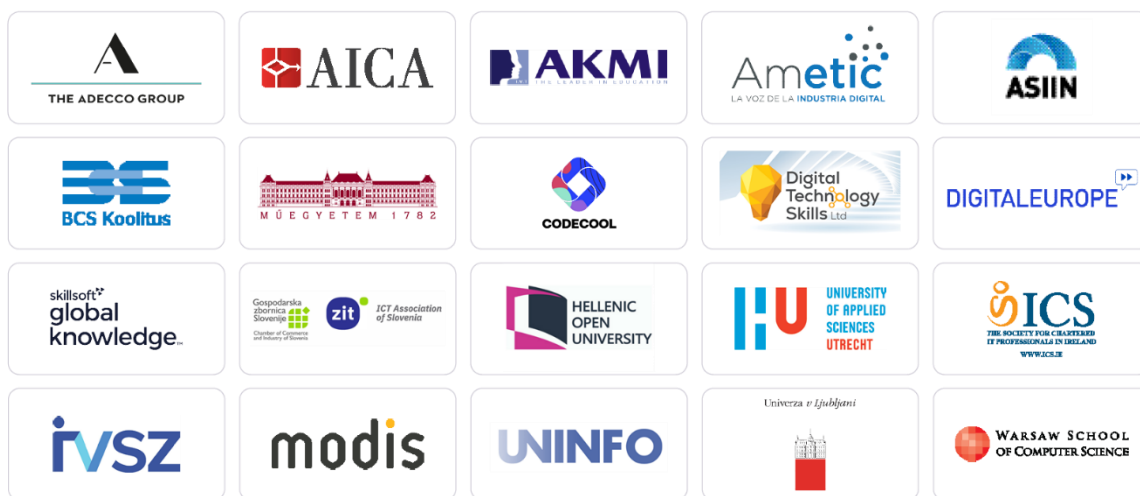


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List of abbreviations and acronyms

Abbreviation	Term
e-CF, EN 16234-1	European e-Competence Framework, European Norm 16234 - Part 1: Framework
ECTS	European Credit Transfer and Accumulation System
EQF	European Qualifications Framework
ESSA	European Software Skills Alliance
LO	Learning Outcome
PLO	Programme Learning Outcome

1. How to use the ESSA Learning programme for Developer EQF 6 profile

1.1 Introduction

In this Annex trainers, teachers and educators are provided with all information necessary to deliver the ESSA Learning Programmes designed for the Developer EQF 6 Educational profile.

The proposed two learning paths follow a modular and flexible structure based on Programme Learning Outcomes (PLOs). Each PLO includes self-consistent Learning Units (LUs) supported by specific learning materials.

In particular, this document provides:

- overall information for Learning Programme - Objective, Total number of Programme Learning Outcomes (PLOs) concerned, Total Learning Units (LUs), Overall duration (hours); Total number of ECTS; Targeted Institutions (learning providers);
- detailed Learning Programme including the Learning Units for each Programme Learning Outcome (PLO).

In this regard, more specifically, the following is provided for each Programme Learning Outcome (PLO):

- overall information (N. of Learning Units, Duration in hours, Total number of ECTS, Recommendations for Micro-credentials, possible integration with studies related to other PLOs, Recommended Didactical Approach, Recommended Delivery methods, etc);
- detailed information for each Learning Unit (Title, Duration in hours, Didactical Approach and delivery method, type of Assessment, Title of the related Learning material proposed, Link to access to the learning material - ESSA Platform).

This Annex is strictly related to the document “Train the Trainer Programme. DELIVERABLE 13 – ESSA Train the Trainer Programme & Materials”.

As a further support, it is advised to consult the documents indicated in the paragraph “Sources of reference” of the Deliverable 13 above mentioned, through the available links.

Learning materials developed to support the delivery of the ESSA Learning Programmes for this Educational Profile are available on the ESSA platform at the following link: <https://learn.softwareskills.eu/>.

1.2 Target

The following two Learning Programmes address two type of target groups:

- **IT-oriented students;**
- **People without ICT knowledge that want to reskill themselves quickly.**

2. How to deliver the ESSA Developer EQF 6 profile

2.1 IT-oriented students

2.1.1 2.1.1. Overall Information about the Learning Programme

Objective	<i>The programme aims to train university students to become an ICT specialist. Students learn smart and devise creative ICT solutions for business issues. The students don't get lessons nor exams but work fully on challenging projects for real clients from the start of the studies – it is therefore a practice-based learning approach. The students are coached in their learning, both on skills and competencies. The learning outcomes of the Open-ICT training program are based on the HBO-I professional tasks (elaborated by the HBO-I Foundation). This foundation is a partnership between the universities of applied sciences in the Netherlands that provide ICT education and the business community. The curriculum leverages a blended learning model, combining the presence classroom and virtual classroom. HBO Open-ICT lasts 8 semesters and the curriculum here present will be addressed to students from 1st and 2nd year.</i>
Total number of PLOs concerned	3
Total Learning Units	11
Duration	73,5 hours
Total number of ECTS	starting from 3 ECTS
Targeted Institutions	Higher Education Institutions

