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CODING-

> valuable outside tool
**for employment**

# CODING-OUT – PROGRAMME AND CURRICULUM

Co-funded by the Erasmus+ Programme of the European Union

PROJECT:

# Coding in prison as a valuable OUTside tool for employment

DELIVERABLE TITLE:

## IO2 Coding-OUT training curriculum and programme

**Release 1.1**

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1 INTRODUCTION 4

2 COMPETENCE MATRIX CONTEXT 4

3 RESULTS FROM THE EMPLOYER ANALYSIS 5

4 RESULTS FROM THE TRAINER ANALYSIS 7

5 COMPETENCE FRAMEWORK 7

6 CODING OUT TRAINING PROGRAMME 13

*6.1 SELF-MANAGEMENT AND SELF-DEVELOPMENT* 14

*6.2 WORKING IN PROGRAMMING* 16

*6.3 FUNDAMENTALS OF TECHNOLOGY* 20

*6.4 COMPUTATION THINKING AND EVERYDAY BUSINESS CODING* 22

*6.5 BASIC PROGRAMMING LANGUAGES* 24

*6.6 WEB DEVELOPMENT* 26

*6.7 APPLICATION DEVELOPMENT* 28

# 1 INTRODUCTION

The present document defines the training programme and curriculum developed under the scope of the “CODING OUT - Coding in prison as a valuable OUTside tool for employment.

Bearing in mind the results from the desk research and needs analysis conducted in O1 Literature Review and Needs Assessment, the present document defines the learning objectives, the structure of the content of the learning programme and the evaluation and assessment method used.

The aim of the learning programme is to introduce trainers providing training to those in prison to digital skills and basic coding, so that they can properly train their learners and increase the employment opportunities for prisoners after their release.
Considering our aim to train/instruct persons in prison to improve their education and training, is essential to develop a well-structured educational program that satisfies the needs of the target group, while giving an answer to the demands and needs of employers for skilled staff in digital jobs.

The curriculum is made of two major parts. The first part consists of a competences matrix, a working tool designed for teachers and trainers, with the description of the learning outcomes accordingly the European Qualification Framework descriptors elements (Knowledge; Skills; Responsibility and Autonomy). The second part of the curriculum compromises a detailed description per sub-unit of the CODING OUT training programme with indications of the course training content, objectives and proposals for methodological approach and evaluation.

# 2 COMPETENCE MATRIX CONTEXT

Learning outcomes are an important part of the curriculum, they guide teachers and trainers on the teaching process and inform the learners about what they are expected to know, understand and be able to do after a given learning activity. In Coding-OUT we used the “Defining, writing and applying learning outcomes: a European handbook” developed by CEDEFOP as baseline for the definition of the learning outcomes.

The learning outcomes are broken down into knowledge, skills, responsibility and autonomy that are mobilised in actions through which the individual shows that he masters the competence acquired, according to certain performance criteria and contextual conditions. In practical terms, the aim of each module is to respond to what the individual is able to do by showing and demonstrating such performance.

It is important to consider the issue of prisoners´ motivation for learning and their participation in the training program carried out in order to properly design the relevant educational activities and program.

The Competence matrix for each of the units is build-up of a common set of blocks which cover:

- Actions – Actions through which the individual demonstrates he masters every module.
- Performance criteria – Quality requirements of the module associated with performance, i.e., quality standards by which the individual is considered competent (the quality level that the actions must have).
- Knowledge – The collection of facts, principles, theories and practices related to the field of studies or professional activity.
- Skills – The ability to apply knowledge and use the acquired resources to complete tasks and solve problems. It may be cognitive (use of logical, intuitive or creative thinking) or practical (implying manual skill and the use of methods, materials, tools and instruments).
- Responsibility and autonomy – The ability to develop tasks and solve problems of a higher or lower degree of complexity with different degrees of autonomy and responsibility.
- External resources – The set of available resources which aid in the foreseen actions.

This is a project of programming skills and not computer skills, therefore it is assumed that what is to be taught would be the basic and intermediate level as they are considered to have some basic computer knowledge.

The platform should therefore be adapted to the basic level of prisoners and seek to improve their basic knowledge of technology as well as aim to improve the lack of interest in education and learning.

## 3 RESULTS FROM THE EMPLOYER ANALYSIS

With regards to the employer analysis, there are several issues to be taken into account for the definition of the competences and content of the CODING OUT curriculum.

Employers indicate that knowledge on internet technology, mobile apps and business analytics are considered extremely relevant, and as such this knowledge needs to be embedded in the curriculum. Web browsers are also considered very relevant. The

recommendation is that this type of knowledge is scattered throughout different units and not dedicate a specific unit to these aspects.

The survey also shows that knowledge on windows (87%) and Microsoft office (74%) are considered extremely relevant. As such it is recommended that the examples and content provided during the training uses Microsoft related applications whenever possible.

With regards to coding, to be capable to write clear and organised code is considered extremely relevant for the 52% of the participating companies. The capability to reuse code created by another person that is considered extremely relevant for the 45% of employers and should be addressed in the curriculum content.

The curriculum should therefore not only address in the introduction to coding understanding of what clear and organised code means for employers, but also how to re-use code written by others (and this includes reading the code written by the person and explaining what its intend to mean to someone more experienced).

PHP is the most requested language for employers, although all the languages mentioned in the survey are considered relevant or extremely relevant for more than 50% of the respondents, as such it is recommended to include also Javascript, Java, Python and C/CCP in the curriculum.

To be capable to package, document and distribute a software library for others to reuse is considered relevant for the 48% of the participating companies and should be addressed in the curriculum.

Concerning the soft skills, it is clear that these are also important for employers, as in the end the aim is to facilitate integration of (ex)prisoners on the labour market it is important to bear these in mind. From the survey it is clear that all the aspects concerning communication, social and organisation skills are considered relevant, the same applies for all aspects related to teamwork, conflict management and critical thinking. It is thus recommended to include a module which addresses the soft skills. As not all soft skills are adequate to be developed through on-line activities, the role of the trainer becomes more important for this section. As such it is vital that the trainer has the skills and competences to work on these aspects with their learners.

Although not addressed in the survey, it is important that learners also get a grip on how to find a job and how to position themselves as candidates. As such addressing issues related to finding job opportunities or developing digital curriculum is also relevant. Of course one should not forget those who want to pursue further learning and want to learn more about their options.

In the same line, it is recommended to have a short introduction on self-learning and self-management at the start of the course, to prepare the learners for on-line learning, as this might be new for most of them.

## 4 RESULTS FROM THE TRAINER ANALYSIS

The trainer analysis shows that most trainers that participated in the survey have the necessary skills and knowledge to provide training in the different fields related to basic coding.

