HUCO LABS

Collaborative **H**VET-**U**niversity-**Co**mpany **Labs** for Research

Future Skills for Applied Innovation in Technical Professions -

Set of training modules on R&D and Innovation skills

(HUCO Labs – D2.2)

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Glossary

Abbreviation	Full term
AI	Artificial Intelligence
CAPA	Corrective and Preventive Action
EACEA	European Education and Culture Executive Agency
ECTS	European Credit Transfer and Accumulation System
EDCS	Europass Digital Credentials
EEA	European Education Area
EHEA	European Higher Education Area
EQF	European Qualifications Framework
EQAVET	European Quality Assurance in Vocational Education and Training
ERA	European Research Area
ESCO	European Skills, Competences, Qualifications and Occupations
EU	European Union
FS	Future Skill
GDPR	General Data Protection Regulation
HE	Higher Education
HVET	Higher Vocational Education and Training
HUCO	Collaborative HVET-University-Company
HUCO Labs	Collaborative HVET–University–Company Labs for Research
IBL	Inquiry-Based Learning
ITS	Istituto Tecnologico Superiore / ITS Academy
JIF	Joint Implementation Framework
KSA	Knowledge, Skills and Attitudes
LO	Learning Outcome
LORF	Learning Outcome Recognition Framework
MoU	Memorandum of Understanding
PBL	Project-Based Learning
QA	Quality Assurance
R&D	Research and Development
REA	Rapid Evidence Assessment

RPL	Recognition of Prior Learning
SME	Small and Medium-Sized Enterprise
ToT	Training of Trainers
TRIComp	Transformation, Research and Innovation Competences Framework
VET	Vocational Education and Training
WBL	Work-Based Learning
WP	Work Package

Executive Summary

Deliverable D2.2 documents the design of the HUCO Labs training offer on research, development, and innovation skills for mid-level technical professionals at EQF Levels 5 and 6. Building on Deliverable D2.1, which established the TRIComp Framework and the related R&D skill map, D2.2 translates the competence model into an applied training architecture that can be implemented within the two pilot pathways foreseen in the project: the Italian EQF Level 5 pathway and the French EQF Level 6 pathway. In line with the project application, the deliverable therefore contributes to the creation of a concrete HUCO training offer that strengthens the interface between Higher Vocational Education and Training (HVET), higher education, and company-based applied research.

The rationale for this work lies in a structural European challenge already described in the project application: while many countries provide EQF Level 5 and Level 6 pathways in advanced manufacturing and related technical fields, these pathways are often not yet systematically equipped with research- and innovation-related competences that would allow technicians to contribute more actively to applied R&D, incremental innovation, digital transformation, and sustainable industrial change. HUCO Labs addresses this challenge by developing a coherent and transferable training architecture through which R&D-related competences can be embedded in existing pathways rather than treated as a separate add-on. This is particularly relevant for the project's overall ambition to connect vocational learning, higher education, and industrial research contexts more closely and to strengthen the link between the European Education Area and the European Research Area.

The present deliverable captures the first consolidated results of this design process. It does not describe a purely preparatory stage. Rather, it documents a working module architecture and an initial comparative mapping between the Italian and French pilot pathways. Existing modules from both contexts have been analysed in relation to the TRIComp Framework and compared with regard to competence areas, learning outcomes, EQF level, and assessment formats. As a result, the deliverable already identifies areas of strong correspondence, partial equivalence, and bridging needs between Level 5 and Level 6. In this way, D2.2 moves beyond a general curriculum concept and provides the first operational basis for piloting, refinement, and future transferability.

A central editorial and conceptual decision taken in the preparation of this deliverable concerns the treatment of recognition. According to the original application, the procedural topic of joint implementation and recognition of learning outcomes is represented in T2.4 and has a strong link to D2.3, which focuses on the collaboration model for dual training-research paths. At the same time, the application itself places T2.4 within WP2 and thus within the broader co-design of the training offer. In the course of drafting D2.2, the consortium concluded that, for the specific logic of the HUCO training architecture, module design and recognition cannot be meaningfully

separated. Recognition depends directly on the way modules are defined, how learning outcomes are formulated, how equivalence across pathways is described, and how assessment evidence is documented. For this reason, the consortium decided to incorporate the recognition dimension already into D2.2, so that the module architecture and its recognition logic are presented in one coherent deliverable. This does not replace the role of D2.3 as the dedicated collaboration and implementation model; rather, it ensures that the recognition interface is already embedded at the level where modules, learning outcomes, mapping, and bridging arrangements are specified.

This integrated approach is especially important in the HUCO context because the project is not developing abstract training standards in isolation. It is working with two real pilot pathways and seeks to support progression, permeability, mobility, and comparability between them. As the application makes clear, the project aims to test the integration of new R&D-related skills in one EQF Level 5 pathway in Italy and one EQF Level 6 pathway in France, while also defining cooperation arrangements and common European standards for the recognition of learning outcomes. Bringing the module structure and the recognition logic together in D2.2 therefore reflects the operational needs of the pilot phase and makes the deliverable more useful for implementation.

Substantively, the deliverable shows how the HUCO training offer can support a research-oriented, challenge-based, and applied form of learning. The modules and their mapping respond to the need for technicians who are able to engage with applied research processes, digital tools, interdisciplinary collaboration, sustainability challenges, and innovation-oriented problem solving. At the same time, the deliverable remains grounded in the realities of existing curricula and institutional frameworks. Rather than creating an entirely new programme, it aligns and enhances existing modules, identifies equivalences across pathways, and defines where bridging arrangements are required. This reflects the project's aim to produce a transferable model that can later be expanded into a broader HUCO catalogue and potentially adapted by further institutions beyond the initial pilots.

The deliverable is therefore best understood as the curricular backbone of WP2. It operationalises the competence framework from D2.1, interfaces with the collaboration and implementation logic further elaborated in D2.3, and provides an important basis for the Train-the-Trainer work in D2.4 as well as for later piloting and validation. By combining module design, pathway mapping, and the recognition interface in one document, D2.2 offers a more coherent foundation for the next project phases. It makes visible how R&D-related skills can be embedded in technical education pathways in a way that is pedagogically meaningful, institutionally workable, and strategically aligned with European objectives for innovation, permeability, and skills development.

1. Introduction

This deliverable presents the HUCO Labs training architecture for research, development, and innovation skills in technical professions. Its purpose is to document how the competence model developed in D2.1 is translated into a structured set of modules, mapped across two pilot pathways, and prepared for implementation in the HUCO context. The deliverable therefore stands at the core of Work Package 2, which is dedicated to the co-design of integrated R&D training for mid-level technicians. According to the project application, WP2 includes not only the analysis of key skills and the co-design of modules, but also the preparation of pilot path architecture, procedures for joint implementation and recognition of learning outcomes, an organisational collaboration model, and the later final validation of the training offer. D2.2 must therefore be read as part of this wider WP2 architecture rather than as a stand-alone module catalogue detached from implementation realities.

1.1 Background and project context

European industry is undergoing a profound transformation shaped by digitalisation, sustainability, advanced manufacturing, and the growing importance of innovation capacity. In this context, companies increasingly require technical professionals who can do more than operate and maintain systems. They also need technicians who can contribute to experimentation, process improvement, prototyping, problem solving, and the transfer of innovation from research and engineering functions into production and application contexts. The HUCO Labs project responds to this need by strengthening research- and innovation-related skills within EQF Level 5 and Level 6 pathways and by creating stronger interfaces between HVET, higher education, and companies.

The project application highlights that mid-level technicians can play a key role in incremental innovation because of their proximity to production processes, technical implementation, and operational problem solving. At the same time, the application argues that many existing pathways still lack a sufficiently systematic integration of R&D-related competences. HUCO Labs addresses this challenge through two pilot pathways in advanced manufacturing, one in Italy at EQF Level 5 and one in France at EQF Level 6, which serve as the basis for co-design, testing, and later transfer. D2.2 is a direct response to this design challenge: it shows how a Future Skills-based competence framework can be transformed into a modular and implementable training offer.

1.2 Purpose of the deliverable

In its original proposal logic, Deliverable D2.2 was conceived as the "Set of training modules on R&D and Innovation skills," while D2.3 was described as the collaboration model between VET and business operators in the joint implementation of dual training-research paths. This distinction remains valid. The primary purpose of D2.2 is to define the training architecture itself: the modules, their competence orientation, their pathway logic, and their cross-pathway mapping. However, as the work progressed, it became clear that the module design task could not be meaningfully separated from the recognition task foreseen in T2.4. The application explicitly places T2.4 within WP2 and defines it as "Procedures for joint implementation and recognition of learning outcomes." Recognition is therefore not external to the co-design of the training offer; it is one of its constitutive dimensions.