2.1.2 Learning Programme PLO 1 – Application Design [e-3]

Overall information PLO 1 – Application Design [e-3]	
N. of Learning Units	3
Learning Outcomes	<ul style="list-style-type: none"> - Explains and distinguishes principles and terminology of software design (e.g., phases in the design process, techniques, deliverables) - Describes principles of usability, UI/UX design, accessibility, privacy, security - Identifies needs of customers, users, stakeholders and formulates requirements and functional specifications - Creates functional and data modelling diagrams, using common languages and techniques (e.g., DFD, IDEF0, ERD, and UML) - Creates a database design - Designs a simple system architecture and interfaces using familiar technologies

	<ul style="list-style-type: none"> - Compares alternatives for a design and selects the most promising alternative(s), optimising the balance between cost and quality - Specifies a design for a software application or component, taking into account certain constraints/ requirements (e.g., the development environment, programming language, technology, requirements related to performance, security, accessibility, usability, privacy, ethics, safety, IS policy, cost, quality)
Duration	39 hours
Total number of ECTS	starting from 2 ECTS
Recommendations for Micro-credentials	This PLO is currently deployed in a 4-year bachelor programme and delivered for students in the first year.
Often integrated with studies of PLO	PLO 2
Recommended Didactical Approach	Presence Classroom Work placement
Additional comments	<p>Continuous feedback is given on the learning and creation process by other students, senior students, teachers in the role of coach and experts from the field. This takes place during the planning of the sprint, the execution of the work, the peer review of products, the delivery to the client, coaching sessions and knowledge sharing. We have continuous contact with the student from within the program and during the final assessment that takes place every ten weeks. As a result, we know exactly how the student is doing.</p> <p>In the final assessment, we look at the complete development of the student. We mainly ask ourselves whether the student is ready for the next phase. The complexity of projects increases every six months and students must be able to successfully fulfil their own role in a team more independently. Together with the development that the student has gone through in his general and substantive skills, we make a decision whether the student is allowed to continue to the next phase.</p>
Recommended Delivery methods	Lecture Case study. Individual/team project 100%
Additional comments	For grasping the fundamental concepts, language, and frameworks of software design, it's advisable to engage in lectures and e-learning. However, solidifying this knowledge is best achieved through hands-on assignments, real-world examples, and collaborative or solo projects.
Work Based Learning Task (If foreseen) and Follow-up, learning reinforcement	<p>Open-ICT training program are based on the HBO-I professional tasks (elaborated by the HBO-I Foundation). This foundation is a partnership between the universities of applied sciences in the Netherlands that provide ICT education and the business community.</p> <p>Open-ICT is characterized by agile project-driven education. Students therefore always work on real projects for our clients. Agile stands for short cyclical. Every two weeks the team thinks about what will be made and each student in the</p>

	<p>team looks at what he or she needs to learn for this. During the two weeks, making and learning alternate and at the end of each two weeks the work is delivered, and you receive feedback on your work and your learning ability. Through this form of education, you learn new general and ICT skills every two weeks and deliver real products every two weeks. With this working method we are 100% in line with how a company works and learns later. The materials are supporting the students learning.</p>
Important (new) approaches and technologies to consider	<p>Open ICT is based on new approaches to education, based on intrinsic motivation. The intrinsic motivation is maximal when students are allowed to make their own choices: autonomy, when students feel included in a learning community: connectedness, and when they develop self-confidence by learning in challenging tasks: feeling competent. Every semester the student chooses a professional role they want to deepen in line with the HBO-I professional tasks. In a development team, together with the client, they determine what they will make.</p> <p>Students work incorporating ways of working implemented in companies such as agile methods. The work and learning process of Open-ICT comes from the agile method of the software development industry, called SCRUM. Every two weeks, students think about what they are going to create as a team, by user stories. They will think of the necessary tasks for their own contribution within the team and what they have to learn in order to be able to perform a certain task (learning stories). By dividing this into sprints and properly guiding students, they can achieve learning objectives every two weeks and deliver working products. These quick results boost confidence and motivation.</p>
Training facilities (Link to ESSA learning material Platform)	<p>https://learn.softwareskills.eu/</p>

