



HINTS

High Innovative VET for green and digital Transformations

DIGITAL TRAINING COURSE

EQF 5



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Version History

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Minimum Requirements for the Education, Training, Examination, and Qualification Personnel

Course Description

Project Result (PR1) presents the draft guidelines for Digital Industry Course. PR1 has been prepared and evaluated by the HINTS consortium.

This course aims to provide learners with the knowledge and skills to effectively use and implement digital tools in their teaching contexts. The guideline for HEI and VET teachers and trainers on the implementation and use of digital tools:

- Digital and computer science training.
- Introduction and advanced course in creating an e-learning space.
- Educational innovation (innovative pedagogical approach, accessibility and openness, WBL, continuous learning, micro credential system etc.).
- Improving effectiveness of learning (including how to define course objective and the target group, how to be succinct and clear, how to make a visually attractive course, how to engage learners through activities and assessments).
- Innovative tools for digital learning support (collaborative whiteboard, video conferencing tools); review of additional useful web platforms, apps and e-learning tools to enable distance and blended learning.
- Principles and practices of instructional design.
- Legal and ethical aspects of online learning.
- Evaluation and improvement of online course quality.

Trainees who successfully pass the examinations are expected to be able to apply the achieved learning outcomes at a level in line with the level of the qualification diploma.

The contents of the modular course are presented in the following structure (overview):

Digital training course - COMPETENCE UNITS		
	Recommended Contact Hours*	Expected Workload**
CUD1: Digital competence	5	10
CUD2: Gamification	4	8
CUD3: Educational Innovation	6	12
CUD4: Digital learning spaces, systems and AI	5	10
TOTAL	20	40

* Contact Hours are the minimum recommended teaching hours for the Standard Routes. A contact hour shall contain at least 50 minutes of direct teaching time.

** Workload is calculated in hours, corresponds to an estimation of the time trainees typically need to complete all learning activities required to achieve the defined learning outcomes in formal learning environments plus the necessary time for individual study.

A Competence Unit is a defined set of knowledge, skills and abilities that an individual must demonstrate to perform a specific task or job role effectively.

The expected learning outcomes are described in two ways: generic outcome descriptors organized in knowledge, skills, autonomy and responsibility; and in detail for each competence unit, organized in job functions and related activities, knowledge and skills corresponding to a specific proficiency level within EWF's Systems Framework levels (see Appendix I).

On each Competence Unit, objectives and scope are defined for a specific depth of knowledge and skills.

Recommended contact hours are distributed between theoretical (A), assigned projects/exercises (B), practical workshop training (C), as showed in the following example:

Qualification: Example 1	
CONTACT HOURS	X= (SUM A:C)
Subject Contents	A + B + C

Competency-based learning

The modular approach is a growing trend in educational philosophy that shifts from traditional instruction to an outcome-based learning model. This approach divides the curriculum into small, distinct, and independent units or modules that are typically brief and non-sequential. By adopting a modular approach, learners gain more control over their learning process and take on greater responsibility. This method emphasizes the importance of learner autonomy, making it particularly suitable for more mature trainees. In a modular system, all necessary competencies for performance are closely connected, and tasks are organized into cohesive sets.

Moreover, the core principle of modularization is placing learners at the center of the teaching-learning process. This approach requires a classroom environment where trainees actively participate in constructing knowledge. It also transforms the teacher's role from a transmitter of knowledge to a facilitator of learning. Additionally, modularization demands continuous monitoring and assessment of trainees' progress throughout each module. Effective continuous assessment enables instructors to adjust their teaching methods based on assessment results. This process also provides trainees with feedback on their learning and guidance on how to improve further.

The modular approach must emphasize:

- Designing assessment tasks as integral parts of the learning process.
- Providing feedback that supports trainees throughout their learning journey rather than only after task completion (i.e., when they receive a grade).
- Encouraging trainees to take an active role in organizing and monitoring their own learning.

Assessment involves collecting evidence and making judgments to determine whether competency has been achieved. This process confirms that an individual can perform to the standards required in the workplace, as specified in a training package or a vocational education and training (VET) accredited course.

The modular approach allows to perform separately the assessment for each CU. Knowledge assessment will use digital assessment formats appropriate to each module, such as multiple-choice questions to assess factual knowledge. In addition, a reliable learning management system (LMS) or specialized examination software will be implemented to enable secure examination delivery, question randomization and time management.

See more details in Section II: Examination and Qualification

e-learning tools

E-learning tools have transformed the education and training landscape, offering several key advantages related to accessibility and interaction:

- **Accessibility and flexibility:** e-learning tools provide staff with unprecedented convenience, allowing access to training materials anytime, anywhere. This flexibility is especially beneficial for staff with different locations or irregular schedules, as it allows them to learn at their own pace, whether in the factory, in the field or at home.
- **Real-time progress tracking:** Many e-learning tools include progress tracking features, allowing employers to monitor employee progress in real time. This facilitates a data-driven approach to employee development, allowing areas requiring additional support to be identified and addressed.
- **Multimedia resources:** E-learning platforms offer versatility by incorporating a variety of multimedia resources such as videos, interactive simulations and 3D models. These tools enhance the learning experience, allowing staff to better understand complex adhesive bonding processes through visual and interactive means.

Professional profile

The course is designed for HEI teachers, VET trainers, and specialists who want to learn more about digital technologies and how to integrate them in their work. EQF level 5 in technical areas is required. The participant must possess proficiency in the language used for the training program to effectively follow lessons, complete quizzes, and undertake examinations.

General access conditions

The access conditions are the following:

- EQF level 5 in fields of science and technology (such as natural sciences, engineering, medical and health sciences, agricultural sciences...) required.
- The participant must be proficient in the respective language in which the training program is carried out to effectively follow lessons, complete quizzes, and undertake examinations.
- Additionally, a suggested familiarity with materials science as a basic requirement.