For those who need to update their knowledge, they will use the present competence framework, curriculum and learning content in first instance, as this represents the minimum level of knowledge that they need to possess to be able to train the learners. However, it is necessary to develop a Trainer Manual in which they get more insight and access to additional resources for further learning. This manual should focus both on the technical content as well as the soft skills, and for the latter how to work on these horizontally across the whole course and not only in the related module.

## 5 COMPETENCE FRAMEWORK

The competence framework and (sub)units of the present curriculum embed all these aspects, albeit not always addressing them in a specific module or unit but horizontally across the different modules.

The competence matrix is organised around a set of differentiated skills which combine soft skills, training on basic programming languages and more advanced training on coding. As such the following modules are proposed:

**Unit 1- Self-management and self-development** [online learning skills].(3 hours) So that they could have the ability to effectively organize, prioritise and manage their study time.

**Unit 2 - Working in programming** (7 hours). This unit focusses on the soft skills needed for future learning and working in programming. It combines skills such as teamwork resilience, communication, motivation and conflict management with opening up options for further learning or entering formal education, or how to use digital tools to elaborate their resume or use digital tools to access job opportunities.

**Unit 3 - Fundamentals of technology** (Operating systems: Windows, Linux, IOS, etc...) – Advanced training (20 hours). Focusses on understanding architecture and the interrelationships between hardware and operating systems software, and the

ability to identify, understand and solve problems related to the development and use of an operating system.

**Unit 4 Computation thinking and every day business coding** (15 hours). With the aim of developing detailed step-by-step solutions to problems, think and interpret the data, and understand how different techniques improve the effectiveness of problem solving. Once presented the main features of computational thinking, it explains their use in day-to-day (professional) common activities, as well as the usefulness of flowcharts as a graphic representation of such algorithms or processes required to design them. It should include issues such as business analytics.

**Unit 5 – Basic programming languages**, (25 hours) in which the fundamentals of programming in Python are addressed; Data types and operators, as well as I/O; Control statements and structures and functions.

**Unit 6 – Web development**. (25 hours). The unit focusses on the competences needed to develop web sites and use integrated development environments to do so. Special attention will be paid to usability and user-friendliness.

**Unit 7 – Application development** (15 hours). In this unit leaners will acquire skills needed to project, develop and implement applications for mobile devices, and use integrated development environments to do so. The use of multimedia in sensor related resources provided by mobile devices is also addressed.

The following template for the competence matrix has been used for each of the units is:

| **Unit 1: Self-management and self-development** | **Workload in hours: 3** |
|---|---|
| *Vocational training may be essential for inmates to get new useful skills in order to properly recidivism and reinsertion, but they need to know how to manage the training and knowledge received, as most of the training provided by IO2 may be brand-new for them (coding and programming, as well as the use of ICTs). That is the reason why they need tools to learn, firstly, how to manage their study time, so that they could have the ability to effectively organize, prioritise and manage their study time while developing the Coding-OUT training. But, on the other hand, it is also important for them to know how to manage and properly use the new knowledge acquired and the technological resources. Aiming to achieve proper training results, prison educators and trainers need knowledge and tools to provide better VET to inmates, in order to be able to provide the required learning, this UC1 will teach them the axis of self-management and self-development.* | |
| **Actions**<br>• To raise awareness about the importance of soft skills for future employment, such as: self-knowledge, proactivity, time management.<br>• To know how to manage their own time. | **Performance criteria:**<br>• Education providers should know how to teach inmates to plan and manage one's own learning autonomously.<br>• They also have to learn how effectively search and reference sources of online information, so they can teach inmates later. |

| | |
|---|---|
| • To effectively search and reference sources of online information.<br>• To effectively know how to teach basic competences about self-management and self-development when studying. | • Learners should be able to schedule their study time and manage their own needs.<br>• Raise awareness about the importance of teaching digital skills to inmates, since not having basic knowledge in this is a huge challenge today.<br>• Increase the trainers' knowledge about teaching digital competences to inmates.<br>• Empower inmates with marketable skills that lead to employment by developing a training programme in prison, focusing on basic computer programming skills.<br>• Improve the skills of prison trainers/educators to train inmates on basic programming by developing and piloting a training programme for staff (blended learning). |
| **Resources needed for the unit:** IT equipment/computer when possible, ITC literacy provided by Coding-OUT training program | |
| **Learning outcomes in terms of knowledge and skills** | |
| **Knowledge**<br>Basic/intermediate knowledge about:<br>• Time management.<br>• Different methods of study suitable for their own learning needs.<br>• New teaching skills about self-management and self-development. | ***Skills***<br>*1) **Choose** the best studying techniques to achieve their best self-development.*<br>*2) **Enhance** motivation among the inmate student.*<br>*3) **Raise awareness** about the importance of training in prison.*<br>*4) **Plan** and manage their study time.* |

| **Unit 2: Working in programming** | **Workload in hours: 15** |
|---|---|
| *This 2nd unit of Coding-OUT programme and curriculum focusses on the soft skills needed for future learning and working in programming. It combines skills such as teamwork resilience, communication, motivation and conflict management with opening up options for further learning or entering formal education, or how to use digital tools to elaborate their resume or use digital tools to access job opportunities.* | |
| **Actions**<br><u>Teamwork:</u><br>• Co-operates with team members to resolve problems and achieve goals;<br>• Supports team members by encouraging participation and listening to other's ideas;<br>• Shares information in a correct and effective way.<br><u>Resilience:</u><br>• Focuses on performance outcomes despite uncertain or difficult circumstances;<br>• Remain calm during stressful or challenging situations; | **Performance criteria:**<br>Kirkpatrick's four levels of Training Evaluation<br>1) Reaction – To what degree did the learners react favourably to the training exercise?<br>2) Learning – To what degree did the learners acquire the intended knowledge, skills and attitudes as a result of the training?<br>3) Behaviour – To what degree did the learners apply what they learned back on the job?<br>4) Results – To what degree did the targeted outcomes occur as a result of the training experience and follow-up reinforcement. |