For that reason, the consortium decided to include the recognition dimension already within D2.2. This editorial and conceptual choice was made because the recognition of modules is directly dependent on the way the modules are defined. If learning outcomes, assessment methods, evidence requirements, and cross-pathway equivalences are part of the module architecture, then the recognition logic must be documented alongside them in order to be intelligible and usable. In practical terms, module mapping between the Italian and French pathways, the identification of partial equivalence, the definition of bridging needs, and the documentation standards for recognition are all inseparable from the description of the training offer itself. Presenting them together in D2.2 therefore produces a more coherent and operational document.

This decision should not be misunderstood as dissolving the distinction between D2.2 and D2.3. D2.3 remains the place where the collaboration model and the organisational logic of joint implementation can be developed in greater procedural depth. What D2.2 does, however, is to ensure that the recognition interface is already anchored where it is most directly needed: at the level of module design, pathway comparison, learning outcome formulation, and bridging arrangements. In other words, D2.2 integrates the recognition dimension insofar as it is necessary to make the training architecture functionally meaningful; D2.3 can then build on this basis when specifying institutional cooperation and implementation procedures in more detail.

1.3 Scope and contribution of this document

Against this background, the present deliverable has four main functions. First, it translates the TRIComp Framework from D2.1 into a concrete training architecture for two pilot pathways. Second, it documents the first comparative module mapping between the Italian EQF Level 5 pathway and the French EQF Level 6 pathway. Third, it identifies how equivalences, partial recognitions, and bridging needs can be understood in relation to those modules. Fourth, it provides the curricular and recognition-related groundwork for piloting, later validation, and possible transfer to additional institutional contexts.

The value of the document therefore lies not only in listing modules, but in making visible the logic that connects them: competence orientation, cross-pathway comparability, permeability, and implementation readiness. This is fully consistent with the broader goals of HUCO Labs as formulated in the application, namely to create a future-oriented, research-related training offer for technicians, to strengthen cooperation between educational sectors and companies, and to support progression and mobility between EQF Level 5 and EQF Level 6 contexts. D2.2 should thus be read as the curricular backbone of WP2 and as a key bridge between competence modelling, joint implementation, and future piloting.

Table 1- Overview of relationships to other Deliverables and WPs

Deliverable	**Function / Purpose**
D2.1 – Future Skills in Technical Professions	Defines the TRIComp competence framework and the R&D Skill Map
D2.2 – Set of Training Modules on R&D and Innovation Skills	Defines the module architecture, module mapping, and integrated recognition interface for the pilot pathways
D2.3 – Collaboration Model between VET and Business Operators	Defines the organisational and procedural model for joint implementation of dual training-research pathways
D2.4 – Train-the-Trainer Programme	Prepares educators and trainers for the delivery of the HUCO training modules
WP3 – Digital Platform and Ecosystem Development	Supports digital documentation, resource sharing, and the broader HUCO learning ecosystem
WP4 – Pilot Testing	Tests the training modules, mapping logic, and recognition arrangements in practice
WP5 – Quality Assurance	Supports monitoring, validation, and continuous improvement of project outputs and implementation processes

2. European Policy Framework

This chapter presents the European policy foundations and implementation principles that underpin the HUCO Labs framework for joint training delivery and the recognition of learning outcomes across vocational and higher education contexts.

2.1 Introduction

The procedures developed in this deliverable are aligned with the major European policy frameworks governing cooperation between vocational education and higher education systems. These frameworks aim to strengthen **transparency, comparability, and permeability between different education pathways across Europe**.

Within the HUCO Labs project, the alignment with these policy instruments is essential in order to enable the recognition of learning outcomes obtained in **Higher Vocational Education and Training (HVET)** within **higher education programmes**.

The framework presented in this deliverable therefore builds upon the following European reference instruments:

- The **Bologna Process**
- The **European Credit Transfer and Accumulation System (ECTS)**
- The **European Qualifications Framework (EQF)**
- The **Lisbon Recognition Convention**
- The **European framework for micro-credentials**
- European policies supporting permeability between **VET and Higher Education**

Together, these instruments provide the regulatory and methodological foundation for the recognition procedures developed in the HUCO Labs project.

2.2 Bologna Process and Learning Outcome Orientation

The Bologna Process established the European Higher Education Area (EHEA) with the aim of increasing transparency and compatibility between national higher education systems. A central principle of the Bologna reforms is the shift from input-based education models to learning-outcome-based approaches. Learning outcomes describe what learners are expected to know, understand, and be able to do after completing a learning process. This approach allows educational achievements to be compared across institutions and countries.

For the HUCO project, this outcome orientation is particularly relevant because:

- HVET programmes and university programmes are structurally different.

- However, **learning outcomes can still be compared and recognised if they are expressed in compatible terms**.

The recognition framework therefore follows the principle that learning outcomes rather than institutional structures constitute the basis for recognition decisions.

2.3 European Qualifications Framework (EQF)

The **European Qualifications Framework (EQF)** serves as a common reference framework for comparing qualifications across European education systems.

The EQF describes qualifications in terms of learning outcomes structured into knowledge, skills, and responsibility/autonomy.

Within the HUCO Labs project, two levels of the EQF are particularly relevant:

EQF Level	Educational Context
EQF Level 5	Higher Vocational Education and Training (HVET)
EQF Level 6	Bachelor-level higher education

The recognition procedures developed in this deliverable rely on the assumption that learning outcomes mapped to comparable EQF levels can be recognised across institutional boundaries when sufficient equivalence is demonstrated. The EQF therefore serves as a reference framework for evaluating the level of learning outcomes obtained in different educational contexts.

2.4 European Credit Transfer and Accumulation System (ECTS)

The **European Credit Transfer and Accumulation System (ECTS)** is the standard system used in the European Higher Education Area to describe the volume of learning based on defined learning outcomes and associated workload.

ECTS credits fulfil several important functions:

- they quantify the **student workload required to achieve learning outcomes**
- they allow the **transfer of learning achievements between institutions**
- they support the **recognition of prior learning**

In the context of HUCO Labs, ECTS provides a mechanism through which **learning achievements obtained in HVET contexts can potentially be recognised within higher education**

programmes. Recognition decisions, however, remain the responsibility of the **awarding higher education institution**, which must evaluate the equivalence of learning outcomes.

2.5 Lisbon Recognition Convention

The **Lisbon Recognition Convention (1997)** establishes the legal framework for the recognition of qualifications within the European region.

One of its key principles states that recognition should be granted **unless substantial differences can be demonstrated**.

Although the convention primarily addresses the recognition of full qualifications, its principles also inform the recognition of **partial learning achievements and prior learning outcomes**.

The procedures defined in this deliverable follow the convention's guiding principles by:

- focusing on **learning outcomes rather than institutional differences**
- ensuring **transparency in recognition decisions**
- establishing **clear documentation procedures**

2.6 Permeability between Vocational Education and Higher Education

European education policy increasingly emphasises the need to create **flexible learning pathways between vocational and academic education systems**.

This objective is reflected in several policy initiatives, including:

- **the European Skills Agenda**, which promotes lifelong learning, upskilling, reskilling, and more flexible learning opportunities in order to help learners adapt to changing labour-market and societal needs;

- **the European VET Recommendation (2020)**, which supports more flexible and permeable pathways between vocational education, general education, and higher education, thereby facilitating progression across different parts of the education system;

- **initiatives promoting micro-credentials and lifelong learning**, which encourage the recognition of smaller units of assessed learning and support more modular, accessible, and learner-centred forms of educational progression.

These policies highlight the importance of recognising learning achievements obtained in **non-traditional educational environments**, including workplace learning and applied research projects.

The HUCO Labs project contributes to this policy agenda by establishing **procedures enabling HVET learners to progress into higher education programmes through the recognition of prior learning outcomes**.

3. Joint Implementation Framework (JIF)

This chapter presents the Joint Implementation Framework (JIF), which provides the operational structure for the collaborative design, delivery, and monitoring of HUCO's integrated R&D training modules.

3.1 Conceptual Overview

The Joint Implementation Framework (JIF) defines the procedures through which HUCO consortium partners collaboratively design, deliver, and monitor the integrated R&D training modules developed within Work Package 2.

The framework ensures that training activities implemented in different institutional and national contexts remain **aligned with the shared competence model and learning outcomes defined within the project**.