Learning Units PLO 1 – Application Design

LU1	Modelling	
MOD - Les 1 TICT-VIMOD-20 Intro Modelling and BPMN	Duration	1 hour and 30 minutes
	Didactical Approach and delivery method	Lecture and case study
	Additional information	Live classes
	Assessment	Practical assessment & Portfolio
MOD - Les 2 TICT-VIMOD-20 BPMN	Title of the Learning material	Introduction modelling and BPMN
	Duration	1 hour and 30 minutes
	Didactical Approach and delivery method	Lecture and case study
	Additional information	Live classes

	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>BPMN continuation</i>
<i>MOD - Les 3 TICT-VIMOD-20 Use Case</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Use Cases</i>
<i>MOD - Les 4 TICT-VIMOD-20 Activity Diagram and Intro DB</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Activity Diagram and Introduction databases</i>
<i>MOD - Les 5 TICT-VIMOD-20 Conceptual data model</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Data modelling – Conceptual data model</i>
<i>MOD - Les 6 TICT-VIMOD-20 Conceptual data model continuation</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Conceptual data model - continuation</i>
<i>MOD - Les 7 TICT-VIMOD-20 Logical data model</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>

	Title of the Learning material	<i>Logical data model</i>
<i>MOD - Les 8 TICT-VIMOD-20 Fysical data model</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Fysical data model</i>
<i>MOD - Les 9 TICT-VIMOD-20 SQL</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>SQL</i>
<i>MOD - Les 10 TICT-VIMOD-20 SQL continuation</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>SQL continuation</i>

LU2	Modelling and Orientation	
<i>MaO – 01 Introduction & BPMN</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>BPMN part 1</i>
<i>MaO - 02 BPMN deel 2</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>

	Title of the Learning material	<i>BPMN part 2</i>
<i>MaO - 03 Feedback BPMN</i>	Duration	<i>45 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Feedback BPMN</i>
<i>MaO - 03 requirements & use cases diagram</i>	Duration	<i>45 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Requirements + Use case diagram</i>
<i>MaO - 04 UML & Use case descriptions</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>UML & Use case description</i>
<i>MaO - 05 Introduction data modelling</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Introduction data modelling</i>
<i>MaO - 06 Business Rules & UI Design</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Business Rules & UI Design</i>
<i>MaO - 07 Class & Sequence diagram</i>	Duration	<i>1 hour and 30 minutes</i>

	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Class- & Sequence diagram</i>

LU3	Object oriented programming	
<i>OOP - VIOOP_ Object Oriented Programming</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Practice exam</i>
	Additional information	<i>Homework</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Object Oriented Programming Practice Exam</i>
<i>OOP - Week 8-DB en SQL 1</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Databases and SQL: Introduction databases and conceptual data model</i>
<i>OOP - Week 9 DB en SQL 2</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Databases and SQL: Logical and Fysical data model</i>
<i>OOP - Week1-Les02_wide</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>

	Title of the Learning material	<i>Classes, Objects & Operations</i>
<i>OOP - Week2-Les04_wide</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Relations between classes</i>
<i>OOP - Week3-Les05_wide</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Relations between classes</i>
<i>OOP - Week3-Les06_wide</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Strings, equals, ArrayList and Contains</i>
<i>OOP - Week4-Les07_wide</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Interfaces & Inheritance</i>
<i>OOP - Week5-Les09_wide</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and case study</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Graphical User Interfaces (JavaFX)</i>

2.1.3 Learning Programme PLO 2 – Application Development [e-3]

Overall information PLO 2 - Application Development [e-3]	
N. of Learning Units	3
Learning Outcomes	<ul style="list-style-type: none"> - Organises data and creates a structured dataset - Writes code and related documentation to it, using programming languages (e.g., Java, Javascript, PHP, Python) and tools (e.g., GitHub), applying programming principles (e.g., clean coding, green coding, secure programming) and other relevant practices, principles, or constraints (e.g., privacy legislation, intellectual property law) - Efficiently creates a working software component/ application taking into account design requirements and other relevant constraints (e.g., architecture, efficiency, cost, quality, energy consumption) and applying relevant tools and techniques (e.g., object-oriented programming; IDE, CASE; editors, compilers; version control management and tools; multimedia integration tools; app development tools; reuse of proved solutions) - Modifies an existing software component/ application, in order to optimize it (e.g., to improve maintenance, performance, security) - Participates in a development process, selecting and applying appropriate methods and techniques (e.g., a software development method such as agile, prototyping)
Duration	25,5 hours
Total number of ECTS	starting from 1 ECTS
Recommendations for Micro-credentials	This PLO is currently deployed in a 4-year bachelor programme and delivered for students in the second year.
Often integrated with studies of PLO	PLO 1
Recommended Didactical Approach	Presence Classroom e-learning Work placement
Additional comments	-
Recommended Delivery methods	Lecture Case study. Individual/team project
Additional comments	-
Work Based Learning Task (If foreseen) and Follow-up, learning reinforcement	Open-ICT training program are based on the HBO-I professional tasks (elaborated by the HBO-I Foundation). This foundation is a partnership between the universities of applied sciences in the Netherlands that provide ICT education and the business community.