General access conditions for pilot training courses

The access conditions are the following:

- EQF level 5 in fields of science and technology (such as natural sciences, engineering, medical and health sciences, agricultural sciences...) required.
- The participant must possess proficiency in English to effectively follow lessons, complete quizzes, and undertake examinations.
- Additionally, a suggested familiarity with materials science and pedagogical education as a basic requirement.

Duration of the training program

The course duration is **1 week**, with an estimated workload of **40 hours**.

Structure of the Digital Industry Course

The course is divided into **18 subjects**, each covering a specific topic and having a specific learning objective. Each session consists of the following elements:

- A title, a description, a learning objective, a duration, a list of required resources, and a method of assessment.
- A video lecture, presenting the main concepts and theories related to the topic.
- A reading, providing additional information and examples on the topic.
- A quiz, testing the learners' understanding and retention of the topic.
- A discussion, facilitating the learners' interaction and reflection on the topic.
- A project, requiring the learners to apply the knowledge and skills acquired on the topic to a real or simulated situation.
- Peer feedback enabling the learners to give and receive constructive feedback on their projects.

Section I: Theoretical and Practical Education

I.1. Qualification Outcome Descriptors

QUALIFICATION	EFW LEVEL	KNOWLEDGE	SKILLS	AUTONOMY AND RESPONSIBILITY
Digital Training Course	SPECIALISED	<p>Comprehensive and specialized knowledge of digital upskilling concepts and its importance in modern industries, such as:</p> <p>How digital upskilling improves workforce capabilities, productivity, and adaptability.</p> <p>Digital and computer science concepts and their relevant to industry applications.</p> <p>Tools and platforms for building e-learning spaces, such as Moodle, Canvas, or Blackboard.</p> <p>Innovative pedagogical approaches and their application in digital learning environments.</p> <p>Knowledge of accessibility standards and practices to ensure inclusivity in digital education.</p> <p>Awareness of open educational resources (OER) and their integration into digital curricula.</p> <p>Strategies for engaging learners through interactive activities, assessments, and feedback mechanisms.</p> <p>Familiarity with collaborative tools such as digital whiteboards and their use in remote or blended learning.</p> <p>Knowledge of video conferencing tools and their features for effective virtual instruction.</p> <p>Awareness of additional web platforms, apps, and e-learning tools that support distance and blended learning environments.</p>	<p>Specialized range of cognitive and practical skills, allowing to develop and explain the concept and the benefits of digital upskilling in industries, for teachers and VET trainers on the implementation and use of digital tools.</p> <p>Foster educational Innovation (innovative pedagogical approach, accessibility and openness); in regular/common Situations.</p>	<p>Manage and supervise the adaptation of learning contents where practical skills and theoretical applications can be taught by implementing Digital Industry Course.</p> <p>Review and develop performance of such adaptation of learning contents.</p>

I.2. Detailed topics for the main training subjects and their subdivision into individual competence units and subjects.

Competence Unit D1: Digital Competence

CU/ULO CUD1: Digital Competence	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
1.1. Digital data and information	0.5
1.2. Digital devices and equipment	0.5
1.3. Online communication technology and devices	2.5
1.4. Digital Media	0.5
1.5. Digital Tools for Learning Processes	0.5
1.6. Internet Environment, Browsers, Ethics, and Threats	0.5
Total	5
WORKLOAD	10

Subject	Knowledge	Skills
1.1. Digital data and information	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> Types of digital data relevant to education. Techniques for efficiently using digital information in VET. 	<p>Interpret different types of digital data that are relevant to the educational context, helping educators make informed decisions based on data.</p> <p>Applying techniques to efficiently use digital information in vocational education and training (VET), ensuring that data serves pedagogical goals effectively.</p>
1.2. Digital devices and equipment	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> Overview of modern digital tools and their educational applications. Best practices for maintaining and troubleshooting digital devices. 	<p>Select the appropriate range of modern digital tools based on their applications in education and teaching needs.</p> <p>Perform basic maintenance and troubleshoot common issues with digital devices, minimizing. Downtime and maintaining the flow of the educational process.</p>

Subject	Knowledge	Skills
1.3. Online Communication Technology and Devices	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Communication protocols for digital learning environments. • Effective and secure online interactions. 	<p>Apply the correct communication protocols in digital learning environments to facilitate clear and effective communication.</p> <p>Implement strategies to ensure secure online interactions, protecting both educators and learners from potential digital threats.</p>
1.4. Digital Media	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Multimedia resources for enhanced learning • Engaging content using digital media tools 	<p>Use various multimedia resources to enhance the learning experience, making educational content more engaging and accessible.</p> <p>Create engaging and educational content using digital media tools, fostering a dynamic and interactive learning environment.</p>
1.5. Digital tools for learning processes	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • e-learning platforms and software. • Integration of digital tools like collaborative whiteboards and video conferencing in teaching. 	<p>Use various e-learning platforms and software, which can help in delivering content more effectively and accommodating different learning styles.</p> <p>Apply modern digital tools, such as collaborative whiteboards and video conferencing, into teaching practices to enhance collaboration and interaction among learners.</p>
1.6. Internet Environment, Browsers, Ethics, and Threats	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Safe Navigation on the internet for educational purposes. • Ethical considerations and threat mitigation in online learning. 	<p>Navigate the internet safely for educational purposes, using browsers and other tools effectively while minimizing risks.</p> <p>Apply ethical considerations in the use of internet resources, coupled with the ability to implement threat mitigation strategies to protect the learning environment</p>

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners' understanding and retention of the topic.
- A discussion to encourage learners' interaction and reflection on the topic.