The Joint Implementation Framework is based on four key principles:

1. Outcome Alignment, which ensures that all jointly implemented training activities are anchored in the shared HUCO competence framework and its defined learning outcomes, thereby supporting coherence, comparability, and academic consistency across partner institutions;

2. Collaborative Delivery, which provides that the design and implementation of training modules are carried out through structured cooperation among consortium partners, combining the complementary expertise of HVET providers, higher education institutions, and company-based actors;

3. Hybrid Learning Environments, which integrate onsite, digital, and work-based learning arrangements in order to facilitate flexible participation, transnational exchange, and the effective linking of different learning contexts;

4. Industry Integration, which ensures that companies contribute not only as hosts for applied learning activities but also as active partners in defining challenges, supervising projects, and supporting the evaluation of competence development, thereby strengthening the practical and professional relevance of the training model.

Together, these principles ensure that training modules delivered across partner institutions remain **academically coherent and professionally relevant**.

3.2 Joint Curriculum Alignment

The training architecture developed within the HUCO Labs project builds upon existing modules offered by partner institutions.

Rather than creating entirely new programmes, the project introduces **a coordinated alignment of existing modules with the HUCO competence framework**.

Each participating institution maps its modules to the competence model defined in Deliverable D2.1.

The mapping process involves the following steps:

1. Identification of modules relevant to the HUCO competence framework
2. Extraction of module learning outcomes
3. Alignment of learning outcomes with competence identifiers
4. Identification of equivalent modules across partner institutions

This mapping process results in a **Joint Module Matrix**, which provides the foundation for joint delivery and recognition procedures.

3.3 Hybrid Teaching and Learning Formats

The implementation of HUCO training modules relies on **hybrid learning formats combining onsite and digital learning activities**.

These formats include:

- joint online lectures
- collaborative project-based learning
- virtual research workshops
- blended innovation labs

Hybrid delivery formats enable partners to **share expertise across institutional boundaries while maintaining flexibility in local implementation**.

3.4 International Faculty Collaboration

To support joint delivery of modules, the consortium establishes an **International Faculty Pool** consisting of instructors from partner institutions.

Faculty members contribute to joint teaching activities through:

- guest lectures
- co-supervision of student projects
- participation in evaluation panels

This collaborative teaching model ensures that students are exposed to **multiple perspectives from different national education systems and industrial contexts**.

3.5 Industry Integration

A defining characteristic of the HUCO training model is the integration of **industry-based learning environments**.

Students participate in applied research and development activities conducted within **companies and innovation labs**.

Industry partners contribute to the training process by:

- defining real-world innovation challenges
- supervising student projects
- participating in evaluation processes

Through this integration, the training modules ensure that students develop **practical competences relevant to contemporary industrial innovation processes**.

4. Learning Outcome Recognition Framework (LORF)

This chapter presents the Learning Outcome Recognition Framework (LORF), which provides the procedural basis for transparent, outcome-based recognition of learning achievements across institutional and national education contexts within HUCO Labs.

4.1 Conceptual Foundations

The Learning Outcome Recognition Framework (LORF) establishes the procedures through which learning outcomes achieved within the HUCO Labs training pathways can be recognised across institutional and national education systems. The framework addresses the specific challenge of recognising learning outcomes obtained in **Higher Vocational Education and Training (HVET)** programmes within **higher education environments**.

Within the HUCO consortium, this challenge arises particularly in the cooperation between:

- the **Italian partner ITS Cuccovillo Foundation**, delivering HVET programmes at **EQF Level 5**, and
- the **French higher education partners**, delivering programmes at **EQF Level 6.**

Although these programmes belong to different educational sectors, the recognition of learning outcomes becomes possible when the outcomes are **expressed in comparable terms and evaluated according to shared criteria**.

The LORF therefore follows a strictly **learning-outcome-based recognition model**.

Recognition decisions are based on the following criteria:

- equivalence of learning outcomes
- alignment of EQF levels
- comparability of assessment procedures
- availability of documented evidence.

4.2 Outcome-Based Recognition Model

Recognition within the HUCO Labs project follows a **three-layered outcome equivalence model**.

Dimension	**Description**
Knowledge	Conceptual and theoretical understanding
Skills	Applied technical and analytical competences
Responsibility & Autonomy	Ability to work independently and manage projects

Learning outcomes from partner institutions are analysed according to these dimensions.

Recognition is granted when learning outcomes demonstrate **substantial equivalence in content, complexity, and level**.

This approach ensures that recognition decisions focus on **competence achievements rather than institutional differences**.

4.3 Learning Outcome Identification

In order to enable transparent recognition procedures, learning outcomes are assigned **unique competence identifiers derived from the HUCO Future Skills framework (D2.1)**.

Each learning outcome is documented through:

- competence identifier
- EQF level
- learning outcome description
- assessment method
- evidence documentation.

Field	**Example entry**
Module title	Computer Aided Design
Module code	TU26
Institution / pathway	French Level 6 pathway
EQF level	6
ECTS credits	3
Source document	*HUCO T2.3 Module Description – 6th Level Pathway*
Learning outcome identifier	HUCO-LO-TU26-LO2
Associated competence identifier	FS-06 / Digital Modelling and Simulation Competence
Learning outcome description	At the end of the module, the student will be able to create simple and complex 3D parts, apply geometric and dimensional constraints, and use advanced CAD functions such as shells, fillets, chamfers, and holes in a technically appropriate manner.
Assessment method	Practical exercises using CAD software, practical work, digital submission, and examination procedures validated by the certification authority and implemented by the accredited teacher.

Evidence documentation	Completed CAD design task; digital model file; technical dossier or digital submission demonstrating correct use of CAD tools; teacher-validated assessment records; where applicable, portfolio documentation stored in the HUCO digital portfolio.
Recognition relevance	This learning outcome may be compared with corresponding Level 5 learning outcomes in the Italian pathway, particularly in modules related to CAD modelling, virtual simulation, or product design. Recognition would be based on content, complexity, autonomy, and documented evidence of achievement.

These identifiers create a **shared reference language for recognition procedures across the consortium**.

5. Recognition of Academic Prior Learning

5.1 Principles

Recognition of academic prior learning refers to learning outcomes obtained within **formal education programmes**.

Within the HUCO Labs project, this primarily concerns learning outcomes obtained within **HVET training modules delivered by the Italian partner**.

Recognition of these outcomes within higher education programmes follows the principles of the **ECTS Users' Guide** and the **Lisbon Recognition Convention**.

The following principles apply:

1. Recognition decisions must be based on **learning outcomes rather than institutional status**.
2. Recognition should be granted **unless substantial differences can be demonstrated**.
3. The **awarding institution retains final authority** over recognition decisions.

The collaborating institutions agree on an institutional agreement process. This means that the sending and receiving institutions establish a shared procedural basis for the submission, evaluation, and documentation of recognition requests. Such an agreement should specify the roles and responsibilities of each institution, the documentation to be provided, the criteria for equivalence assessment, the competent academic bodies involved in the decision-making process, and the procedures for recording recognition outcomes. In the HUCO Labs context, this institutional agreement process is particularly important for ensuring that learning outcomes achieved within the Italian HVET pathway can be assessed by the French higher education partner institution(s) in a transparent, consistent, and mutually understood manner.

5.2 Credit Transfer Procedures

Recognition of HVET learning outcomes within higher education programmes may result in the **allocation of ECTS credits** when the following conditions are met:

- learning outcomes correspond to programme learning objectives
- assessment procedures demonstrate comparable academic standards
- student workload corresponds to ECTS credit allocation principles.

The credit transfer process follows these steps:

1. **Learning Outcome Mapping**
   The HVET module is mapped to the competence framework.

2. **Equivalence Assessment**
   The receiving institution evaluates the comparability of learning outcomes.
3. **Recognition Decision**
   The awarding institution grants recognition.
4. **Documentation**
   Recognition is recorded in the student transcript and learning portfolio.

6. Recognition of Non-Academic Prior Learning

This chapter outlines the framework for recognising non-academic prior learning achieved in workplace-based, project-based, laboratory-based, and applied research contexts, and for assessing how such learning may contribute to recognition within higher education pathways.

6.1 Workplace Learning and Applied Research Activities

In addition to formal education modules, the HUCO training model includes extensive **learning activities conducted within industry environments**.

These activities include:

- applied research and development projects
- laboratory-based experimentation
- innovation workshops conducted with industrial partners.