| | |
|---|---|
| • Uses experience or knowledge to manage and mitigate against risks.<br>Communication:<br>• Demonstrates effective written and oral communication skills;<br>• Actively listens, provides constructive feedback, and demonstrates respect for differing views;<br>• Actively seeks others' perspectives to ensure inclusiveness and understanding.<br>Motivation:<br>• Identifies problems and recommends solutions;<br>• Does more than a minimum;<br>• Shows drive and determination to get results;<br>Accountability:<br>• Demonstrates perseverance when performing a long and difficult task;<br>• Actively manages time and tasks;<br>• Shows confidence in own opinions and performs the tasks with autonomy;<br>Conflict management:<br>• Is consciously aware of differences and conflict-related issues;<br>• Assumes responsibility for own actions and the consequences for actions undertaken and decisions made;<br>• Demonstrates diplomacy, cultural sensitivity and tact. | NOTE: The Kirkpatrick Model is probably the best-known model for analysing and evaluating the results of training and educational programmes. It takes into account any style of training, both informal or formal, to determine aptitude based on four levels criteria.<br><br>**Level 1** Reaction measures how participants react to the training (e.g., satisfaction?). **Level 2** Learning analyzes if they truly understood the training (e.g., increase in knowledge, skills or experience?). **Level 3** Behavior looks at if they are using what they learned at work (e.g., change in behaviors?), and **Level 4** Results determines if the material had a positive impact on the business / organisation. |
| **Resources needed for the unit:** Chairs, tables, papers, pens, markers, laptop/computer, | |
| **Learning outcomes in terms of knowledge and skills** | |
| **Knowledge**<br>1) To know the importance of teamwork and its positive effect on effectiveness;<br>2) To know what resilience is and its importance to cope with difficult situations;<br>3) To know the importance of communication (verbal and non-verbal) in daily work;<br>4) To know what motivation is and its importance for job performance and retainment;<br>5) To know what time and resource management is and its importance to productivity and effectiveness;<br>6) To know the importance of conflict resolution and mentoring to reach a peaceful resolution. | ***Skills***<br>*5) Teamwork;*<br>*6) Resilience;*<br>*7) Communication;*<br>*8) Motivation;*<br>*9) Accountability*<br>*10) Conflict management* |

| **Unit 3 – Fundamentals of technology** | **Workload in hours: 20** |
|---|---|
| *This 3rd unit focusses on understanding architecture and the interrelationships between hardware and operating systems software, and the ability to identify, understand and solve problems related to the development and use of an operating system.* | |
| **Actions**<br>• Sets up hardware (drivers, system optimization, maintenance activities, …), and operating system (Linux) for different scenarios, and case-studies<br>• Fosters a problem solution, selecting an adequate methodology | **Performance criteria**<br>Ranging from 0 to 20:<br>1) Identify computer components, and showing ability to discuss on hardware and operating system software topics (up to 7 points);<br>2) Identify hardware and software problems, evidencing the ability to deliver a solution of the problem (up to 8 points);<br>3) Working together, evidencing efficient time management (up to 5 points). |
| **Resources needed for the unit:** Pen, paper and laptop/computer. | |
| **Learning outcomes in terms of knowledge and skills** | |
| ***Knowledge***<br>1) To understand the computer architecture and the interrelationships between hardware and operating systems software;<br>2) To identify the various types of operating system architectures and understand their components;<br>3) To identify the role and impact of an operating system, and solve practical problems related to the development and use of an operating system. | ***Skills***<br>*1) Teamwork*<br>*2) Organization and planning*<br>*3) Rational* |

| **Unit 4: Computation thinking and everyday business coding** | **Workload in hours:15** |
|---|---|
| *This 4th unit aims the development of detailed step-by-step solutions to problems, think and interpret the data, and understand how different techniques improve the effectiveness of problem solving. Once presented the main features of computational thinking, it explains their use in day-to-day (professional) common activities, as well as the usefulness of flowcharts as a graphic representation of such algorithms or processes required to design them. It should include issues such as business analytics.* | |
| **Actions**<br>• Has a solution-oriented approach;<br>• Knows how to design adequate algorithms, following the best practices | **Performance criteria**:<br>Ranging from 0 to 20:<br>1) Ability to formulate and explain a step-by-step algorithm (up to 7 points)<br>2) Ability to program either a new algorithm or adapted an existing one, to solve a problem (up to 8 points)<br>3) Working together, and goal oriented (up to 5 points) |
| **Resources needed for the unit:** Pen, paper and laptop/computer. | |
| **Learning outcomes in terms of knowledge and skills** | |
| ***Knowledge*** | ***Skills***<br>*1)* Teamwork |

| | |
|---|---|
| 1) To solve problems writing programmes by means of abstract thinking<br>2) Develops algorithms from the problem statement<br>3) Applies algorithms to the problem<br>4) Transforms algorithms into programme code. | *2)* Critical thinking |

| **Unit 5: Basic programming languages** | **Workload in hours:25** |
|---|---|
| This 5th unit focuses on basic programming languages, in which fundamentals of programming in Python are addressed. It also includes, data types and operators, as well as I/O; Control statements and structures and functions. | |
| **Actions**<br>Knows to code a programme in Python, following the best practices (adequate datatypes, code-reuse, functions, robustness …); | **Performance criteria**<br>Ranging from 0 to 20:<br>1) Ability to structure a challenge/problem by means of source code (up to 10 points)<br>2) Ability to promote source code refactoring, and preventive and/or evolutionary maintenance (up to 5 points)<br>3) Working together, and goal oriented (up to 5 points) |
| **Resources needed for the unit:** Pen, paper and laptop/computer. | |
| **Learning outcomes in terms of knowledge and skills** | |
| ***Knowledge***<br>1) Identifies concepts, models, and structures of a language programming<br>2) Designs, writes, tests, debugs, and maintains the source code | ***Skills***<br>*1)* Teamwork<br>*2)* Critical thinking<br>*3) Logic* |

| **Unit 6: Web development** | **Workload in hours:25** |
|---|---|
| This 6th unit focusses on the competences needed to develop web sites and use integrated development environments to do so. Special attention will be paid to usability and user-friendliness. | |
| **Actions**<br>• Develops websites based on HTML, and CSS;<br>• Adopts an adequate IDE to design the website. | **Performance criteria**<br>Ranging from 0 to 20:<br>1) Ability to adopt a strategy for web-based applications development (up to 10 points)<br>2) Ability to use frameworks, and tools in the development life cycle (up to 5 points)<br>3) Working together, with efficient time management, and goal oriented (up to 5 points) |
| **Resources needed for the unit:** Pen, paper and laptop/computer. | |
| **Learning outcomes in terms of knowledge and skills** | |
| ***Knowledge***<br>1) To project and implement web applications; | ***Skills***<br>*1)* Teamwork<br>*2)* Critical thinking |

| | |
|---|---|
| *2)* To use integrated development environments for the development of web applications | |

| **Unit 7: Application development** | **Workload in hours:15** |
|---|---|
| In this 7th unit leaners will acquire skills needed to project, develop and implement applications for mobile devices, and use integrated development environments to do so. The use of multimedia in sensor related resources provided by mobile devices is also addressed. | |
| **Actions**<br>• Develops a mobile application based on web development techniques (HTML, and CSS)<br>• Adopts an adequate framework to design the mobile application | **Performance criteria**<br>Ranging from 0 to 20:<br>1) Ability to adopt a strategy for mobile applications development (up to 10 points)<br>2) Ability to use frameworks, and tools in the development life cycle (up to 5 points)<br>3) Working together, with efficient time management, and goal oriented (up to 5 points) |
| **Resources needed for the unit:** Pen, paper and laptop/computer. | |
| **Learning outcomes in terms of knowledge and skills** | |
| ***Knowledge***<br>1) To project and implement applications for mobile devices<br>2) To use integrated development environments for the development of mobile applications<br>3) To take advantage of multimedia in sensor related resources provided by mobile devices | ***Skills***<br>*1)* Teamwork<br>*2)* Critical thinking |

While it is true that the target group may be interested in learning something that is not so complicated, it is important that the fundamentals take up the necessary time and introduce some intermediate level agenda. After all, the aim of this project is to make it easier for them to return to work when they leave the prison, and with training focused only on the basics, getting a job can be a difficult, if not impossible, goal.