	<p><i>Open-ICT is characterized by agile project-driven education. Students therefore always work on real projects for our clients. Agile stands for short cyclical. Every two weeks the team thinks about what will be made and each student in the team looks at what he or she needs to learn for this. During the two weeks, making and learning alternate and at the end of each two weeks the work is delivered, and you receive feedback on your work and your learning ability. Through this form of education, you learn new general and ICT skills every two weeks and deliver real products every two weeks. With this working method we are 100% in line with how a company works and learns later. The materials are supporting the students learning</i></p>
Important (new) approaches and technologies to consider	<p><i>Open ICT is based on new approaches to education, based on intrinsic motivation. The intrinsic motivation is maximal when students are allowed to make their own choices: autonomy, when students feel included in a learning community: connectedness, and when they develop self-confidence by learning in challenging tasks: feeling competent. Every semester the student chooses a professional role they want to deepen in line with the HBO-I professional tasks. In a development team, together with the client, they determine what they will make.</i></p> <p><i>Students work incorporating ways of working implemented in companies such as agile methods. The work and learning process of Open-ICT comes from the agile method of the software development industry, called SCRUM. Every two weeks, students think about what they are going to create as a team, by user stories. They will think of the necessary tasks for their own contribution within the team and what they have to learn in order to be able to perform a certain task (learning stories). By dividing this into 'sprints' and properly guiding students, they can achieve learning objectives every two weeks and deliver working products. These quick results boost confidence and motivation.</i></p>
Training facilities (Link to ESSA learning material Platform)	<p>https://learn.softwareskills.eu/</p>

Learning Units PLO 2 – Application Development [e-3]

LU1	Continuous Integration and Software Quality	
CISQ - 3 Test principles and patterns	Duration	1 hour and 30 minutes
	Didactical Approach and delivery method	Lecture and practical exercises
	Additional information	Live classes
	Assessment	Practical assessment & Portfolio
	Title of the Learning material	Test principles and patterns
CISQ - 4 Code coverage	Duration	1 hour and 30 minutes
	Didactical Approach and delivery method	Lecture and practical exercises

	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Coverage and mutation testing</i>
<i>CISQ - 7 Security</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Security</i>
<i>CISQ - 8 Bonus</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Bonus-lecture on Continuous Integration & Software Quality</i>
<i>CISQ -1 Introduction on Continuous Integration & Software Quality</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Introduction on Continuous Integration & Software Quality</i>

LU2	Modelling	
<i>MOD - Les 9 TICT-VIMOD-20 SQL</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>SQL</i>
<i>MOD - Les 10 TICT-VIMOD-20 SQL continuation</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>

	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>SQL Continuation</i>

LU3	Object oriented programming	
<i>OOP - Week1-Les01_wide</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Classes and Objects</i>
<i>OOP - VIOOP_ Practical Exam</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Practice exam</i>
	Additional information	<i>Homework</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Object Oriented Programming Practical Exam</i>
<i>OOP - Week 8-DB en SQL 1</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Databases and SQL: Introduction databases and conceptual data model</i>
<i>OOP - Week 9 DB en SQL 2</i>	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Databases and SQL: Logical and Fysical datamodel</i>

OOP - Week 10 DB en SQL 3	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Databases and SQL: SQL</i>
OOP - Week3-Les06_wide	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Strings, equals, ArrayList and Contains</i>
OOP - Week4-Les08_wide	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>OO: Polymorfism & Abstract Classes</i>
OOP - Week5-Les10_wide	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>JavaFX, controllers & events</i>
OOP - Week6-Les11_wide	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Input / Output (IO)</i>
Back end programming – (BEP) - VIBEP-19_Ies02	Duration	<i>1 hour and 30 minutes</i>
	Didactical Approach and delivery method	<i>Lecture and practical exercises</i>

	Additional information	<i>Live classes</i>
	Assessment	<i>Practical assessment & Portfolio</i>
	Title of the Learning material	<i>Multithreading</i>

2.1.4 2.1.4 Learning Programme PLO 4 – Testing [e-2]