Such learning activities may generate **valuable competence development even when they occur outside formal education institutions**.

6.2 Recognition of Experiential Learning

Recognition of non-academic prior learning follows the principles of **Recognition of Prior Learning (RPL)** (Cooper et al., 2017). The process relies on documented evidence demonstrating that learning outcomes have been achieved, a requirement that is echoed across European RPL systems where the validation of competencies is built around clear, verifiable artefacts (Andersson et al.,2013).

The process relies on documented evidence demonstrating that learning outcomes have been achieved.

Acceptable evidence may include:

- project reports

- prototypes and technical artefacts
- research documentation
- supervisor evaluations.

The Cedefop Guidelines (2016) provide a common reference for the collection and appraisal of non-formal and informal learning evidence, recommending that institutions adopt transparent criteria for the acceptance of project reports, prototypes, and research outputs. National experiences, such as those reported for Estonia and Ireland, illustrate how detailed interview templates and competency-mapping grids are employed to verify the relevance and quality of technical artefacts and supervisor feedback (Guimarães and Mikulec, 2021). The evaluation of experiential learning is typically carried out by academic staff in cooperation with industry supervisors, a partnership model highlighted in recent European case studies that link universities, vocational colleges, and employers to ensure that assessment judgments reflect both academic rigour and workplace relevance (Heinonen and Taomainen, 2020).

7. Module Mapping between Level 5 and Level 6 Pathways

This chapter presents the module mapping approach used to compare Level 5 and Level 6 pathways and to establish the basis for recognition and bridging arrangements within HUCO Labs.

7.1 Mapping Approach

In order to facilitate recognition procedures between the Italian HVET programmes and the French higher education programmes, a **module mapping exercise** was conducted within Work Package 2.

The mapping process compares modules according to four interrelated criteria:

- competence areas, in order to determine whether the modules address comparable fields of competence within the HUCO framework, such as digital, innovation, management, or green transformation;

- learning outcomes, in order to assess whether students are expected to achieve similar forms of knowledge, skills, and responsibility/autonomy, regardless of differences in programme structure or institutional setting;

- EQF level descriptors, in order to verify whether the compared modules are positioned at compatible levels of complexity, autonomy, and cognitive demand within the European Qualifications Framework;

- assessment formats, in order to examine whether the modules rely on sufficiently comparable forms of assessment and evidence, such as project work, practical tasks, written outputs, or supervised workplace-based evaluation.

Taken together, these criteria make it possible to assess not only whether two modules appear similar in title or subject area, but whether they are sufficiently comparable in their intended competence profile, level, and evidence base to support recognition decisions.

The resulting mapping provides the basis for **recognition decisions within the HUCO training pathways**.

Table 2- Example Mapping Table

HVET Module (Italy)	EQF	Corresponding HE Module (France)	EQF	Recognition Mode
TU12 – Applied R&D – Applied Research Methodologies	5	TU27 – Research and Scientific Communication	6	Bridging recognition
TU15 – Virtual Simulation and Digital Validation	5	TU30 – Digitization of the Design Function	6	Partial recognition
TU21 – Lean Manufacturing and Process Sustainability	5	TU29 – Industrial Design Jam	6	Partial recognition
TU22 – Green Technologies and Circular Economy	5	TU25 – Introduction to Life Cycle Analysis and Eco-Design of Products	6	Partial recognition
TU24 – Curricular Internship	5	TU31 – Professional Experience	6	Full recognition or partial recognition, depending on documented evidence

The mapping demonstrates that **substantial overlaps exist between competence profiles developed within HVET and higher education programmes**. Recognition procedures therefore focus on ensuring **transparent documentation of learning outcomes rather than imposing structural equivalence between programmes**.

7.2 Bridging Modules

In cases where learning outcomes demonstrate **partial equivalence**, the framework introduces **bridging modules**.

Bridging modules allow students to complement previously acquired competences in order to meet the full requirements of higher education programmes.

Examples include:

- advanced research methods, which support learners in developing a more systematic understanding of research design, methodological rigour, data interpretation, and analytical procedures expected in higher education contexts;
- academic writing for engineering research, which helps learners acquire the conventions of higher education communication, including structured argumentation, technical reporting, documentation standards, and the presentation of research findings in an academically appropriate form;
- interdisciplinary innovation management, which enables learners to strengthen their capacity to work across disciplinary boundaries, coordinate innovation processes, and engage with the organisational and strategic dimensions of research and development activities.

8. Assessment and Evidence Procedures

This chapter presents the assessment and evidence framework through which competence development in HUCO Labs is documented, evaluated, and validated across academic and industry-based learning environments.

8.1 Principles of Competence Assessment

Assessment within the HUCO Labs training pathways follows a **competence-oriented evaluation model** aligned with European higher education and vocational education standards. The assessment procedures are designed to ensure that learning outcomes obtained across different institutional contexts can be **evaluated in a transparent and comparable manner**.

The following principles guide the assessment framework:

- **Learning outcome alignment:** Assessment methods must correspond directly to the defined learning outcomes of each module.

- **Authentic assessment:** Evaluation focuses on real-world problem solving and applied research activities.
- **Multiple evidence sources:** Student competence development is documented through a variety of evidence types.
- **Joint evaluation:** Assessment processes involve both academic staff and industry supervisors.

This approach ensures that competence evaluation reflects the **interdisciplinary and applied nature of the HUCO training model**.

8.2 Types of Assessment Evidence

Student learning outcomes may be demonstrated through a range of evidence formats.

These include:

- **project reports and research documentation**
- **technical prototypes or engineering artefacts**
- **innovation project presentations**
- **laboratory experiment documentation**
- **reflective learning reports**
- **evaluation reports from company supervisors**

The combination of these evidence types allows for a **holistic assessment of both theoretical understanding and applied competence development**.

8.3 Joint Assessment Panels

In order to ensure fairness and transparency in recognition procedures, the HUCO consortium introduces **joint assessment panels** for selected project-based modules.

These panels may include:

- academic instructors from participating universities
- trainers from HVET institutions
- industry experts involved in project supervision.

Joint evaluation contributes to the creation of **mutual trust between institutions** and strengthens the credibility of recognition decisions across the consortium.

9. Digital Documentation and Micro-Credentialing

This chapter presents the digital documentation and micro-credentialing instruments through which competence development in HUCO Labs is evidenced, recorded, and made transferable across learning contexts.

9.1 Digital Learning Portfolios

To support transparent recognition procedures, all student achievements within the HUCO training pathways are documented through **digital learning portfolios**.

The portfolio system allows students to collect evidence demonstrating the achievement of defined competences.

Each portfolio entry includes:

- description of the learning activity
- associated competence identifiers
- assessment results
- supporting evidence.

The portfolio system enables students to **demonstrate competence development across multiple learning environments**, including academic modules, research projects, and workplace-based learning.

9.2 Micro-Credentials and Digital Badges

The HUCO project introduces **micro-credentials and digital badges** as complementary tools for documenting competence achievements.

Each micro-credential corresponds to a specific competence cluster defined within the HUCO competence framework.

Digital badges include metadata describing:

- competence area
- learning outcomes
- EQF level
- assessment method
- issuing institution.

The use of micro-credentials allows competences to be recognised **independently from traditional degree structures**, thereby supporting flexible learning pathways.

10. Time Planning for the Pilot phase

This chapter presents the time planning for the pilot phase, defining the main implementation stages, the responsible partners, and the key moments at which the HUCO training modules, mapping logic, assessment formats, and recognition arrangements are prepared, tested, and reviewed within the HUCO Labs framework.

The implementation of the HUCO training offer follows a structured multi-phase approach combining competence alignment, module mapping, joint delivery preparation, assessment design, pilot implementation, and evaluation. Recognition procedures form part of this process, but they are embedded within the broader testing and refinement of the training architecture.

Table 3- Summary of activities

Phase	**Timeline**	**Key Activities**	**Responsible Partners**
Phase 1	M6–M8	Competence framework alignment	DHBW
Phase 2	M8–M10	Module mapping across institutions	ITSAC, CMQ
Phase 3	M10–M13	Development of joint delivery formats	UPV, SSMTP
Phase 4	M13–M15	Assessment and recognition procedure validation	CEA-PME
Phase 5	M15–M17	Pilot implementation in partner institutions	All partners
Phase 6	M17–M18	Evaluation and final reporting	DHBW

The pilot phase will provide valuable insights into the **practical implementation of cross-border recognition procedures** and will inform the final refinement of the framework.