Competence Unit D2: Gamification

CU/ULO CUD2: Gamification	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
2.1. Basics of Gamification in Education	1
2.2. Virtual Reality (VR) and Augmented Reality (AR) Technologies	1
2.3. Educational Games	1
2.4. Innovative Tools for Digital Learning Support	1
Total	4
WORKLOAD	8

Subject	Knowledge	Skills
2.1. Basics of Gamification in Education	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Game mechanics and their educational benefits. • Design principles for gamification in learning. 	<p>Outline mechanics of games, including rules, goals, and feedback systems, and recognizing how these elements can be applied to enhance educational experiences.</p> <p>Design learning experiences that incorporate game elements to increase engagement, motivation, and participation in educational settings.</p>
2.2. Virtual Reality (VR) and Augmented Reality (AR) Technologies	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Tools and software for creating VR/AR content. 	<p>Use VR and AR technologies to create immersive and interactive learning experiences that can transform the traditional learning environment into a more engaging and effective one.</p>

Subject	Knowledge	Skills
2.3. Educational Games	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Use of educational games across disciplines. • Case studies on successful educational games. 	<p>Design educational games that effectively convey content across various disciplines, catering to different learning styles and objectives.</p> <p>Analyse case studies of successful educational games to identify best practices and strategies that can be adapted to one’s own educational contexts.</p>
2.4. Innovative Tools for Digital Learning Support	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Overview of the latest digital learning tools and their applications. • Customizing tools for specific educational needs. 	<p>Evaluate the latest digital learning tools, including their potential applications in education to enhance learning outcomes.</p> <p>Customize digital learning tools to meet specific educational needs, ensuring that the tools align with the curriculum goals and enhance the learning experience.</p>

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners’ understanding and retention of the topic.
- A discussion to encourage learners’ interaction and reflection on the topic.

Competence Unit D3: Educational innovation

CU/ULO CUD3: Educational innovation	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
3.1. Learner-Cantered Didactics	1.5
3.2. Innovative Pedagogical Approaches	1.5
3.3. Critical Thinking and Collaborative Learning	3
Total	6
WORKLOAD	12

Subject	Knowledge	Skills
3.1. Learner-Cantered Didactics	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> Principles and practices for developing learner-cantered strategies. Differentiating instruction to meet diverse learner needs. 	<p>Adapt teaching methods to accommodate diverse learning styles and needs, ensuring that all students can access and engage with the content effectively.</p> <p>Design educational experiences that centre on the learner's needs, preferences, and previous knowledge, aiming to maximize individual learning outcomes.</p>
3.2. Innovative Pedagogical Approaches	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> Integration of problem-based learning and micro-credentials into curricula. Strategies for promoting accessibility and openness in education. 	<p>Integrate cutting-edge pedagogical strategies such as problem-based learning and the use of micro-credentials into existing curricula, enhancing both engagement and the assessment of learning outcomes.</p> <p>Create an accessible and open educational environment that facilitates equal learning opportunities for all students, including those with disabilities or from diverse backgrounds.</p>

Subject	Knowledge	Skills
3.3. Critical Thinking and Collaborative Learning	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Techniques to foster critical thinking in students. • Designing collaborative learning sessions that encourage interaction and problem-solving. 	<p>Influence critical thinking skills among students, enabling them to analyse information critically, evaluate different perspectives, and make informed decisions.</p> <p>Manage collaborative learning environments that encourage interaction, discussion, and problem-solving among students, promoting a deeper understanding of the subject matter and improving interpersonal skills.</p>

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners' understanding and retention of the topic.
- A discussion to encourage learners' interaction and reflection on the topic.

Competence Unit D4: Digital Learning Spaces, Systems, and AI

CU/ULO CUD4: Digital Learning Spaces, Systems, and AI	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
4.1. Types of Learning Styles and Digital Learning Spaces	1
4.2. Strengths and Weaknesses of Learning Styles Models	1
4.3. Digital Learning Systems and AI	1
4.4. Curriculum Design and Implementation Using AI	1
4.5. AI in Testing and Assessment	1
Total	5
WORKLOAD	10

Subject	Knowledge	Skills
4.1. Types of Learning Styles and Digital Learning Spaces	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> Digital spaces influence over the various learning styles. Digital classrooms and learning portals. 	<p>Analysing how different digital learning spaces can cater to various learning styles, ensuring that the educational content is accessible and effective for all types of learners.</p> <p>Design digital classrooms and learning portals that are versatile and supportive of diverse learning preferences, enhancing the educational experience through tailored digital environments.</p>
4.2. Strengths and Weaknesses of Learning Styles Models	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> Evaluation of learning style models and their impact on educational efficacy. 	<p>Evaluate different learning styles models and their applicability in educational settings, identifying potential strengths that can enhance learning and weaknesses that may hinder it.</p> <p>Adjust teaching strategies based on the insights gained from the evaluation of learning styles models, optimizing educational efficacy.</p>

Subject	Knowledge	Skills
4.3. Digital Learning Systems and AI	Comprehensive and specialized knowledge of: <ul style="list-style-type: none"> • Overview of AI technologies in education. • AI for personalized learning and assessment. 	<p>Explain AI technologies in education and their potential to transform learning environments.</p> <p>Implement AI for personalized learning and assessment, tailoring educational experiences to individual learner needs and capabilities.</p>
4.4. Curriculum Design and Implementation Using AI	Comprehensive and specialized knowledge of: <ul style="list-style-type: none"> • AI use to design dynamic and adaptive curricula. • Case studies. 	<p>Use of AI to design dynamic and adaptive curricula that respond to the evolving educational needs of learners.</p>
4.5. AI in Testing and Assessment	Comprehensive and specialized knowledge of: <ul style="list-style-type: none"> • Automating assessments and feedback using AI. • Enhancing fairness and accuracy in tests through AI analytics. 	<p>Implement automated assessments and feedback systems using AI, streamlining the evaluation process while maintaining high standards.</p> <p>Improve fairness and accuracy of tests through AI analytics, ensuring assessments are equitable and reflective of true learner understanding.</p>

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners' understanding and retention of the topic.
- A discussion to encourage learners' interaction and reflection on the topic.