## 6 CODING OUT TRAINING PROGRAMME

The training programme consists of 6 modules and can also be lengthened or shortened depending on the level of training and expertise of the learners. Each unit comprises several sub-units.

Unit 1- Self-management and self-development
Subunit 1: self-management and self-development
Subunit 2: Time-management and on-line learning

Unit 2 - Working in programming

Subunit: 2.1. Teamwork
Subunit: 2.2. Resilience
Subunit: 2.3. Communication
Subunit: 2.4. Motivation
Subunit: 2.5. Accountability
Subunit: 2.6. Conflict Management

Unit 3 - Fundamentals of technology
Subunit 3.1 Pillars of fundamentals of technology
Subunit 3.2 Hardware & Software
Subunit 3.3 Let's party

Unit 4 Computation thinking and every day business coding
Subunit 4.1 Pillars of computational thinking
Subunit 4.2 Designing workflows
Subunit 4.3 Writing pseudo code
Subunit 4.4 Let's party

Unit 5 – Basic programming languages
Subunit 5.1 Pillars of programming
Subunit 5.2 Conditions and cycles
Subunit 5.3 Functions and testing
Subunit 5.4 Self-learning
Subunit 5.5 Let's party

Unit 6 – Web development.
Subunit 6.1 Pillars of web programming
Subunit 6.2 HTML & CSS
Subunit 6.3 Self-learning
Subunit 6.4 Let's party

Unit 7 – Application development
Subunit 7.1 Pillars of mobile programming
Subunit 7.2 Design & Usability
Subunit 7.3 Self-learning
Subunit 7.4 Let's party

For each subunit of each module the specifics of the unit are described following the same structure for all as depicted in the sections below.

### *6.1 Self-management and self-development*

| **Unit 1 - Self-management and self-development** | **Workload: 3h00m** |
|---|---|

| | |
|---|---|
| **Presential Learning** | N/A |
| **Online Learning** | 3h00m |
| **Evaluation** | N/A |

| **Unit 1 - Self-management and self-development** | |
|---|---|
| **Subunit 1: self-management and self-development** | **Total duration of the unit: 90m** |

**Objectives of the sub-unit**

- To introduce learners in self-knowledge and its benefits.
- Be aware of the importance of soft-skills such as: self-knowledge, emotional intelligence, auto-efficacy or proactivity.
- Learn how to set personal SMART goals.

**Content**

The content of this unit has been divided into different sections oriented to offer tools and techniques for the improvement of personal management skills:

- Self-knowledge and personal SWOT analysis.
- How to improve self-productivity
- Emotional intelligence
- How to set their own personal goals.

**Resources**

IT equipment/computer when possible, ITC literacy provided by Coding-OUT training program

**Learning Outcomes**

Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | • Develop awareness of self-knowledge<br>• Recognise the benefits of emotional intelligence<br>• How to stay motivated and how to motivate learners. | **Skills** | • Being able to emotional intelligence principles when training/learning.<br>• Organize and prioritize personal objectives. |

**Methodological approach**

The trainer acts as facilitator and motivator, guiding and steering the learner towards the content and support them in the realisation of the activities to enhance their self-management and self-development.

**Evaluation**

The learners will self-evaluate their own progress in this Unit of Competence through the proposed self-reflective questions in both *Subunit 1. Self-learning and self-developmen*t and *Subunit 2. Time management and online learning.*

| **Unit 1 - Self-management and self-development** | |
|---|---|
| **Subunit 2: Time-management and on-line learning** | **Total duration of the unit: 90m** |

**Objectives of the sub-unit**

- To encourage learners to identify and define their own study time.
- To support learners to plan and schedule their time.
- To encourage autonomy for online learners.

**Content**

- Time management skills
- Different learning styles.
- Online study skills and self-learning.

**Resources**

IT equipment/computer when possible, ITC literacy provided by Coding-OUT training program

**Learning Outcomes**

Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | • Identify different learning styles.<br>• Define strategies for different learning styles.<br>• To develop time management skills.<br>• Scheduling the own learning objectives.<br>• To learn how to teach organising skills to inmates learners | **Skills** | • Demonstrate ability to organise, prioritize and manage the study time.<br>• Create their own online learning schedule/agenda.<br>• Define a learning strategy based on their own objectives and time available.<br>• Manage their own study needs. |
| **Methodological approach**<br>The trainer acts as facilitator and motivator, guiding and steering the learner towards the content, introduce them to learning styles and strategies and support them in identifying their own learning styles. The trainer conveys the message that each learner needs to be able to management their own learning process, and that the trainer is there to support, but that there is not "one-size-fits-all" solution to the learning provided in CODING OUT. | | | |
| **Evaluation**<br>The learners will self-evaluate their own progress in this Unit of Competence through the proposed self-reflective questions in both *Subunit 1. Self-learning and self-development* and *Subunit 2. Time management and online learning.* | | | |

## *6.2 Working in programming*

| **Unit 2: Working in programming** | **Workload: 15h00m** |
|---|---|
| **Presential Learning** | N/A |
| **Online Learning** | 15h00m |
| **Evaluation** | Kirkpatrick model |

| **Unit 2: Working in programming** | |
|---|---|
| **Subunit: 2.1. Teamwork** | **Total duration of the unit: 2h50m** |
| **Objectives of the sub-unit**<br>• To co-operate with team members to solve problems and achieve goals;<br>• To support team members by encouraging participation and listening to other's ideas;<br>• To share information in a correct and effective way. | |
| **Content**<br>• Small presentation to introduce teamwork (definitions, objectives of the sub-unit, benefits, challenges, etc.,)<br>• Specification of possible different roles in a team;<br>• Techniques to solve problems within the team;<br>• Activities | |
| **Resources**<br>Participants presence + Trainer + Projector + Computer + Chairs/ Tables + work sheets for activity 1 + work sheets for activity 2 + pens/pencils | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | |

| | | | |
|---|---|---|---|
| **Knowledge** | • To know the importance of teamwork and its positive effect on effectiveness;<br>• To know how to work in a team; | **Skills** | • Working cooperatively;<br>• Contributing to groups with ideas, suggestions, and effort;<br>• Ability to participate in group decision-making;<br>• Communication;<br>• Healthy respect for different opinions. |

**Methodological approach**

The approach that will be used is a short theoretical introduction (with interactive resources e.g. videos, dynamic images, etc.,) about the topic given by the trainer, followed by an explanation of the different roles that someone can have on a team and various techniques to overcome problems within the team. Afterwards, three activities will take place where the participants will contribute to group discussions, critical thinking, and self-learning. The trainer will use PowerPoint presentations to interact with the participants.