10.1 Pilot pathways

The pilot phase concerns two specific implementation contexts within the consortium:

1. the Italian Level 5 pilot pathway, delivered by ITS Cuccovillo Foundation, which constitutes the HVET pathway within the project and provides the main basis for prior learning to be considered for recognition;

2. the French Level 6 pilot pathway, delivered by the French higher education partners, which constitutes the receiving higher education context in which recognition, partial recognition, or bridging arrangements may be applied.

The existence of these two clearly structured pilot pathways is essential because the recognition framework is not developed in the abstract, but in direct relation to actual modules, learning outcomes, assessment formats, and progression possibilities between EQF Level 5 and EQF Level 6. This corresponds to the project application, which explicitly identifies the development of two pilot pathways as a core element of the HUCO approach.

10.2 Key implementation and recognition moments within the pilot phase

Key implementation and recognition moments within the pilot phase

Table 4- Pilot phases and their respective recognition-related actions

Phase	Timeline	Recognition relevance
Phase 1: Competence framework alignment	**M6–M8**	This is the foundational phase of the process. At this stage, the shared competence framework and its reference language are aligned across the consortium. Although formal recognition decisions are not yet taken at this point, Phase 1 is essential because it establishes the common conceptual basis on which later module mapping, assessment comparison, and recognition decisions depend.

Phase 2: Module mapping across institutions	**M8–M10**	This is the first direct recognition moment, because the Italian and French modules are compared in terms of competence areas, learning outcomes, EQF level descriptors, and assessment formats. At this stage, potential correspondences, partial equivalences, and likely bridging needs are identified.
Phase 3: Development of joint delivery formats	**M10–M13**	This phase is relevant for recognition because the way modules are jointly delivered influences the comparability of learning experiences across institutions. It is therefore important to ensure that delivery formats, learning activities, and expected outputs remain sufficiently aligned with the mapped learning outcomes and evidence requirements.
Phase 4: Assessment and recognition procedure validation	**M13–M15**	This is a key operational recognition moment, because the consortium must agree on how recognition will be implemented in practice. This includes the validation of documentation formats, assessment evidence, recognition criteria, and the responsibilities of the sending and receiving institutions.
Phase 5: Pilot implementation in partner institutions	**M15–M17**	This is the phase in which learners actually complete the relevant modules and training activities within the Italian Level 5 and French Level 6 pilot pathways. Their achievements must therefore be documented in a way that supports subsequent recognition, including learning outcomes, assessment results, and portfolio-based evidence.
Phase 6: Evaluation and final reporting	**M17–M18**	This is the concluding recognition-related phase, in which the consortium reviews whether the recognition procedures functioned as intended, where difficulties arose, and which aspects of the framework require further refinement.

10.3 Function of the timetable

The timetable is therefore not only an implementation plan, but also a procedural structure for recognition.

before implementation, through competence alignment and module mapping;

- during preparation, through validation of assessment and recognition procedures;
- during delivery, through the systematic collection of evidence;
- after implementation, through institutional review and final evaluation.

This staged approach is important because recognition decisions cannot be made reliably at the end of the process unless the necessary groundwork has been completed in earlier phases. The pilot phase therefore provides the consortium with an opportunity to test not only the training offer itself, but also the practical feasibility of cross-border recognition procedures between the Italian HVET and French higher education pathways. This logic is consistent with the wider project architecture set out in the application and in the pilot pathway documents.

10.4 Concluding statement

The pilot phase will provide valuable insights into the practical implementation of cross-border recognition procedures and will inform the final refinement of the framework. In particular, it will make it possible to assess whether the proposed documentation standards, module mapping logic, assessment formats, and institutional coordination mechanisms are sufficiently robust to support transparent and transferable recognition arrangements across the HUCO consortium.

11. Quality Assurance and Governance

This chapter outlines the quality assurance and governance framework through which recognition procedures in HUCO Labs are monitored, coordinated, and aligned with the responsibilities and standards of the participating institutions.

11.1 Institutional Responsibilities

Recognition procedures implemented within the HUCO Labs project must comply with the **quality assurance standards of participating institutions**. Quantitative monitoring of recognition effectiveness will be supported through KPIs, such as recognition approval rates, time required for validation decisions, and learner progression success rates, in line with the quality assurance framework defined in D5.3.

Each institution retains final responsibility for:

- recognition decisions
- credit allocation
- certification of learning outcomes.

However, recognition decisions are supported by the **shared frameworks and procedures defined within this deliverable**.

11.2 Consortium Coordination

To ensure consistency across partner institutions, the project establishes a **Recognition Coordination Group**.

A proposed composition of this group includes academic programme representatives from the participating institutions, one representative of the Italian HVET partner, one representative of the French higher education partner institution(s), one quality assurance representative, and, where appropriate, one advisory representative from industry or work-based learning contexts.

This group is responsible for:

- monitoring recognition procedures
- resolving recognition disputes
- updating the learning outcome mapping framework.

Regular coordination meetings will allow partners to **continuously refine recognition procedures based on practical experience**.

12. Expected Impact

This chapter presents the expected impact of the framework by explaining how it supports strategic European objectives in learner mobility, educational permeability, and collaboration between vocational education, higher education, and industry.

The framework developed in this deliverable contributes to several strategic objectives of European education policy.

These include:

- strengthening permeability between vocational and higher education systems, by establishing procedures through which learning outcomes achieved in HVET can be compared, documented, and recognised within higher education contexts, thereby reducing structural barriers between the two sectors;

- enabling transnational learning pathways for technical professionals, by creating a common procedural basis for cooperation between partner institutions in different countries and by supporting progression between the Italian EQF Level 5 pathway and the French EQF Level 6 pathway;

- supporting mobility between HVET and university programmes, by making learning outcomes more transparent, portable, and recognisable across institutional boundaries, including in the context of study visits, internships, and joint learning arrangements foreseen within the HUCO model;

- fostering industry–education collaboration in applied research and innovation, by linking recognition procedures to training formats that involve companies, applied projects, workplace-based learning, and collaborative delivery between HVET institutions, higher education partners, and business actors.

By integrating module development, pathway mapping, assessment logic, and recognition arrangements, the HUCO Labs project contributes to the creation of a more flexible and integrated European skills ecosystem. In this way, the deliverable supports the broader project objective of connecting vocational education, higher education, and company-based research environments through structured and transferable learning pathways.

13. Sustainability and Transferability

This chapter outlines how the recognition framework developed within HUCO Labs can be sustained beyond the funded project period and transferred to additional institutional and national contexts through governance, dissemination, curricular integration, and continued cross-border cooperation.

The recognition framework developed within the HUCO Labs project has been designed not only as a project-specific procedural instrument, but also as a transferable model for longer-term cooperation between Higher Vocational Education and Training (HVET), higher education institutions, and company-based learning environments. In line with the wider project strategy, its sustainability depends on embedding the framework into institutional practice, maintaining consortium-level coordination structures, and linking recognition procedures to future dissemination, policy dialogue, and ecosystem-building activities. This approach is consistent with the project application, which presents HUCO Labs as a first step towards a sustainable European ecosystem for research-oriented technician education and foresees continuation measures beyond the funded period.

Sustainability within HUCO Labs should be understood at four interrelated levels:

- **Institutional sustainability.** The framework should remain in use within the participating institutions after the end of the project by being integrated into internal procedures for module mapping, recognition requests, documentation requirements, and progression decisions. In practical terms, this means that recognition should no longer depend solely on project structures, but should become part of regular academic and administrative workflows.

- **Pedagogical sustainability.** The recognition framework will only remain viable if the linked learning pathways, assessment approaches, and competence documentation practices continue to be applied. This is supported by the project's wider emphasis on training design, active learning methodologies, and trainer preparation, which together strengthen the consistency, transparency, and transferability of dual learning arrangements.

- **Network sustainability.** The continuation of the framework depends on maintaining structured cooperation among HVET providers, universities, companies, and public stakeholders. The application explicitly foresees this through the HUCO Sustainability Board, the continuation of the WE HUCO Forum, and peer-to-peer exchange formats involving ministries, regions, and associated stakeholders.

- **Transferability.** The framework has been designed so that it can be adapted to further institutions, sectors, and countries beyond the initial pilots. The application links this transferability to the comparative analysis of Level 5 and Level 6 pathways, the dissemination of project outputs through open web resources and external platforms, and the identification of additional institutions interested in replication.

13.1 Measures to support long-term sustainability

To remain operational after the project, the framework should be supported by a concrete set of post-project measures.