Section II: Examination and Qualification

II.1 Examination Planning

- Examination objectives clearly align with the digital course's learning outcomes across Digital Competence, Gamification, Educational Innovation, and AI Integration.
- Use appropriate digital assessment formats for each module, such as multiple-choice questions for factual knowledge, simulations for skills in VR/AR, and project submissions for gamification and AI implementation strategies.
- Develop and compile a bank of questions and tasks that thoroughly test both theoretical understanding and practical application.
- Ensure the questions are diverse and inclusive, catering to different learning styles and digital proficiency levels.

II.2 Examination Scheduling

- Schedule online examinations that can be taken within a flexible window to accommodate different time zones and personal circumstances of remote learners.
- Define specific time limits for different sections of the exam based on their complexity and the expected time to complete them fairly.

II.3 Examination Administration

- Utilize a reliable Learning Management System (LMS) or specialized examination software that supports secure test-taking, question randomization, and time management.
- Implement virtual proctoring tools where necessary to maintain academic integrity. This may include webcam monitoring, screen sharing, and activity tracking.
- Provide detailed instructions about the examination process, rules, and technical requirements prior to the exam through the course portal and via email.

II.4 Examination Execution

- Ensure technical support is available throughout the examination period to assist with any software issues or connectivity problems.
- Establish a clear protocol for trainees to report and resolve issues during the examination, with contingency plans for extended time or rescheduling if technical problems occur.

II.5 Examination Processes

- Automatically collect and secure digital submissions within the LMS or examination platform. Ensure data is backed up and protected against unauthorized access.
- Use automated tools for objective questions and detailed rubrics for subjective assessments to ensure consistency and fairness in grading.
- Provide opportunities for trainees to review their results and receive feedback through the digital platform.
- Schedule live feedback sessions if needed to discuss performance and clarify doubts.

II.6 Results Compilation and Distribution

- Analyse results to identify trends, areas for improvement, and achievements.
- Use analytics tools provided by the LMS to assess class performance comprehensively.
- Prepare and distribute digital certificates or credentials through the LMS, verifying successful course completion and mastery of specific skills.
- Feedback from trainees will be collected to help improve the course and the teaching process. A questionnaire will be developed and given to trainees at the end of the course to collect their opinions and impressions on the competences and knowledge acquired, as well as to identify possible areas for improvement. The approach adopted will be designed to assess the strengths and weaknesses of the course and allow for continuous improvement.

II.7 Examination and Evaluation

There will be written and practical examinations (where applicable) for the award of the applicable HINTS Digital Diploma.

Participants in the training program are eligible to take the examination if they can demonstrate attendance of at least 80% of the lessons.

Participants that have 80% correct answers will be granted the HINTS Digital diploma.

II.7.1 Written examination

For each Competence Unit, a writing examination consists in a list of multiple-choice questions. A minimum of 1 question per recommended teaching hour is required.

For each question:

- 1 good answer is expected among 4 proposed answers.
- 1 minute is allowed to the candidate to answer.

Optionally, training centres can additionally test the trainees through a project. Thus, learners are asked to develop a project on a topic of their choice, using the knowledge and skills acquired during the course.

- The projects require learners to apply the knowledge and skills acquired in real or simulated situations;
- There will be peer feedback sessions, allowing learners to give and receive constructive feedback on their projects.

II.7.2. Evaluation performance

In order to pass a Competence Unit's examination, candidates shall achieve at least 60% of the maximum possible mark.

The final decision has to be given by the chairman of the Board of Examiners.

II.7.3 Re-examination

Failure in any individual module of the examination shall require re-examination only in the module failed.

Candidates who fail in any of the Competence Unit three times, must retake the classes and the full examination of the Competence Unit failed.

Appendix I: EWF Systems Framework

FIELD OF ACTIVITY	EQF LEVELS	EFW PROFICIENCY LEVEL	KNOWLEDGE	SKILLS	AUTONOMY AND RESPONSIBILITY
COORDINATORS/MANAGERS WELDERS & OPERATORS	7	EXPERT	Highly specialised and forefront knowledge including original thinking, research and critical assessment of theory, principles and applicability of metal additive manufacturing or welding related technologies.	Highly specialised problem-solving skills including critical and original evaluation, allowing to define or develop the best technical and economical solutions, when applying metal additive manufacturing or welding related technologies, in complex and unpredictable conditions	Manage and transform the metal additive manufacturing or welding and related technologies processes in a highly complex context. Fully responsible for the definition and revision of personnel's tasks.
	6	ADVANCED	Advanced knowledge and critical understanding of the theory, principles and applicability of metal additive manufacturing or welding and related technologies.	Advanced problem-solving skills including critical evaluation, allowing to choose the proper technical and economical solutions, when applying metal additive manufacturing or welding and related technologies, in complex and unpredictable conditions	Manage the applications of metal additive manufacturing or welding and related technologies in a highly complex context. Act autonomously in decision making and definition in the definition of the metal additive manufacturing or welding and related personnel's tasks.
	5	SPECIALIZED	Specialised, factual and theoretical of theory, principles and applicability of metal additive manufacturing or welding and related technologies	Specialised range of cognitive and practical skills, allowing to develop solutions or choose the appropriate methods, when applying metal additive manufacturing or welding and related technologies, in common/regular problems.	Manage and supervise common or standard metal additive manufacturing or welding applications and related technologies, in an unpredictable context. Take responsibility in standard work and supervise the metal additive manufacturing or welding and related personnel's tasks.
	4	INDEPENDENT	Factual and broad concepts in the field of metal additive manufacturing or welding technology	Fundamental cognitive and practical skills required to develop proper solutions and application of procedures and tools on simple and specific metal additive manufacturing or welding problems.	Self-manage of professional activities and simple standard applications of metal additive manufacturing or welding and related technologies in predictable contexts but subject to change. Supervise routine tasks and similar function workers, as well as take responsibility for decision making in basic work.
	3	BASIC	Basic facts, principles, processes and general concepts of welding, joining and related technologies	Be able to check and follow the information on the welding procedure specification, to produce butt and fillet welds in plates and or tubes, and or profiles in a variety of geometries and positions to the required quality and of specified dimensional accuracy	Work under supervision, taking personal responsibility for own actions and for the quality and accuracy of the work produced.
	2	ELEMENTARY	Elementary principles of welding, joining and related technologies	Able to check and follow the information on the welding procedure or adhesive bonding specification, and to produce weld/joints in a variety of geometries and positions to the required quality and of specified dimensional accuracy	Work under supervision.