**Evaluation**

Kirkpatrick model

| **Unit 2: Working in programming** | |
|---|---|
| **Subunit: 2.2. Resilience** | **Total duration of the unit: 2h50m** |

**Objectives of the sub-unit**

- To focus on performance outcomes despite uncertain or difficult circumstances;
- To remain calm during stressful or challenging situations;
- To use experience or knowledge to manage and mitigate against risks.

**Content**

- Small presentation to introduce the concept of resilience;
- The Seven C's of Resilience;
- Present the importance of self-awareness to enhance resilience;
- Activities

**Resources**

Participants presence + Trainer + Projector + Computer + Chairs/ Tables + work sheets for activity 1 (diagnostic test) + work sheets for activity 2 (questionnaire) + pens/pencils

**Learning Outcomes**

Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | • To know what resilience is;<br>• To know the importance of resilience to cope with difficult situations; | **Skills** | • Maintain focus under stress<br>• Mental toughness<br>• Self-awareness<br>• Self-compassion |

**Methodological approach**

The approach that will be used is a short theoretical introduction (with interactive resources e.g. videos, dynamic images, etc.,) about the topic given by the trainer, followed by an explanation of the seven characteristics of resilience. Then the trainer will explain the importance of self-awareness and whether it has impact in resilience. Afterwards, three activities will take place where the participants will contribute to group discussions, critical thinking, and self-learning. The trainer will use PowerPoint presentations to interact with the participants.

**Evaluation**

Kirkpatrick model

| **Unit 2: Working in programming** | |
|---|---|
| **Subunit: 2.3. Communication** | **Total duration of the unit: 2h50m** |

**Objectives of the sub-unit**

- To demonstrate effective written and oral communication skills;

- To actively listen, to provide constructive feedback and to demonstrate respect for differing views;
- To actively seek others' perspectives to ensure inclusiveness and understanding.

**Content**

- Small presentation about the definition of communication and its application as a soft skill;
- Methods and techniques to improve communication;
- Verbal and non-verbal communication (and its importance for daily work);
- Activities

**Resources**

Participants presence + Trainer + Projector + Computer + Chairs/ Tables + work sheets for activity 1 (quiz) + materials for activity 4 (strips of paper) + pens/pencils

**Learning Outcomes**

Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | To know the importance of communication (verbal and non-verbal) in daily work; | **Skills** | • To communicate effectively;<br>• Clarity and concision of speech;<br>• Empathy;<br>• Confidence |

**Methodological approach**

The approach that will be used is a short theoretical introduction (with interactive resources e.g. videos, dynamic images, etc.,) about the topic given by the trainer, followed by an explanation of techniques and methods to improve communication skills. Then, the trainer will explain the distinction between verbal and non-verbal communication. Afterwards, four activities will take place where the participants will contribute to group discussions, critical thinking, and self-learning through dynamic games and activities. The trainer will use PowerPoint presentations to interact with the participants.

**Evaluation**

Kirkpatrick model

| **Unit 2: Working in programming** | |
|---|---|
| **Subunit: 2.4. Motivation** | **Total duration of the unit: 2h50m** |

**Objectives of the sub-unit**

- To identify problems and recommends solutions;
- To do more than a minimum;
- To show willingness and determination to achieve the results;

**Content**

- Small presentation about motivation as a soft skill;
- Demotivating factors and motivational factors;
- Basic information on the Maslow's hierarchy of needs;
- Tips for self-motivation;
- Activities

**Resources**

Participants presence + Trainer + Projector + Computer + Chairs/ Tables + work sheet for activity 2 + Pens/pencils

**Learning Outcomes**

Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | • To know what motivation is;<br>• To know the importance for job performance and retainment; | **Skills** | • Self-motivation;<br>• Optimism;<br>• Commitment to goals. |

**Methodological approach**

| |
|---|
| The approach that will be used is a short theoretical introduction (with interactive resources e.g. videos, dynamic images, etc.,) about the topic given by the trainer, followed by an explanation of demotivating factors versus motivational factors. Afterwards, the trainer will provide the trainees basic information on the Maslow's hierarchy of needs that influence motivation. The last part of the presentation, will consist of tips for self-motivation. The presentation will be followed by two activities where the participants will contribute to group discussions, critical thinking, and self-learning through dynamic games and activities. The trainer will use PowerPoint presentations to interact with the participants. |
| **Evaluation**<br>Kirkpatrick model |

| **Unit 2: Working in programming** | | | |
|---|---|---|---|
| **Subunit: 2.5. Accountability** | | **Total duration of the unit: 2h50m** | |
| **Objectives of the sub-unit**<br>• To demonstrate perseverance when performing a long and difficult task;<br>• To actively manage time and tasks, showing confidence in own opinions;<br>• To take responsibility for own actions and decisions; | | | |
| **Content**<br>• Small presentation about accountability as a soft skill – what is accountability?;<br>• What is responsibility and how does it relate with accountability?;<br>• The typical excuses of avoiding own accountability;<br>• Tips to improve accountability;<br>• Activities | | | |
| **Resources**<br>Participants presence + Trainer + Projector + Computer + Chairs/ Tables + work sheets for activity 3 (test) + Pens/pencils | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | • To know what time and resource management is;<br>• To know the importance of accountability to productivity and effectiveness; | **Skills** | • Manage thoughts;<br>• Develop accountable behaviour;<br>• Take actions and not excuses;<br>• Authenticity. |
| **Methodological approach.**<br>The approach that will be used is a short theoretical introduction (with interactive resources e.g. videos, dynamic images, etc.,) about the topic given by the trainer, followed by an explanation on how responsibility can be related. Then, the trainer will expose the typical excuses of avoiding own accountability and give tips to improve the same. Afterwards, four activities will take place where the participants will contribute to group discussions, critical thinking, and self-learning through dynamic tests and activities. The trainer will use PowerPoint presentations to interact with the participants. | | | |
| **Evaluation**<br>Kirkpatrick model | | | |

| **Unit 2: Working in programming** | |
|---|---|
| **Subunit: 2.6. Conflict Management** | **Total duration of the unit: 2h50m** |
| **Objectives of the sub-unit**<br>• To be consciously aware of differences and conflict-related issues;<br>• To assume responsibility for own actions and the consequences for actions undertaken and decisions made;<br>• To demonstrate diplomacy, cultural sensitivity and tact. | |
| **Content** | |