- **Continuation of the HUCO Sustainability Board.** The Sustainability Board should remain the central body coordinating post-project follow-up. In line with the application, it should supervise continued dissemination, stakeholder engagement, and the annual WE HUCO Forum. In the context of this deliverable, it should also monitor whether recognition procedures continue to be used and updated by the partner institutions.

- **Annual continuation of the WE HUCO Forum.** The application states that the WE HUCO Forum should be replicated for at least five years after the project. This provides a concrete sustainability mechanism. The forum can function not only as a dissemination event, but also as a review space where partners present recognition experiences, discuss implementation barriers, and invite new institutions into the ecosystem through Memoranda of Understanding.

- **Maintenance of digital resources.** Sustainability also depends on continued access to the project's website, digital outputs, and documentation tools. The application explicitly foresees the maintenance of web resources and other digital tools in both the project lifetime and the post-project period. For this deliverable, that means that templates, mapping matrices, flowcharts, recognition forms, and examples of evidence should remain accessible and reusable by partner institutions and external adopters.
- **Integration into institutional regulations and agreements.** For durable implementation, the framework should be reflected in institutional cooperation agreements, progression rules, and internal quality procedures. Without such integration, recognition practices risk remaining informal or dependent on individual project staff.

13.2 Proposed sustainability measures for Italy and France

Because the pilot architecture centres particularly on the recognition of Italian HVET learning outcomes within French higher education contexts, sustainability must be secured through concrete institutional measures in both countries.

In Italy, the sending HVET partner should:

1. **Maintain the mapped Level 5 pathway as a recognised reference pathway.** The Italian pathway already contains a clearly structured module catalogue and an explicit section on recognisability and transferability. This can serve as the stable basis for continued recognition cooperation.
2. **Update module documentation annually.** Each relevant module should continue to include learning outcomes, workload, assessment methods, competence references, and evidence requirements in a format usable for recognition purposes.
3. **Nominate a recognition contact point.** ITS Cuccovillo Foundation should designate a staff member or unit responsible for preparing recognition dossiers, supporting learners, and liaising with the French receiving institution.
4. **Embed recognition preparation into learner guidance.** Students in the Italian pathway should be informed from the start which modules are potentially recognisable, what evidence they must collect, and when recognition requests should be prepared.
5. **Maintain digital evidence portfolios and micro-credential records.** Since the project architecture links recognition to digital documentation, Italy should continue to use structured portfolios and competence records as part of normal programme delivery.

In France, the receiving higher education partner(s) should:

1. **Adopt an internal recognition procedure for HUCO-related requests.** This should specify who evaluates requests, what evidence is required, how equivalence is judged, and within what timeframe decisions are issued.
2. **Formally identify recognition windows in the student lifecycle.** Recognition should not be handled ad hoc; it should be linked to defined moments such as admission, semester transition, or pre-enrolment assessment for bridging arrangements.
3. **Establish a standing academic review group.** This group should include programme leaders, subject specialists, and quality representatives able to assess module comparability and decide on full recognition, partial recognition, or bridging requirements.
4. **Define bridging offers in advance.** Where partial equivalence is recurrent, French institutions should predefine small bridging units rather than handling each case from scratch.
5. **Integrate recognition outcomes into student records.** Decisions should be documented in transcripts, internal records, and any digital competence documentation system used by the institution.

13.3 Transferability to further institutions and contexts

The framework is also designed to be transferable beyond the initial Italy–France pilot relationship. The project application states that comparative analysis of Level 5 and Level 6 systems should help identify further institutions interested in adopting the HUCO curriculum and training approach, while dissemination through multilingual, open-access resources should support wider uptake.

Transferability can be supported through the following measures:

- **Use of standardised templates.** Shared templates for learning outcomes, module mapping, recognition requests, and evidence documentation make the model easier to adopt elsewhere.
- **Open dissemination of tools and examples.** The application states that deliverables and training tools should be openly disseminated and made available in multilingual form. This strengthens reusability across Europe.
- **Replication through external networks.** The application refers to the use of European partner networks, associated ministries, regional actors, and external platforms to spread the approach. This can support adoption by additional HVET and higher education providers.

- **Adaptability to other sectors.** Although developed in advanced manufacturing, the framework is built around learning outcomes, EQF alignment, documentation, and recognition logic rather than a single narrow curriculum. This increases its transfer potential.

13.4 Post-project recommendation

To ensure that sustainability is not merely declarative, the consortium should adopt a simple post-project continuation plan consisting of:

- one annual WE HUCO Forum,
- one annual update of the module mapping and recognition templates,
- one designated recognition contact point in Italy and one in France,
- one annual review of recognition cases and lessons learned,
- and at least one renewed institutional agreement or MoU confirming continued cooperation.

This would convert sustainability from a general aspiration into a manageable operational model for the years following the funded project period.

5^{th} Level Course: General Presentation and Module Description

HUCO LABS

Collaborative **H**vet-**U**niversity-**Co**mpany **Labs** for Research

Section 1

General Premises

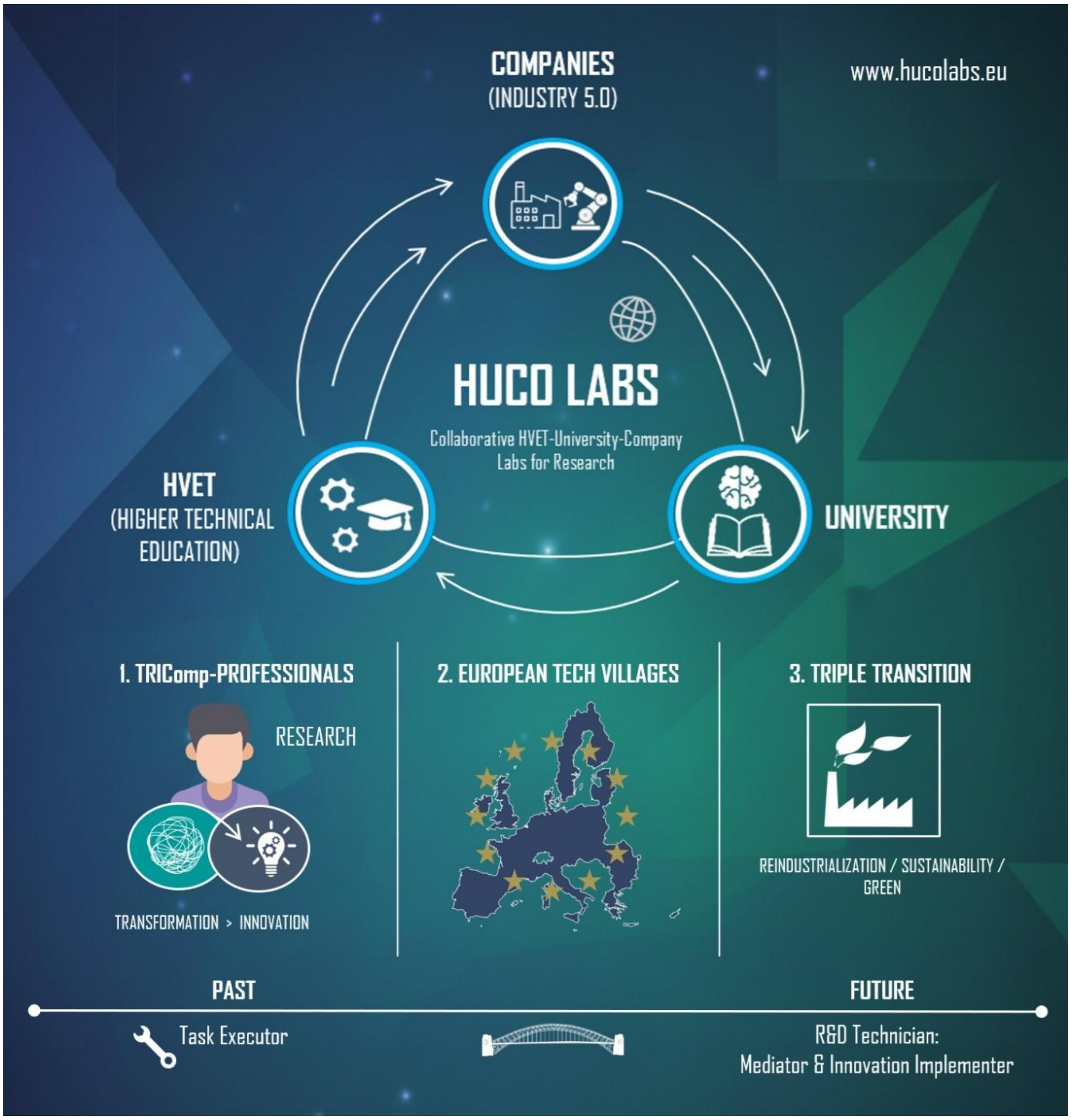
This document presents the comprehensive design of the **HUCO 5th Level Italian Training Pathway** developed within the framework of the **HUCO Labs project** (Collaborative HVET-University-Company Labs for Research). Its primary goal is to define the curriculum for the **"Innovation Enabler,"** a professional figure equipped to manage innovation and digital and green transitions in the advanced manufacturing sector.