General reference descriptors transversal to all qualifications. Each Qualification has its own specific descriptors in terms of knowledge, skills, autonomy and responsibility.



GREEN AND SUSTAINABLE EDUCATION COURSE

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Version History

Revision	Date	Author/Organization	Description
1 st	19/04/2024	CESOL	Draft version
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3 rd	11/07/2024	CESOL	Updated version based on survey results from partners
4 th	26/07/2024	CESOL	Updated version after revision of the draft during TM2 in Madrid
5 th	31/07/2024	ISIM	Final version

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Minimum Requirements for the Education, Training, Examination, and Qualification Personnel

Course Description

Project Result (PR1) presents the draft guidelines for Green and Sustainable Education Course. PR1 has been prepared and evaluated by the HINTS consortium.

This course aims to provide trainers, teachers and experts with the knowledge and skills to understand and apply the use green technologies and processes, such as sustainable manufacturing, sustainable construction, and innovative technologies for supporting the transition to a green economy. The course covers the following topics:

- Green and sustainable education.
- Sustainable manufacturing (manufacturing technologies & digital twins; additive and hybrid manufacturing processes).
- Lifecycle analysis in manufacturing; circular economy in manufacturing (reuse, repurpose, recycle).
- Energy-efficient assembly, material handling, and fixturing technologies.
- industrial automation, robotics, and machine vision (including deep tech) for environmental and social impact of manufacturing.
- Sustainable construction (Sustainable design practices; minimization of structural material through shape optimization).
- renewable materials, recyclable/disposable materials, materials with no harm to human health; low-carbon or low energy materials.
- Innovative technologies for supporting transition to a green industry; use of green technologies in education, manufacturing and constructions.
- Green industrial policy: promoting competitiveness and structural transformation.
- Green jobs and skills: ensuring decent work and social inclusion.
- Green standards and certification: enhancing quality and market access.

Trainees who successfully pass the examinations are expected to be able to apply the achieved learning outcomes at a level in line with the Specialized Proficiency level of the qualification diploma.

The programme of the modular course is presented in the following structure (overview):

COMPETENCE UNITS		
	Recommended Contact Hours*	Expected Workload**
CUG1: Principles in Green Industries	6	12
CUG2: Improving efficiency, productivity, and quality: Use of appropriate technologies and materials	4	8
CUG3: Methods and innovative technologies for the transition to a green industry	6	12
CUG4: Green Education for sustainable practices and lifestyles.	4	8
TOTAL	20	40

* Contact Hours are the minimum recommended teaching hours for the Standard Routes. A contact hour shall contain at least 50 minutes of direct teaching time.

** Workload is calculated in hours, corresponds to an estimation of the time trainees typically need to complete all learning activities required to achieve the defined learning outcomes in formal learning environments plus the necessary time for individual study.

A Competence Unit is a defined set of knowledge, skills and abilities that an individual must demonstrate to perform a specific task or job role effectively.

The expected learning outcomes are described in two ways: generic outcome descriptors organized in knowledge, skills, autonomy and responsibility; and in detail for each competence unit, organized in job functions and related activities, knowledge and skills corresponding to a specific proficiency level within EWF 's Systems Framework levels (see Appendix I).

On each Competence Unit, objectives and scope are defined for a specific depth of knowledge and skills.

Recommended contact hours are distributed between theoretical (A), assigned projects/exercises (B), practical workshop training(C), as showed in the following example:

<i>Qualification: Example 1</i>	
CONTACT HOURS	X= (SUM A:C)
Subject Contents	A + B + C

Competency-based learning

The modular approach is a growing trend in educational philosophy that shifts from traditional instruction to an outcome-based learning model. This approach divides the curriculum into small, distinct, and independent units or modules that are typically brief and non-sequential. By adopting a modular approach, learners gain more control over their learning process and take on greater responsibility. This method emphasizes the importance of learner autonomy, making it particularly suitable for more mature trainees. In a modular system, all necessary competencies for performance are closely connected, and tasks are organized into cohesive sets.

Moreover, the core principle of modularization is placing learners at the centre of the teaching-learning process. This approach requires a classroom environment where trainees actively participate in constructing knowledge. It also transforms the teacher's role from a transmitter of knowledge to a facilitator of learning. Additionally, modularization demands continuous monitoring and assessment of trainees' progress throughout each module. Effective continuous assessment enables instructors to adjust their teaching methods based on assessment results. This process also provides trainees with feedback on their learning and guidance on how to improve further.

The modular approach must emphasize:

- Designing assessment tasks as integral parts of the learning process.
- Providing feedback that supports trainees throughout their learning journey rather than only after task completion (i.e., when they receive a grade).
- Encouraging trainees to take an active role in organizing and monitoring their own learning.

Assessment involves collecting evidence and making judgments to determine whether competency has been achieved. This process confirms that an individual can perform to the standards required in the workplace, as specified in a training package or a vocational education and training (VET) accredited course.

The modular approach allows to perform separately the assessment for each CU. Knowledge assessment will use digital assessment formats appropriate to each module, such as multiple-choice questions to assess factual knowledge. In addition, a reliable learning management system (LMS) or specialized examination software will be implemented to enable secure examination delivery, question randomisation and time management.