<table>
<tr><td colspan="4">

- Small presentation about conflict management as a soft skill;
- Types of conflict management skills;
- Ineffective ways to deal with conflicts;
- Tips for an effective conflict resolution;
- Activities

</td></tr>
<tr><td colspan="4">Resources<br>Participants presence + Trainer + Projector + Computer + Chairs/ Tables + work sheets for activity 1 (blank cards and papers) + Pens/pencils</td></tr>
<tr><td colspan="4">Learning Outcomes<br>Upon completion of this unit the learner will know and be able to:</td></tr>
<tr><td>Knowledge</td><td>• To know the importance of conflict resolution;<br>• To know the importance of conflict resolution and mentoring to reach a peaceful resolution.</td><td>Skills</td><td>• Generate options;<br>• Positive approach;<br>• Better perception over problems;<br>• Diffusion of anger;<br>• Emotional intelligence;<br>• Solving a problem/ disagreement.</td></tr>
<tr><td colspan="4">Methodological approach<br>The approach that will be used is a short theoretical introduction (with interactive resources e.g. videos, dynamic images, etc.,) about the topic given by the trainer, followed by an explanation of the types of conflict management skills that should be helpful when facing a conflict. Then, the trainer will talk about ineffective ways to deal with conflicts, along with tips for an effective conflict resolution. Afterwards, there will be two activities where the participants will contribute to group discussions, critical thinking, and self-learning through dynamic games and activities. The trainer will use PowerPoint presentations to interact with the participants.</td></tr>
<tr><td colspan="4">Evaluation<br>Kirkpatrick model</td></tr>
</table>

### *6.3 Fundamentals of technology*

| **Unit 3 – Fundamentals of technology, Workload: 20h00m** | |
|---|---|
| **Presential Learning** | 20h00m |
| **Online Learning** | 0h00m |
| **Evaluation** | • Two individual exercises<br>• One teamwork exercise |

| **Unit 3 Fundamentals of technology** | |
|---|---|
| **Subunit 3.1 Pillars of fundamentals of technology** | **Total duration of the unit: 5h00m** |
| **Objectives of the sub-unit**<br>Provide an introductory perspective on computer architectures | |
| **Content**<br>• Evolution of computer architectures<br>• Case studies | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: Pen and paper | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | |

| | | | |
|---|---|---|---|
| **Knowledge** | To identify the various types of operating system architectures and understand their components | **Skills** | • Teamwork<br>• Organization and planning |

**Methodological approach**
Short theoretical introduction. Individual assignment and its presentation *inter-pares*.

**Evaluation**
Individual assignment: hands-on exercise

| **Unit 3 Fundamentals of technology** | |
|---|---|
| **Subunit 3.2 Hardware & Software** | **Total duration of the unit: 5h00m** |

**Objectives of the sub-unit**
Provide an introductory perspective on computer hardware and operating systems

**Content**
- Evolution of operating systems
- Setting operating systems
- Case studies

**Resources**
1. Trainer: flip-chart-board, laptop, and projector
2. Trainee: Pen-and-paper, and laptop

**Learning Outcomes**
Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | To understand the computer architecture and the interrelationships between hardware and operating systems software; | **Skills** | • Teamwork<br>• Organization and planning |

**Methodological approach**
Short theoretical introduction. Individual assignment and its presentation *inter-pares*.

**Evaluation**
Individual assignment: hands-on exercise

| **Unit 3 Fundamentals of technology** | |
|---|---|
| **Subunit 3.3 Let's party** | **Total duration of the unit: 10h00m** |

**Objectives of the sub-unit**
- Teamwork
- Discussion and brainstorming

**Content**
Teamwork assignment

**Resources**
1. Trainer: flip-chart-board, laptop, and projector
2. Trainee: Pen-and-paper, and laptop

**Learning Outcomes**
Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | To identify the role and impact of an operating system, and solve practical problems related to the development and use of an operating system. | **Skills** | • Teamwork<br>• Rational |

**Methodological approach**
Short introduction and explanation on teamwork objectives: to solve real-world hardware and software problems among different case studies

**Evaluation**

| |
|---|
| Individual assessment, based on teamwork |

## *6.4 Computation thinking and everyday business coding*

| **Unit 4 - Computation thinking and everyday business coding, Workload: 15h00m** | |
|---|---|
| **Presential Learning** | 15h00m |
| **Online Learning** | 0h00m |
| **Evaluation** | • Three individual exercises<br>• One teamwork exercise |

| **Unit 4 Computation thinking and everyday business coding** | | | |
|---|---|---|---|
| **Subunit 4.1 Pillars of computational thinking** | | **Total duration of the unit: 4h00m** | |
| **Objectives of the sub-unit**<br>• Provide an introductory perspective on computational thinking<br>• Discussion and brainstorming | | | |
| **Content**<br>• Definition of algorithm. Divide-and-conquer. Simpler is better. Deterministic and non-deterministic algorithms.<br>• Individual presentation of a case study | | | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: Pen-and-paper | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | Develops algorithms from the problem statement | **Skills** | Critical thinking |
| **Methodological approach**<br>Short theoretical introduction. Individual assignment and its presentation *inter-pares*. | | | |
| **Evaluation**<br>Individual assignment: assertiveness of the proposed algorithm, and clarity of the oral presentation | | | |

| **Unit 4 Computation thinking and everyday business coding** | |
|---|---|
| **Subunit 4.2 Designing workflows** | **Total duration of the unit: 4h00m** |
| **Objectives of the sub-unit**<br>• Provide an introductory perspective on workflows design<br>• Discussion and brainstorming | |
| **Content**<br>• Terminology and symbology on workflow design.<br>• Individual presentation of a case study | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: Pen-and-paper | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | |

| | | | |
|---|---|---|---|
| **Knowledge** | Applies algorithms to the problem | **Skills** | • Teamwork<br>• Critical thinking |

**Methodological approach**
Short theoretical introduction. Individual assignment and its presentation *inter-pares*.

**Evaluation**
Individual assessment, based on role-paying: each trainee needs to develop an algorithm based on a teammate description and vice-versa.

| **Unit 4 Computation thinking and everyday business coding** | |
|---|---|
| **Subunit 4.3 Writing pseudo code** | **Total duration of the unit: 4h00m** |