Overall information PLO 4 – Testing [e-2]	
N. of Learning Units	5
Learning Outcomes	<ul style="list-style-type: none"> - Explains and distinguishes principles of software testing, common testing methods, techniques, and tools - Writes an (automated) test on a piece of code - Performs common test activities, applying testing and debugging techniques and tools - Records and interprets test outcomes and writes test result documentation/ test report
Duration	7,5 hours
Total number of ECTS	starting from n. 0,5 ECTS
Recommendations for Micro-credentials	<i>This PLO is currently deployed in a 4-year bachelor programme and delivered for students in the second year</i>
Often integrated with studies of PLO	<i>PLO 2</i>
Recommended Didactical Approach	Presence Classroom Work placement
Additional comments	-
Recommended Delivery methods	<i>Lecture Case study. Individual/team project</i>
Additional comments	-
Work Based Learning Task (If foreseen) and Follow-up, learning reinforcement	<p><i>Open-ICT training program are based on the HBO-I professional tasks (elaborated by the HBO-I Foundation). This foundation is a partnership between the universities of applied sciences in the Netherlands that provide ICT education and the business community.</i></p> <p><i>Open-ICT is characterized by agile project-driven education. Students therefore always work on real projects for our clients. Agile stands for short cyclical. Every two weeks the team thinks about what will be made and each student in the</i></p>

	<p>team looks at what he or she needs to learn for this. During the two weeks, making and learning alternate and at the end of each two weeks the work is delivered, and you receive feedback on your work and your learning ability. Through this form of education, you learn new general and ICT skills every two weeks and deliver real products every two weeks. With this working method we are 100% in line with how a company works and learns later. The materials are supporting the students learning.</p>
Important (new) approaches and technologies to consider	n/a
Training facilities (Link to ESSA learning material Platform)	https://learn.softwareskills.eu/

Learning Units PLO 4 – Testing [e-2]

LU1	CISQ – 2 Test automation
Duration	1 hour and 30 minutes
Didactical Approach and delivery method	Lecture and practical exercises
Additional information	Live classes
Assessment	Practical assessment & Portfolio
Title of the Learning material	Test automation

LU2	CISQ - 3 Test principles and patterns
Duration	1 hour and 30 minutes
Didactical Approach and delivery method	Lecture and practical exercises
Additional information	Live classes
Assessment	Practical assessment & Portfolio
Title of the Learning material	Test principals and patterns

LU3	CISQ - 5 Testen met collaborators
Duration	1 hour and 30 minutes
Didactical Approach and delivery method	Lecture and practical exercises
Additional information	Live classes
Assessment	Practical assessment & Portfolio

Title of the Learning material	<i>Testen met collaborators</i>
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LU4	CISQ - 6 Structure and test approach
Duration	<i>1 hour and 30 minutes</i>
Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
Additional information	<i>Live classes</i>
Assessment	<i>Practical assessment & Portfolio</i>
Title of the Learning material	<i>Structure and test approach</i>

LU5	CISQ – 8 Bonus
Duration	<i>1 hour and 30 minutes</i>
Didactical Approach and delivery method	<i>Lecture and practical exercises</i>
Additional information	<i>Live classes</i>
Assessment	<i>Practical assessment & Portfolio</i>
Title of the Learning material	<i>Bonus-lecture on Continuous Integration & Software Quality</i>

2.2 People without ICT knowledge that want to reskill themselves quickly

2.2.1 2.2.1. Overall Information about the Learning Programme

Objective	<i>The programme aims to reskill people to become an all-round software developer at level EQF6. The programme target group are people without ICT knowledge that want to reskill themselves quickly. The programme is well suited to be offered by VET and training institutes, both in more traditional settings, and also, for example, in more time- and location-independent settings, for example, in the case of distance learning institutes. As the programme focuses on a rapid reskilling and short route to the labour market, cooperation can be sought with labour market intermediaries.</i>
Total number of PLOs concerned	<i>4</i>
Total Learning Units	<i>4</i>
Duration	<i>216 hours</i>
Total number of ECTS	<i>Starting from 8 ECTS</i>
Targeted Institutions	<i>Training providers</i>