See more details in Section II: Examination and Qualification

e-learning tools

E-learning tools have transformed the education and training landscape, offering several key advantages related to accessibility and interaction:

- **Accessibility and flexibility:** e-learning tools provide staff with unprecedented convenience, allowing access to training materials anytime, anywhere. This flexibility is especially beneficial for staff with different locations or irregular schedules, as it allows them to learn at their own pace, whether in the factory, in the field or at home.
- **Real-time progress tracking:** Many e-learning tools include progress tracking features, allowing employers to monitor employee progress in real time. This facilitates a data-driven approach to employee development, allowing areas requiring additional support to be identified and addressed.
- **Multimedia resources:** E-learning platforms offer versatility by incorporating a variety of multimedia resources such as videos, interactive simulations and 3D models. These tools enhance the learning experience, allowing staff to better understand complex adhesive bonding processes through visual and interactive means.

Professional profile

The course is designed for teachers, VET trainers, and specialists who want to learn more about the green transition and sustainable development and how to integrate them in their work.

General access conditions

The access conditions are the following:

- EQF level 5 in fields of science and technology (such as natural sciences, engineering, medical and health sciences, agricultural sciences) required.
- The participant must be proficient in the respective language in which the training program is carried out to effectively follow lessons, complete quizzes, and undertake examinations.
- Additionally, a suggested familiarity with materials science as a basic requirement.

General access conditions for pilot training courses

The access conditions are the following:

- EQF level 5 in fields of science and technology (such as natural sciences, engineering, medical and health sciences, agricultural sciences...) required.
- The participant must possess proficiency in English to effectively follow lessons, complete quizzes, and undertake examinations.
- Additionally, a suggested familiarity with materials science and pedagogical education as a basic requirement.

Duration of the training program

The course duration is **1 week**, with an estimated workload of **40 hours**.

Structure of the Green and Sustainable Education Course

The course is divided into **12 subjects**, each covering a specific topic and having a specific learning objective. Each session consists of the following elements:

- A title, a description, a learning objective, a duration, a list of required resources, and a method of assessment.
- A video lecture, presenting the main concepts and theories related to the topic.
- A reading, providing additional information and examples on the topic.
- A quiz, testing the learners' understanding and retention of the topic.
- A discussion, facilitating the learners' interaction and reflection on the topic.
- A project, requiring the learners to apply the knowledge and skills acquired on the topic to a real or simulated situation.
- Peer feedback enabling the learners to give and receive constructive feedback on their projects.

Section I: Theoretical and Practical Education

I.1. Qualification Outcome Descriptors

QUALIFI- CATION	EWF LEVEL	KNOWLEDGE	SKILLS	AUTONOMY AND RESPONSIBILITY
Green and Sustainable Education Course	SPECIALISED	<p>Comprehensive and specialized knowledge of principles and practices of green education, such as:</p> <p>Principles and practices of green industries, such as sustainable manufacturing, sustainable construction, and innovative technologies for supporting the transition to a green economy.</p> <p>Principles and methods of lifecycle analysis and circular economy required to optimize the use of resources and minimize the environmental impact of industrial processes and products.</p> <p>Various technologies and tools to improve the energy efficiency, productivity, and quality of industrial operations and outputs.</p> <p>Design and implementation of innovative solutions for enhancing the environmental and social performance of industrial sectors and activities.</p> <p>Policies and regulatory frameworks that support the development and competitiveness of green industries.</p> <p>Teaching material on Sustainable Development Goals (SDGs) and how to develop students' green skills.</p>	Specialized range of cognitive and practical skills, allowing to develop green sustainable solutions or choose the appropriate methods, when applying resources, implementing processes and products, in common/regular situations.	<p>Manage and supervise the adaptation of learning contents where practical skills and theoretical applications can be taught by implementing Green and Sustainable Education Course.</p> <p>Review and develop performance of such adaptation of learning contents.</p>

I.2. Detailed topics for the main training subjects and their subdivision into individual competence units and subjects.

CUG1: Principles in Green Industries

CU/ULO CUG1: Principles in Green Industries	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
1.1. Introduction to Green Industries	1
1.2. Sustainable Manufacturing	2
1.3. Lifecycle Analysis and Circular Economy in Manufacturing	2
1.4. Green Industrial Policy	1
Total	6
WORKLOAD	12

Subject	Knowledge	Skills
1.1. Introduction to Green Industries	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> The vision and advantages of green industries. The main driving forces and key challenges for their development and competitiveness. 	<ul style="list-style-type: none"> Explain the concept and the benefits of green industries. Identify the main drivers and challenges related to green industries development and competitiveness.
1.2. Sustainable Manufacturing	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> The concept and the examples of sustainable manufacturing. The main technologies and tools for achieving a sustainable manufacturing, such as digital twins, additive and hybrid manufacturing processes. 	<ul style="list-style-type: none"> Compare the main features and challenges of sustainable manufacturing, Use the main technologies and tools for achieving a sustainable manufacturing.

Subject	Knowledge	Skills
1.3. Lifecycle Analysis and Circular Economy in Manufacturing	<p>Comprehensive and specialized knowledge of:</p> <p>Basics and practical applications of lifecycle analysis and circular economy, and how they can be applied.</p>	<p>Apply the principles and methods of lifecycle analysis and circular economy to optimize the use of resources and minimize the environmental impact of industrial processes and products.</p>
1.4. Green Industrial Policy	<p>Comprehensive and specialized knowledge of:</p> <p>Principles and applicability of the policy and legislative frameworks that fosters the competitiveness and structural transformation of green industries.</p>	<p>Analyse the policy and regulatory frameworks that promote the competitiveness and structural transformation of green industries, such as green industrial strategy, green public procurement, and green trade policy.</p>

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners' understanding and retention of the topic.
- A discussion to encourage learners' interaction and reflection on the topic.

CUG2: Improving efficiency, productivity, and quality: Use of appropriate technologies and materials.