The document is structured into the following key sections:

- **Macro Structure:** An overview of the 2,000-hour biennial program, detailing the balance between classroom training, advanced laboratories, and an 800-hour internship.
- **TRIComp Framework Integration:** A description of how 22 future-oriented competencies (Innovation, Management, Green, and Digital) are strategically embedded into each technical module.
- **Training Units (TU):** A detailed catalogue of **24 Training Units**, each specifying learning objectives, technical contents, active teaching methodologies (such as PBL and Inquiry-based labs), and assessment criteria.
- **Cooperation Model:** An explanation of the tripartite collaboration between **HVET institutions, Universities, and Companies**, illustrating their integrated roles in the design and delivery of the training.

In summary, this report serves as a technical and pedagogical blueprint for implementing a modern, research-driven vocational path that aligns education with the high-level demands of Industry 5.0.

HUCO LABS INFOGRAPHIC



1. Course Macro Structure

1. Introduction: The Evolution of the ITS Academy System towards Innovation and R&D

The ITS Academy System: A Strategic National Resource

Today, **ITS Academies** represent the pillar of professionalizing higher education in Italy, consolidating their role as a primary "bridge" between the world of education and the production system. Thanks to the support of PNRR (National Recovery and Resilience Plan) funds and recent legislative reforms, ITS Academies have evolved into high-tech hubs capable of responding in real-time to the challenges of **Transition 5.0**.
According to the **2025 INDIRE National Monitoring Report** (referring to courses completed in 2023 and operational in 2024), the system confirms a performance of excellence:

- **Employability: 84%** of graduates find employment within a year, with peaks exceeding **90%** in the most high-demand technological fields.
- **Relevance:** More than **93%** of those employed hold positions closely related to their specific field of study.
- **Educational Model:** The system's strength lies in its faculty (over **60%** of whom come directly from the professional world) and a laboratory-based pedagogy that transforms "knowledge" into "know-how." Furthermore, **courses are always co-designed with local enterprises**, utilizing rigorous analysis of the most sought-after professional profiles and their correlated specialist skills. This collaborative logic ensures the ITS system contributes directly to the development of **Territorial Smart Specialization Strategies (S3)**.

The Primacy of the Mechanical and Mechatronics Sector

Within this landscape, the **Mechanical and Mechatronics** sector asserts itself as the "beating heart" of the system. This field records both the highest number of enrollments and the strongest job placement rates within the industrial sector.

2025 Key Performance Indicators

Indicator	**Performance: Mechanical/Mechatronics Sector**
Placement at 12 months	> **92%** (constantly growing
Corporate Relations	Over **4,000 partner companies** involved in curriculum co-design
Innovation	Priority focused on **Robotics, IIoT, and Additive Manufacturing**

The Evolving Professional Profile

Companies within the mechatronics supply chain are no longer simply looking for technicians specialized in maintenance or plant operation. Instead, they require profiles capable of **managing the complexity of cyber-physical systems** and supporting continuous improvement processes.

1.2 The National Reference Profile

This new curriculum has been designed based on the National Profile of the **"Higher Technician for Advanced Mechatronic Design and Production."** This is one of the most comprehensive and strategic roles within the ITS system, acting as a "hinge" between digital design and the physical realization of the product. The ITS Academy reform (**Law 99/2022** and subsequent implementing decrees) has profoundly updated this profile, shifting the focus toward the **ecological and digital transition.**

The New Macro-Competencies (ITS Academy Reform)
The reform has introduced essential pillars that elevate the technical profile to that of an innovation management figure:

1. Digital Transition and Cyber-Physical Systems (Digital Skills)
- **Digital Twin:** Ability to create and manage virtual models to simulate product and process behaviour before physical production begins.
- **Big Data and Industrial AI:** Management and analysis of data streams from interconnected machinery to optimize performance and implement predictive maintenance.
- **Industrial Cybersecurity:** Protecting data integrity and control systems within factory networks exposed to the web.

2. Ecological Transition and Sustainability (Green Skills)
- **Eco-design:** Designing mechatronic components oriented toward durability, repairability, and material recycling.
- **Energy Efficiency:** Optimizing production cycles to reduce carbon footprints and resource consumption.
- **Circular Economy:** Managing Product Lifecycle Management (PLM) with a focus on regeneration and reuse.

3. Research, Development, and Innovation Skills (R&D)
- **Technology Transfer:** Acting as an interface between research centers and production, transforming scientific findings into applicable industrial solutions.
- **Advanced Prototyping:** Utilizing Additive Manufacturing technologies (industrial 3D printing) for rapid iteration of new projects.
- **Agile Methodologies:** Applying project management models (Scrum, Kanban) to hardware and manufacturing sectors.

4. Internationalization and Soft Skills
- **Technical Communication in a Foreign Language:** Ability to operate in multinational contexts and interpret complex technical documentation in English.
- **Complex Problem Solving:** Ability to intervene in systems where failures may be mechanical, electronic, or software-based.

Exit Profile (Graduate Outcomes)
Upon completion of the program, the graduate is an "Innovation Enabler" capable of:
- Designing mechatronic systems by integrating mechanics, sensors, and automation.
- Programming collaborative robots (Cobots) and machine vision systems.
- Supervising production by monitoring sustainability and digitalization indicators.
- Actively collaborating with R&D departments to introduce new materials or cutting-edge technologies.

1.3 New 5° Level Curriculum Overview

The **new HUCO 5° Level EQF** training program is structured to transform student potential into high-level operational skills, following a logical progression from technological fundamentals to cutting-edge R&D methodologies.

The program is organized into two complementary years:

- **Year One: Foundations and Innovation Tools** The first year is dedicated to acquiring a solid technical core (**CAD, Automation, CNC**) and introducing innovation tools (**AI, 3D Prototyping, Design for Manufacturing**). The focus is on the ability to design and digitally validate complex solutions.

- **Year Two: Strategic Management and Applied R&D** The second year focuses on the strategic management of production and innovation. It integrates the pillars of the ITS Academy Reform—specifically **Sustainability, Lean Manufacturing, and Agile methodologies—** culminating in an intensive **800-hour practical internship** within a partner company.

	Higher Technician for Advanced Mechatronic Design and Production 1° YEAR - 5TH LEVEL	Hours	FUNDAMENTAL MODULE	SPECIALIZING MODULE	INTEGRATIVE MODULE
TU 1	**Basic ICT and Digital Security**	**50**	☒	☐	☐
TU 2	**Occupational Safety**	**20**	☒	☐	☐
TU 3	**Technical English**	**60**	☒	☐	☐
TU 4	**Communication, Teamworking and Problem solving**	**40**	☒	☐	☐
TU 5	Creativity, AI and Proactive Mindset	30	☐	☒	☐
TU 6	**Technical Drawing and CAD Modeling**	**120**	☒	☐	☐
TU 7	Product Development and Advanced Design	20	☐	☒	☐
TU 8	**Materials and Production Technologies – MRP**	**60**	☒	☐	☐
TU 9	**Industrial Automation**	**150**	☒	☐	☐
TU 10	**Mechanical Machining and CNC**	**80**	☒	☐	☐
TU 11	**Automated Production Systems**	**60**	☒	☐	☐
TU 12	Applied R&D – Applied Research Methodologies	60	☐	☒	☐
TU 13	**Prototyping, 3D Printing and Testing**	**90**	☒	☐	☐
TU 14	Design for Manufacturing & Concurrent Engineering	40	☐	☒	☐
TU 15	Virtual Simulation and Digital Validation	40	☐	☒	☐
TU 16	Ergonomic Simulation and Human-Centered Design	40	☐	☒	☐
TU 17	Statistical Methods and Process Optimization	40	☐	☒	☐
	TOTAL HOURS 1st YEAR	1.000			
INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 1		160			☒
4 ONLINE Modules with testimonies of companies (4 hours each)		16			☒

	2° YEAR - 5TH LEVEL	Hours			
TU 18	**Metrology and Quality Control**	**40**	☒	☐	☐
TU 19	**PLM and Technical Documentation**	**30**	☒	☐	☐
TU 20	**Project Management (Waterfall and Agile)**	**40**	☒	☐	☐
TU 21	**Lean Manufacturing and Process Sustainability**	**30**	☒	☐	☐
TU 22	Green Technologies and Circular Economy	30	☐	☒	☐
TU 23	Industrial Economics and Sustainable Innovation	30	☐	☒	☐

TU 24	Final Practical Internship	800	☒	☐	☐
	TOTAL HOURS 2nd YEAR	1.000			
INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 2		160			☒

Difference between the types of modules:

1. Core Modules

(Fundamental Modules) These represent the essential pillars of the study program. They are mandatory for obtaining the final qualification and are strictly aligned with the **macro-competencies** defined by the **Ministry of Education** for the specific professional profile. They ensure that every student meets the national standards required for the diploma.