2.2.2 Learning Programme PLO 1 – Application Design [e-3]

Overall information PLO 1 – Application Design [e-3]	
N. of Learning Units	1
Learning Outcomes	<ul style="list-style-type: none"> - Explains and distinguishes principles and terminology of software design (e.g., phases in the design process, techniques, deliverables) - Describes principles of usability, UI/UX design, accessibility, privacy, security - Identifies needs of customers, users, stakeholders and formulates requirements and functional specifications - Creates functional and data modelling diagrams, using common languages and techniques (e.g., DFD, IDEF0, ERD, and UML) - Creates a database design - Designs a simple system architecture and interfaces using familiar technologies - Compares alternatives for a design and selects the most promising alternative(s), optimising the balance between cost and quality - Specifies a design for a software application or component, taking into account certain constraints/ requirements (e.g., the development environment, programming language, technology, requirements related to performance, security, accessibility, usability, privacy, ethics, safety, IS policy, cost, quality)
Duration	40 hours
Total number of ECTS	starting from 1,6 ECTS.
Recommendations for Micro-credentials	<p>This PLO and its subsequent parts can be offered as a micro-credential as part of a modular (re)skilling programme for learners with no prior knowledge of software design. This PLO is also recommended as an independent stand-alone micro-credential for skilling and reskilling (ICT) professionals that are interested in learning the basics of application development. Parts of this PLO are also good candidates for micro-credentials, such as:</p> <ul style="list-style-type: none"> • Object design • SQL basics • UX design
Often integrated with studies of PLO	PLO 2. Application Development and PLO 4. Testing, and if there are practical assignments, groupwork and a team project also involved PLO's: 6. Profession related competences, 7. Soft competences and 8. Functioning in organisations may be involved.
Recommended Didactical Approach	F2F classroom Virtual classroom Blended e-Learning In-company

Additional comments	<i>To maximise accessibility and flexibility it is recommended that different didactical approaches are used as much as possible, so that the individual learner can decide what suits best. Besides this, offering in-company courses and training supports accessibility and flexibility.</i>
Recommended Delivery methods	<i>Lectures F2F Lectures virtual Lectures blended Virtual instructor-led training (VILT) Practical exercises Group/ teamwork Team project</i>
Additional comments	<i>Lectures, e-learning and virtual instructor-led training are recommended for learning the basic principles, terminology, and methods of software design. These should be reinforced through practical tasks, individual and group assignments, and if possible, a team project. The ratio between on the one hand lectures/ VILT and on the other hand practical work done by the learners should be appr. 60% - 40% respectively.</i>
Work Based Learning Task (If foreseen) and Follow-up, learning reinforcement	<i>After learning the basic principles, terminology, and models of software design, the programme should focus on analysing and simulating real work-life-like tasks as, for example:</i> <ul style="list-style-type: none"> · <i>Practical exercises, based on real life situations, e.g., case studies</i> · <i>Working together in a team to design an application</i>
Important (new) approaches and technologies to consider	<i>n/a</i>
Training facilities (Link to ESSA learning material Platform)	<i>https://learn.softwareskills.eu/</i>

Learning Units PLO 1 – Application Design [e-3]

LU1	Development basics: -Object design -SQL basics
Duration	<i>40 hours (1,6 ECTS)</i>
Didactical Approach and delivery method	<i>Training lectures, Virtual instructor-led training (VILT), Practical exercises</i>
Additional information	<i>F2F, virtual, blended, e-learning/ videos</i>
Assessment	<i>Practical exercises, Exam</i>
Title of the Learning material	<i>Course materials, workbook; “Object design and UML”, “Object design exercise - Mini Bank”, “Object design exercise solution - Mini Bank”</i>

2.2.3 Learning Programme PLO 2 – Application Development [e-3]

Overall information PLO 2 - Application Development [e-3]	
N. of Learning Units	7
Learning Outcomes	<ul style="list-style-type: none"> - Organises data and creates a structured dataset - Writes code and related documentation to it, using programming languages (e.g., Java, Javascript, PHP, Python) and tools (e.g., GitHub), applying programming principles (e.g., clean coding, green coding, secure programming) and other relevant practices, principles, or constraints (e.g., privacy legislation, intellectual property law) - Efficiently creates a working software component/application taking into account design requirements and other relevant constraints (e.g., architecture, efficiency, cost, quality, energy consumption) and applying relevant tools and techniques (e.g., object-oriented programming; IDE, CASE; editors, compilers; version control management and tools; multimedia integration tools; app development tools; reuse of proved solutions) - Modifies an existing software component/application, in order to optimize it (e.g., to improve maintenance, performance, security) - Participates in a development process, selecting and applying appropriate methods and techniques (e.g., a software development method such as agile, prototyping)
Duration	80 hours
Total number of ECTS	starting from 3,2 ECTS.
Recommendations for Micro-credentials	<p>This PLO and its subsequent parts can be offered as a micro-credential as part of a modular (re)skilling programme for learners with no prior knowledge of software development. This PLO is also recommended as an independent stand-alone micro-credential for skilling and reskilling (ICT) professionals that are interested in learning the basics of application development. Parts of this PLO are also good candidates for micro-credentials, such as:</p> <ul style="list-style-type: none"> • Java programming fundamentals • HTML 5 programming with JavaScript and CSS • Web applications development • Web services development • Spring and Hibernate
Often integrated with studies of PLO	PLO 1. Application Design and PLO 4. Testing, and if there are practical assignments, groupwork and a team project involved also PLO's: 6. Profession related competences, 7. Soft competences and 8. Functioning in organisations may be involved.
Recommended Didactical Approach	F2F classroom Virtual classroom Blended e-Learning In-company
Additional comments	To maximise accessibility and flexibility it is recommended that different didactical approaches are used as much as possible, so that the individual