**Objectives of the sub-unit**
- Provide an introductory perspective on pseudo-code
- Discussion and brainstorming

**Content**
- Terminology of pseudo-code
- Individual presentation of a case study

**Resources**
1. Trainer: flip-chart-board, laptop, and projector
2. Trainee: Pen-and-paper

**Learning Outcomes**
Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | • To solve problems writing programmes by means of abstract thinking<br>• Transforms algorithms into programme code. | **Skills** | • Teamwork<br>• Critical thinking |

**Methodological approach**
Short theoretical introduction. Individual assignment and its presentation *inter-pares*.

**Evaluation**
Individual assessment, based on role-paying: each trainee needs to develop an algorithm and its pseudo code based on a teammate description and vice-versa.

| **Unit 4 Computation thinking and everyday business coding** | |
|---|---|
| **Subunit 4.4 Let's party** | **Total duration of the unit: 3h00m** |

**Objectives of the sub-unit**
- Teamwork
- Discussion and brainstorming

**Content**
Teamwork assignment

**Resources**
1. Trainer: flip-chart-board, laptop, and projector
2. Trainee: Pen-and-paper

**Learning Outcomes**
Upon completion of this unit the learner will know and be able to:

| | | | |
|---|---|---|---|
| **Knowledge** | • To solve problems writing programmes by means of abstract thinking<br>• Develops algorithms from the problem statement<br>• Applies algorithms to the problem<br>• Transforms algorithms into programme code. | **Skills** | • Teamwork<br>• Critical thinking |
| **Methodological approach**<br>Short introduction and explanation on teamwork objectives: to develop an algorithm, workflow, and pseudo code whose topic must be selected among different case studies | | | |
| **Evaluation**<br>Individual assessment, based on teamwork (case study algorithm 40%, workflow 30% and pseudo code 30%) | | | |

## *6.5 Basic programming languages*

| **Unit 5: Basic programming languages, Workload: 25h00m** | |
|---|---|
| **Presential Learning** | 18h00m |
| **Online Learning** | 7h00m |
| **Evaluation** | • Three individual exercises<br>• One teamwork exercise |
| **Pre-Requisite** | Unit 4 or background in workflows, and pseudo-code |

| **Unit 5: Basic programming languages** | | | |
|---|---|---|---|
| **Subunit 5.1 Pillars of programming** | | **Total duration of the unit: 5h00m** | |
| **Objectives of the sub-unit**<br>Provide an introductory perspective on python programming | | | |
| **Content**<br>• Program structure, variables, input/output<br>• Case studies | | | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: laptop | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | Identifies concepts, models, and structures of a language programming | **Skills** | Critical thinking |
| **Methodological approach** Theoretical presentations mixed with real-world examples | | | |
| **Evaluation**<br>Individual assignment: hands-on exercise | | | |

| **Unit 5: Basic programming languages** | |
|---|---|
| **Subunit 5.2 Conditions and cycles** | **Total duration of the unit: 5h00m** |
| **Objectives of the sub-unit**<br>Provide a basic perspective on python programming | |
| **Content**<br>• Decisions, and cycles | |

<table>
<tr><td colspan="4">• Case studies</td></tr>
<tr><td colspan="4">Resources<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: laptop</td></tr>
<tr><td colspan="4">Learning Outcomes<br>Upon completion of this unit the learner will know and be able to:</td></tr>
<tr><td>Knowledge</td><td>• Identifies concepts, models, and structures of a language programming<br>• Designs, writes, tests, debugs, and maintains the source code</td><td>Skills</td><td>• Critical thinking<br>• Logic</td></tr>
<tr><td colspan="4">Methodological approach Theoretical presentations mixed with real-world examples</td></tr>
<tr><td colspan="4">Evaluation<br>Individual assignment: hands-on exercise</td></tr>
</table>

<table>
<tr><td colspan="4">Unit 5: Basic programming languages</td></tr>
<tr><td colspan="2">Subunit 5.3 Functions and testing</td><td colspan="2">Total duration of the unit: 5h00m</td></tr>
<tr><td colspan="4">Objectives of the sub-unit<br>Provide an advanced basic perspective on python programming</td></tr>
<tr><td colspan="4">Content<br>• Functions, and data structures<br>• Case studies</td></tr>
<tr><td colspan="4">Resources<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: laptop</td></tr>
<tr><td colspan="4">Learning Outcomes<br>Upon completion of this unit the learner will know and be able to:</td></tr>
<tr><td>Knowledge</td><td>• Identifies concepts, models, and structures of a language programming<br>• Designs, writes, tests, debugs, and maintains the source code</td><td>Skills</td><td>• Critical thinking<br>• Logic</td></tr>
<tr><td colspan="4">Methodological approach Theoretical presentations mixed with real-world examples</td></tr>
<tr><td colspan="4">Evaluation<br>Individual assignment: hands-on exercise</td></tr>
</table>

<table>
<tr><td colspan="2">Unit 5: Basic programming languages</td></tr>
<tr><td>Subunit 5.4 Self-learning</td><td>Total duration of the unit: 7h00m</td></tr>
<tr><td colspan="2">Objectives of the sub-unit<br>Consolidate python programming concepts</td></tr>
<tr><td colspan="2">Content<br>Hand-on exercises</td></tr>
<tr><td colspan="2">Resources<br>1. Trainer: -<br>2. Trainee: laptop</td></tr>
<tr><td colspan="2">Learning Outcomes<br>Upon completion of this unit the learner will know and be able to:</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Knowledge** | • Identifies concepts, models, and structures of a language programming<br>• Designs, writes, tests, debugs, and maintains the source code | **Skills** | • Critical thinking<br>• Logic |
| **Methodological approach** eLearning | | | |
| **Evaluation**<br>N/A | | | |

| | |
|---|---|
| **Unit 5: Basic programming languages** | |
| **Subunit 5.5 Let's party** | **Total duration of the unit: 3h00m** |
| **Objectives of the sub-unit**<br>• Teamwork<br>• Discussion and brainstorming | |
| **Content**<br>Teamwork assignment | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: laptop | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | |

| | | | |
|---|---|---|---|
| **Knowledge** | • Identifies concepts, models, and structures of a language programming<br>• Designs, writes, tests, debugs, and maintains the source code | **Skills** | • Teamwork<br>• Critical thinking<br>• Logic |
| **Methodological approach**<br>Short introduction and explanation on teamwork objectives: to develop program whose topic must be selected among different case studies (in addition, the workflow of the program must be also designed. Correlation with UC4) | | | |
| **Evaluation**<br>Individual assessment, based on teamwork (workflow 10% and programming 90%) | | | |