CU/ULO CUG2: Improving efficiency, productivity, and quality: Use of appropriate technologies and materials	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
2.1. Energy-efficient Assembly, Material Handling, and Fixturing Technologies	2
2.2. Use of Appropriate Materials in Construction	2
Total	4
WORKLOAD	8

Subject	Knowledge	Skills
2.1. Energy-efficient Assembly, Material Handling, and Fixturing Technologies	<p>Comprehensive and specialized knowledge of:</p> <p>Different technologies and utilities that can enhance energy efficiency, productivity and the quality of industrial operations and performance.</p>	Use various technologies and tools to improve the energy efficiency, productivity, and quality of industrial operations and outputs, such as assembly, material handling, and fixturing technologies.
2.2. Use of Appropriate Materials in Construction	<p>Comprehensive and specialized knowledge of:</p> <p>Criteria and examples of suitable materials in construction.</p> <ul style="list-style-type: none"> • Sustainability/ recycling criteria for materials. • Examples of widely used. recycled/renewable materials. • Advantages and innovations of new materials for the environment and performance. 	Use the criteria and the examples of appropriate materials in construction, such as renewable materials, recyclable/disposable materials, materials that are safe for human health and materials with low carbon emissions or low energy consumption

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners' understanding and retention of the topic.
- A discussion to encourage learners' interaction and reflection on the topic.

CUG3: Methods and innovative technologies for the transition to a green industry

CU/ULO CUG3: Methods and innovative technologies for the transition to a green industry	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
3.1. Basics of Industrial Automation, Robotics, and Machine Vision for Environmental and Social Impact of Manufacturing	2
3.2. Sustainable Construction	2
3.3. Innovative Technologies for Supporting Transition to a Green Industry	2
Total	6
WORKLOAD	12

Subject	Knowledge	Skills
3.1. Basics of Industrial Automation, Robotics, and Machine Vision for Environmental and Social Impact of Manufacturing	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Fundamentals of industrial automation, robotics, and machine vision. • Automation, robotics and machine vision role for improving the environmental and social performance of industrial sectors and activities: <ul style="list-style-type: none"> - Waste reduction. - Improving safety. - Creation of new jobs. 	<p>Use the basics of industrial automation, robotics, and machine vision to enhance the environmental and social performance of industrial sectors and activities.</p>
3.2. Sustainable Construction	<p>Comprehensive and specialized knowledge of:</p> <ul style="list-style-type: none"> • Principles and examples of sustainable construction. • Main practices and methods for achieving a sustainable construction, such as sustainable design, material optimization, and renewable energy. 	<p>Identify and compare the main features and challenges of sustainable construction and use the main practices and methods for achieving it.</p>
3.3. Innovative Technologies for Supporting Transition to a Green Industry	<p>Comprehensive and specialized knowledge of:</p> <p>Innovative technologies to underpin the transition to a green industry, such as smart grids, biotechnology, nanotechnology, green chemistry, carbon capture and storage and e-mobility.</p>	<p>Use various innovative technologies for supporting the transition to a green industry.</p>

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners' understanding and retention of the topic.
- A discussion to encourage learners' interaction and reflection on the topic.

CUG4: Green Education for sustainable practices and lifestyles

CU/ULO CUG4: Green Education for sustainable practices and lifestyles.	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
4.1. Green education for a sustainable development	1
4.2. Integration of sustainability principles and green mindset training practices	1
4.3. Experimental session: Designing a green lesson plan	2
Total	4
WORKLOAD	8

Subject	Knowledge	Skills
4.1. Green education for a sustainable development	<p>Comprehensive and specialized knowledge of:</p> <p>The impact of education on sustainability.</p> <p>Definition of environmentally aware educator.</p>	<p>Use of teaching material on Sustainable Development Goals (SDGs) and integrate it in the curriculum.</p> <p>Identify the role of an educator who is aware of eco-consciousness by specifying the impact of education on sustainable development.</p>
4.2. Integration of sustainability principles and green mindset training practices	<p>Comprehensive and specialized knowledge of:</p> <p>Implementation of sustainable and environmentally friendly practices in education.</p> <p>Active engagement methods to involve learners in promoting green thinking and innovation.</p>	<p>Use of specific soft skills training methods to foster a green mindset in the students.</p> <p>Use of innovative teaching methods to support green skills.</p>

Subject	Knowledge	Skills
4.3. Experimental session: Designing a green lesson plan	Comprehensive and specialized knowledge of: How to make a lesson greener through the use of ICT, creativity-based approaches and project-based learning.	Develop a green learning activity on a given topic, making use of the acquired knowledge and skills during the course.

Teaching methods

- A video lecture that presents the main concepts and theories related to the topic.
- Readings that offer additional information and examples on the topic.
- A quiz to test learners' understanding and retention of the topic.
- A discussion to encourage learners' interaction and reflection on the topic.
- Green learning activities that require trainees to apply acquired knowledge and skills to real or simulated situations.
- Peer feedback sessions, allowing trainees to give and receive constructive feedback on their green learning activities.

Section II: Examination and Qualification

II.1 Examination Planning

- Examination objectives clearly align with the Green and Sustainable Education course's learning outcomes across *CUG1: Principles in Green Industries*, *CUG2: Improving efficiency, productivity, and quality: Use of appropriate technologies and materials*, *CUG3: Methods and innovative technologies for the transition to a green industry* and *CUG4: Final project*.
- Use appropriate digital assessment formats for each module, such as multiple-choice questions for factual knowledge.
- Develop and compile a bank of questions and tasks that thoroughly test both theoretical understanding and practical application.
- Ensure the questions are diverse and inclusive, catering to different learning styles and digital proficiency levels.

II.2 Examination Scheduling

- Schedule online examinations that can be taken within a flexible window to accommodate different time zones and personal circumstances of remote learners.
- Define specific time limits for different sections of the exam based on their complexity and the expected time to complete them fairly.