	<i>learner can decide what suits best. Besides this, offering in-company courses and training supports accessibility and flexibility.</i>
Recommended Delivery methods	<i>Lectures F2F Lectures virtual Lectures blended Virtual instructor-led training (VILT) Practical exercises Group/ teamwork Team project</i>
Additional comments	Lectures, e-learning and virtual instructor-led training are recommended for learning the basic principles, terminology, and methods of application development. These should be reinforced through practical tasks, individual and group assignments, and if possible, a team project. The ratio between on the one hand lectures/ VILT and on the other hand practical work done by the learners should be appr. 60% - 40% respectively.
Work Based Learning Task (If foreseen) and Follow-up, learning reinforcement	<i>After learning the basic principles, terminology, and models of application development, the programme should focus on analysing and simulating real work-life-like tasks as, for example:</i> <ul style="list-style-type: none"> · <i>Practical exercises, based on real life situations, e.g., case studies</i> · <i>Working together in a team to develop an application</i>
Important (new) approaches and technologies to consider	<i>n/a</i>
Training facilities (Link to ESSA learning material Platform)	<i>https://learn.softwareskills.eu/</i>

Learning Units PLO 2 – Application Development [e-3]

LU1	Development basics: -Object design -SQL basics -Java Programming Fundamentals]
Duration	<i>80 hours (3,2 ECTS)</i>
Didactical Approach and delivery method	<i>Training lectures, Virtual instructor-led training (VILT), Practical exercises</i>
Additional information	<i>F2F, virtual, blended, e-learning/ videos</i>
Assessment	<i>Practical exercises, Exam</i>
Title of the Learning material	<i>Course materials, workbook; “Object design and UML”, “Object design exercise - Mini Bank”, “Object design exercise solution - Mini Bank”</i>

2.2.4 Learning Programme PLO 5 – Documentation Production [e-3]

Overall information PLO 5 – Documentation Production [e-3]	
N. of Learning Units	1
Learning Outcomes	<ul style="list-style-type: none"> - Identifies the needs of different populations regarding software documentation. - Provides (parts of) relevant technical documents, (e.g., required for designing, developing, and deploying applications and services), in line with identified needs of different audiences, using appropriate tools
Duration	80 hours
Total number of ECTS	starting from n. 3,2 ECTS
Recommendations for Micro-credentials	This PLO can be offered as a micro-credential as part of a modular (re)skilling programme for learners with no prior knowledge of software development.
Often integrated with studies of PLO	PLO 1. Application Design, PLO 2. Application development, PLO 3 Component Integration and PLO 4. Testing
Recommended Didactical Approach	F2F classroom Virtual classroom Blended e-Learning In-company
Additional comments	To maximise accessibility and flexibility it is recommended that different didactical approaches are used as much as possible, so that the individual learner can decide what suits best. Besides this, offering in-company courses and training supports accessibility and flexibility.
Recommended Delivery methods	Lectures virtual Virtual instructor-led training (VILT) Practical exercises
Additional comments	Lectures, e-learning and virtual instructor-led training are recommended for learning the basic principles and techniques of different types of (technical) documentation. These should be reinforced through practical tasks, individual and group assignments, and if possible, a team project. The ratio between on the one hand lectures/ VILT and on the other hand practical work done by the learners should be appr. 60% - 40% respectively.
Work Based Learning Task (If foreseen) and Follow-up, learning reinforcement	After learning the basic principles, terminology, methods and techniques of documentation production, the programme should focus on real work-life-like tasks as, for example: <ul style="list-style-type: none"> · Writing a requirements document · Writing functional specifications · Making a project planning
Important (new) approaches and technologies to consider	n/a
Training facilities (Link to ESSA	https://learn.softwareskills.eu/

learning material Platform)	
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Learning Units PLO 5 – Document Production [e-3]

LU1	Development basics: -Object design -SQL basics -Java Programming Fundamentals]
Duration	80 hours (3,2 ECTS)
Didactical Approach and delivery method	Training lectures, Virtual instructor-led training (VILT), Practical exercises
Additional information	F2F, virtual, blended, e-learning/ videos
Assessment	Practical exercises, Exam
Title of the Learning material	Course materials, workbook "Object design and UML", "Object design exercise - Mini Bank", "Object design exercise solution - Mini Bank"