### *6.6 Web development*

| | |
|---|---|
| **Unit 6 - Web development, Workload: 25h00m** | |
| **Presential Learning** | 18h00m |
| **Online Learning** | 7h00m |
| **Evaluation** | • Two individual exercises<br>• One teamwork exercise |

| | |
|---|---|
| **Unit 6 - Web development** | |
| **Subunit 6.1 Pillars of web programming** | **Total duration of the unit: 6h00m** |
| **Objectives of the sub-unit**<br>• Provide an introductory perspective on HTML<br>• Using an IDE<br>• Case studies | |
| **Content**<br>• IDE: basics<br>• Structure of HTML projects<br>• HTML: tags, tables, and forms | |

| | | | |
|---|---|---|---|
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: laptop | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | To use integrated development environments for the development of web applications | **Skills** | Critical thinking |
| **Methodological approach** Theoretical presentations mixed with real-world examples | | | |
| **Evaluation**<br>Individual assignment: hands-on exercise | | | |

| | | | |
|---|---|---|---|
| **Unit 6 - Web development** | | | |
| **Subunit 6.2 HTML & CSS** | | **Total duration of the unit: 4h00m** | |
| **Objectives of the sub-unit**<br>Provide a basic perspective on CSS based on Bootstrap | | | |
| **Content**<br>CSS principles | | | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: laptop | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | • To project and implement web applications;<br>• To use integrated development environments for the development of web applications | **Skills** | Critical thinking |
| **Methodological approach** Theoretical presentations mixed with real-world examples | | | |
| **Evaluation**<br>Individual assignment: hands-on exercise | | | |

| | | | |
|---|---|---|---|
| **Unit 6 - Web development** | | | |
| **Subunit 6.3 Self-learning** | | **Total duration of the unit: 7h00m** | |
| **Objectives of the sub-unit**<br>Consolidate HTML/CSS concepts | | | |
| **Content**<br>Hand-on exercises | | | |
| **Resources**<br>1. Trainer: -<br>2. Trainee: laptop | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | • To project and implement web applications;<br>• To use integrated development environments for the development of web applications | **Skills** | Critical thinking |
| **Methodological approach** eLearning | | | |
| **Evaluation**<br>N/A | | | |

| **Unit 6 - Web development** | | | |
|---|---|---|---|
| **Subunit 6.4 Let's party** | | **Total duration of the unit: 8h00m** | |
| **Objectives of the sub-unit**<br>• Teamwork<br>• Discussion and brainstorming | | | |
| **Content**<br>Teamwork assignment | | | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: laptop | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | • Identifies concepts, models, and structures of a language programming<br>• Designs, writes, tests, debugs, and maintains the source code | **Skills** | • Teamwork<br>• Critical thinking<br>• Logic |
| **Methodological approach**<br>Short introduction and explanation on teamwork objectives: to develop a website whose topic must be selected among different case studies | | | |
| **Evaluation**<br>Individual assessment, based on teamwork (HTML 60%, CSS 40%) | | | |

### *6.7 Application development*

| **Unit 7: Application development, Workload: 15h00m** | |
|---|---|
| **Presential Learning** | 10h00m |
| **Online Learning** | 5h00m |
| **Evaluation** | • Two individual exercises<br>• One teamwork exercise |
| **Prerequisite** | Unit 6 or background in HTML/CSS |

| **Unit 7: Application development** | | | |
|---|---|---|---|
| **Subunit 7.1 Pillars of mobile programming** | | **Total duration of the unit: 2h00m** | |
| **Objectives of the sub-unit**<br>Provide an introductory perspective on mobile programming | | | |
| **Content**<br>• Structure of a mobile application projects<br>• Case studies | | | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: Pen-and-paper | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | To use integrated development environments for the development of mobile applications | **Skills** | Critical thinking |
| **Methodological approach** Theoretical presentations mixed with real-world examples | | | |
| **Evaluation** | | | |

| |
|---|
| Individual assignment: hands-on exercise |

| **Unit 7: Application development** | | | |
|---|---|---|---|
| **Subunit 7.2 Design & Usability** | | **Total duration of the unit: 2h00m** | |
| **Objectives of the sub-unit**<br>Provide a basic perspective on user-experience (UX) | | | |
| **Content**<br>Basic concepts on usability, design, prototyping, user interaction | | | |
| **Resources**<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: Pen-and-paper, and laptop | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | • To use integrated development environments for the development of mobile applications<br>• To project and implement applications for mobile devices<br>• To take advantage of multimedia in sensor related resources provided by mobile devices | **Skills** | Critical thinking |
| **Methodological approach** Theoretical presentations mixed with real-world examples | | | |
| **Evaluation**<br>Individual assignment: hands-on exercise | | | |

| **Unit 7: Application development** | | | |
|---|---|---|---|
| **Subunit 7.3 Self-learning** | | **Total duration of the unit: 7h00m** | |
| **Objectives of the sub-unit**<br>Consolidate mobile application programming concepts | | | |
| **Content**<br>Hand-on exercises (HTML&CSS) | | | |
| **Resources**<br>1. Trainer: -<br>2. Trainee: laptop | | | |
| **Learning Outcomes**<br>Upon completion of this unit the learner will know and be able to: | | | |
| **Knowledge** | • To use integrated development environments for the development of mobile applications<br>• To project and implement applications for mobile devices<br>• To take advantage of multimedia in sensor related resources provided by mobile devices | **Skills** | Critical thinking |
| **Methodological approach** eLearning | | | |
| **Evaluation**<br>N/A | | | |

| **Unit 7: Application development** | |
|---|---|
| **Subunit 7.4 Let's party** | **Total duration of the unit: 4h00m** |
| **Objectives of the sub-unit**<br>• Teamwork<br>• Discussion and brainstorming | |

<table>
<tr><td colspan="4">Content<br>Teamwork assignment</td></tr>
<tr><td colspan="4">Resources<br>1. Trainer: flip-chart-board, laptop, and projector<br>2. Trainee: Pen-and-paper, and laptop</td></tr>
<tr><td colspan="4">Learning Outcomes<br>Upon completion of this unit the learner will know and be able to:</td></tr>
<tr><td>Knowledge</td><td>• To use integrated development environments for the development of mobile applications<br>• To project and implement applications for mobile devices<br>• To take advantage of multimedia in sensor related resources provided by mobile devices</td><td>Skills</td><td>• Teamwork<br>• Critical thinking</td></tr>
<tr><td colspan="4">Methodological approach<br>Short introduction and explanation on teamwork objectives: to develop a mobile application whose topic must be selected among different case studies</td></tr>
<tr><td colspan="4">Evaluation<br>Individual assessment, based on teamwork (Design/Usability 30%, Programming 70%)</td></tr>
</table>