II.3 Examination Administration

- Utilize a reliable Learning Management System (LMS) or specialized examination software that supports secure test-taking, question randomization, and time management.
- Implement virtual proctoring tools where necessary to maintain academic integrity. This may include webcam monitoring, screen sharing, and activity tracking.
- Provide detailed instructions about the examination process, rules, and technical requirements prior to the exam through the course portal and via email.

II.4 Examination Execution

- Ensure technical support is available throughout the examination period to assist with any software issues or connectivity problems.
- Establish a clear protocol for trainees to report and resolve issues during the examination, with contingency plans for extended time or rescheduling if technical problems occur.

II.5 Examination Processes

- Automatically collect and secure digital submissions within the LMS or examination platform. Ensure data is backed up and protected against unauthorized access.
- Use automated tools for objective questions and detailed rubrics for subjective assessments to ensure consistency and fairness in grading.
- Provide opportunities for trainees to review their results and receive feedback through the digital platform.
- Schedule live feedback sessions if needed to discuss performance and clarify doubts.

II.6 Results Compilation and Distribution

- Analyse results to identify trends, areas for improvement, and achievements.
- Use analytics tools provided by the LMS to assess class performance comprehensively.
- Prepare and distribute digital certificates or credentials through the LMS, verifying successful course completion and mastery of specific skills.
- Feedback from trainees will be collected to help improve the course and the teaching process. A questionnaire will be developed and given to trainees at the end of the course to collect their opinions and impressions on the competences and knowledge acquired, as well as to identify possible areas for improvement. The approach adopted will be designed to assess the strengths and weaknesses of the course and allow for continuous improvement.

II.7 Examination and Evaluation

There will be written and practical examinations (where applicable) for the award of the applicable HINTS Green Diploma.

Participants in the training program are eligible to take the examination if they can demonstrate attendance of at least 80% of the lessons.

Participants that have 80% correct answers will be granted the HINTS Green diploma.

II.7.1 Written examination

For each Competence Unit, a writing examination consists in a list of multiple-choice questions. A minimum of 1 question per recommended teaching hour is required.

For each question:

- 1 good answer is expected among 4 proposed answers.
- 1 minute is allowed to the candidate to answer.

Optionally, training centres can additionally test the trainees through a project. Thus, learners are asked to develop a project on a topic of their choice, using the knowledge and skills acquired during the course.

- The projects require learners to apply the knowledge and skills acquired in real or simulated situations;
- There will be peer feedback sessions, allowing learners to give and receive constructive feedback on their projects.

II.7.2. Evaluation performance

In order to pass a Competence Unit's examination, candidates shall achieve at least 60% of the maximum possible mark.

The final decision has to be given by the chairman of the Board of Examiners.

II.7.3 Re-examination

Failure in any individual module of the examination shall require re-examination only in the module failed.

Candidates who fail in any of the Competence Unit three times, must retake the classes and the full examination of the Competence Unit failed.

Appendix I: EWF Systems Framework

FIELD OF ACTIVITY	EQF LEVELS	EFW PROFICIENCY LEVEL	KNOWLEDGE	SKILLS	AUTONOMY AND RESPONSIBILITY
COORDINATORS/MANAGERS WELDERS & OPERATORS	7	EXPERT	Highly specialised and forefront knowledge including original thinking, research and critical assessment of theory, principles and applicability of metal additive manufacturing or welding related technologies.	Highly specialised problem-solving skills including critical and original evaluation, allowing to define or develop the best technical and economical solutions, when applying metal additive manufacturing or welding related technologies, in complex and unpredictable conditions	Manage and transform the metal additive manufacturing or welding and related technologies processes in a highly complex context. Fully responsible for the definition and revision of personnel's tasks.
	6	ADVANCED	Advanced knowledge and critical understanding of the theory, principles and applicability of metal additive manufacturing or welding and related technologies.	Advanced problem-solving skills including critical evaluation, allowing to choose the proper technical and economical solutions, when applying metal additive manufacturing or welding and related technologies, in complex and unpredictable conditions	Manage the applications of metal additive manufacturing or welding and related technologies in a highly complex context. Act autonomously in decision making and definition in the definition of the metal additive manufacturing or welding and related personnel's tasks.
	5	SPECIALIZED	Specialised, factual and theoretical of theory, principles and applicability of metal additive manufacturing or welding and related technologies	Specialised range of cognitive and practical skills, allowing to develop solutions or choose the appropriate methods, when applying metal additive manufacturing or welding and related technologies, in common/regular problems.	Manage and supervise common or standard metal additive manufacturing or welding applications and related technologies, in an unpredictable context. Take responsibility in standard work and supervise the metal additive manufacturing or welding and related personnel's tasks.
	4	INDEPENDENT	Factual and broad concepts in the field of metal additive manufacturing or welding technology	Fundamental cognitive and practical skills required to develop proper solutions and application of procedures and tools on simple and specific metal additive manufacturing or welding problems.	Self-manage of professional activities and simple standard applications of metal additive manufacturing or welding and related technologies in predictable contexts but subject to change. Supervise routine tasks and similar function workers, as well as take responsibility for decision making in basic work.
	3	BASIC	Basic facts, principles, processes and general concepts of welding, joining and related technologies	Be able to check and follow the information on the welding procedure specification, to produce butt and fillet welds in plates and or tubes, and or profiles in a variety of geometries and positions to the required quality and of specified dimensional accuracy	Work under supervision, taking personal responsibility for own actions and for the quality and accuracy of the work produced.
	2	ELEMENTARY	Elementary principles of welding, joining and related technologies	Able to check and follow the information on the welding procedure or adhesive bonding specification, and to produce weld/joints in a variety of geometries and positions to the required quality and of specified dimensional accuracy	Work under supervision.

General reference descriptors transversal to all qualifications. Each Qualification has its own specific descriptors in terms of knowledge, skills, autonomy, and responsibility.