2.2.5 Learning Programme PLO 8 – Soft competences [EQF6]

Overall information PLO 8 – Soft competences [EQF6]	
N. of Learning Units	1
Learning Outcomes	<ul style="list-style-type: none"> - Manages teamwork processes and facilitates collaboration to reach common objectives, e.g., handles conflicts, negotiates, motivates, and persuades. - Communicates with peers, colleagues, supervisors and or relevant others, specialists and non-specialists, and clients, appropriately to the scientific and professional community, using conventions which are relevant. Applies communication to the objective and the target group. - Masters the English language at level B2. Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation - Related to the occupation and knowledge domain, critically collects detailed professional and/or scientific information on a limited range of basic theories, principles and concepts, as well as limited information on some important current issues and topics. Analyses, evaluates, and combines critically this information, knowledge and insights and presents this. Critically applies/ translates/ interprets results of research (possibly executed by others) to the own context (the occupation and/or knowledge domain). Executes applied and practice-oriented research. - Identifies and analyses complex and unpredictable problems. Solves these problems in a tactical, strategic and creative way by selecting and using data and by using one's creativity, flexibility and inventiveness. - Exercises self-management in complex technical or professional activities or projects, taking responsibility for decision making in

	<p><i>unpredictable work or study contexts. Is able to cope with change (positive or negative) and to adapt to a considerable level of variety in the workplace. Handles pressure and setbacks and maintains composure. Shows initiative, creativity and some originality and carries responsibility for the results of own activities, work and or study and for the work results of others. Works correctly and carefully, fully aware of the importance of trustworthiness and accountability.</i></p> <ul style="list-style-type: none"> - <i>Realises learning and personal development on one's own initiative, by reflecting on and evaluating personal (learning) results. Selects and uses training/instructional methods and procedures appropriate for the situation when learning.</i>
Duration	16
Total number of ECTS	starting from n.0,64 ECTS
Recommendations for Micro-credentials	<p><i>Due to its strong intertwining with other PLOs, it may be difficult to offer this PLO in its entirety as a stand-alone micro-credential. However, this PLO can be given explicit attention in combination with other PLOs such as mentioned above. Any more theoretical parts of this PLO could be offered separately as micro-credential for skilling (ICT) professionals, such as:</i></p> <ul style="list-style-type: none"> • <i>Time management</i> • <i>Creativity development</i>
Often integrated with studies of PLO	<p><i>This PLO addresses competences that relate to more generic aspects in work related contexts. It is often integrated with: PLO 9. Functioning in organisations. The problem solving and critical analysis aspects of this PLO are often intertwined with PLO's 1. Application design, 2. Application development and 6. Problem Management.</i></p>
Recommended Didactical Approach	<p>F2F classroom Virtual classroom Blended e-Learning In-company</p>
Additional comments	<p><i>To maximise accessibility and flexibility it is recommended that different didactical approaches are used as much as possible, so that the individual learner can decide what suits best. Besides this, offering in-company courses and training supports accessibility and flexibility.</i></p>
Recommended Delivery methods	<p><i>Lectures virtual Virtual instructor-led training (VILT) Practical exercises Group/ teamwork Team project</i></p>
Additional comments	<p>Lectures, e-learning and virtual instructor-led training are recommended for learning the basic principles, terminology, and methods related to soft competences. These should be reinforced through practical tasks, individual and group assignments, and if possible, a team project. The ratio between on the one hand lectures/ VILT and on the other hand practical work done by the learners should be appr. 20% (or less) - 80% (or more) respectively.</p>
Work Based Learning Task	<p><i>After learning the basic principles of the different soft competences, the programme should focus on real work-life-like tasks as, for example:</i></p> <ul style="list-style-type: none"> • <i>Practical exercises, based on real life situations, e.g., case studies</i>

(If foreseen) and Follow-up, learning reinforcement	· Working together in a group or a team to analyse and solve specific problems
Important (new) approaches and technologies to consider	n/a
Training facilities (Link to ESSA learning material Platform)	https://learn.softwareskills.eu/

Learning Units PLO 8 – Soft competences [EQF6]

LU1	Get trained and informed: - Managing time and priorities -Developing creativity
Duration	16 Hours (0,64 ECTS)
Didactical Approach and delivery method	Virtual instructor-led training (VILT), Training lecture, practical exercises, work in groups
Additional information	F2F, virtual, blended, e-learning/ videos
Assessment	Practical exercises
Title of the Learning material	Course materials: - Creative thinking for professional efficiency - Trainee booklet - Creative thinking for professional efficiency – Exercises - Manage your time and priorities - Trainee booklet - Manage your time and priorities - Exercises

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