2. Professionalizing Modules

(Industry-Tailored Curriculum) While still part of the mandatory curriculum and necessary for graduation, these modules are specifically **tailored to the technical requirements of partner companies**. They bridge the gap between national education standards and the actual, high-level skills currently demanded by the local and international industrial market.

3. Integrative Modules

(Extracurricular & Micro-credentials) These activities sit outside the standard study path and are not strictly required for the final qualification. However, they offer significant added value by allowing students to earn **micro-credentials**. They focus on emerging trends, specific workshops, or niche certifications that enhance the student's professional portfolio.

1.4 Integration of the TRIComp competences within the Programme

The **new HUCO 5th-level EQF curriculum** adopts an innovative approach to skill development by integrating **TRIComp Framework**[1]**,** a core output of the HUCO Labs project, designed to address the evolving competence needs of mid-level technicians (EQF levels 5 and 6) in the context of Europe's digital and green "twin transition." It moves beyond traditional vocational training by bridging the gap between Higher Vocational Education and Training (HVET), universities, and industry. Key features of the framework include:

- **The TRIProfessional Concept:** The framework is the foundation for a new generation of skilled workers—**TRIProfessionals**. These individuals combine deep technical expertise with transformative, research-based, and innovative competencies.
- **Future Skills (FS) Integration:** It introduces an empirically validated set of "Future Skills" essential for driving innovation and implementing sustainable solutions within modern industrial ecosystems.
- **Curriculum Adaptation:** TRIComp provides a structured approach for training institutions and industrial actors to adapt vocational curricula, fostering applied research and cross-sectoral competence development.

[1] https://hucolabs.eu/wp-content/uploads/2025/10/wp2-short-brief.pdf

- **Driving Innovation:** By applying these skills in diverse professional settings, TRIProfessionals actively contribute to Europe's digital, ecological, and societal renewal.

In summary, the TRIComp Framework acts as a strategic tool to transform technicians into "Innovation Enablers," ensuring they possess the holistic mindset required to manage the complexities of Industry 5.0 and the global shift toward sustainability. The new 5th-level EQF curriculum adopts the approach to integrating **TRIComp competencies** directly into the technical training units rather than treating them as isolated modules. This strategic choice ensures that soft and transversal skills are contextualized within real-world industrial scenarios, making them more relevant and immediately applicable for future "Innovation Enablers". Specifically, each technical module is associated with a maximum of **four TRIComp competencies**, carefully selected based on their alignment with the module's core technical objectives. To maximize the effectiveness of this integration, the program employs **active teaching methodologies**—such as Project-Based Learning, Case-Based Learning, and Inquiry-Based Laboratories—which are designed to simultaneously train technical proficiency and the associated TRIComps. By tackling complex, hands-on challenges, students can "train" these four key competencies in parallel with their technical expertise, ensuring a holistic development that meets the high-level demands of the modern mechatronic and R&D sectors.

TRICcomp matrix in HUCO

TRAINING MODULES - 5TH LEVEL PATHWAY

INNOVATION COMPETENCES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
INNOVATION COMPETENCES																								
CREATIVE PROBLEM-SOLVING			X	X	X	X	X	X	X	X			X	X		X					X			X
APPLIED INNOVATION RESEARCH					X							X					X	X						X
RESPONSIBLE RESEARCH																								
COMMUNICATION			X	X						X		X						X	X	X				
INTERDISCIPLINARY COLLABORATION		X	X	X		X	X		X	X	X	X	X	X	X	X			X		X			X
DIGITAL MODELLING & SIMULATION						X		X	X		X		X		X	X			X					X
BENCHMARK & STANDARDS																		X						
INNOVATION MANAGEMENT					X	X	X		X			X	X		X							X	X	
MANGEMENT COMPETENCES																								
PROJECT LEADERSHIP																				X				X
RESEARCH-DRIVEN																								
QUALITY & PROCESS MANAGEMENT		X						X		X				X	X	X	X	X	X	X	X		X	X
ENTREPRENEURIAL THINKING																							X	X
SELF & TIME MANAGEMENT		X		X																X				X
GREEN COMPETENCES																								
SUSTAINABILITY THINKING								X						X							X	X	X	X
SYSTEMS THINKING		X															X					X		
SUSTAINABLE SYSTEM DESIGN							X															X		
DIGITAL COMPETENCES																								
DIGITAL FUNDAMENTALS	X		X								X													
DATA LITERACY	X																X							X
CYBERSECURITY & PRIVACY	X										X													
AI-LITERACY & APPLICATION					X																			
CLOUD-BASED MANUFACTURING																								
DIGITAL APPLICATION DESIGN	X																							

TRAINING MODULES
TU1 - BASIC ICT AND DIGITAL SECURITY
TU2 - OCCUPATIONAL SAFETY
TU3 - TECHNICAL ENGLISH
TU4 - COMMUNICATION, TEAMWORKING AND PROBLEM SOLVING
TU5 - CREATIVITY, AI AND PROACTIVE MINDSET
TU6 - TECHNICAL DRAWING AND CAD MODELING
TU7 - PRODUCT DEVELOPMENT AND ADVANCED DESIGN
TU8 - MATERIALS AND PRODUCTION TECHNOLOGIES - MRP
TU9 – INDUSTRIAL AUTOMATION
TU10 - MECHANICAL MACHINING AND CNC
TU11 - AUTOMATED PRODUCTION SYSTEMS
TU12 - APPLIED R&D – APPLIED RESEARCH METHODOLOGIES
TU13 - PROTOTYPING, 3D PRINTING AND TESTING
TU14 - DESIGN FOR MANUFACTURING & CONCURRENT ENGINEERING
TU15 - VIRTUAL SIMULATION AND DIGITAL VALIDATION
TU16 - ERGONOMIC SIMULATION AND HUMAN-CENTERED DESIGN
TU17 - STATISTICAL METHODS AND PROCESS OPTIMIZATION
TU18- METROLOGY AND QUALITY CONTROL
TU19 - PLM AND TECHNICAL DOCUMENTATION
TU20 - PROJECT MANAGEMENT (WATERFALL AND AGILE)
TU21 - LEAN MANUFACTURING AND PROCESS SUSTAINABILITY
TU22 - GREEN TECHNOLOGIES AND CIRCULAR ECONOMY
TU23 - INDUSTRIAL ECONOMICS AND SUSTAINABLE INNOVATION
TU24 – CURRICULAR INTERNSHIP

The provided matrix offers a comprehensive overview of the integration of **TRIComp Future Skills** across the 24 Training Units (TU) of the **HUCO 5th-level EQF pathway**. This mapping serves as a strategic blueprint for the curriculum, illustrating how transversal and innovative competencies are embedded within the technical journey. Key observations from the table include:

Integrated Competence Clusters: The framework is organized into four main pillars: **Innovation, Management, Green, and Digital Competences**. This structure confirms that the pathway is designed to train "Innovation Enablers" who possess a holistic set of skills ranging from technical digitalization to sustainable leadership.

Strategic Mapping (The "X" Marks): Rather than overwhelming every module with all skills, the table shows a targeted selection. Most Training Units are associated with a limited number of competencies (typically 3 to 4), ensuring that the training remains focused and that the active teaching methodologies can effectively "train" those specific skills alongside the technical content.

High-Frequency Competencies: Interdisciplinary Collaboration and **Creative Problem-Solving** appear as the most pervasive skills throughout the pathway. This reflects the project's emphasis on collaborative research and the ability to solve complex industrial problems, which are core requirements for modern mechatronics.

Specialized Clusters:

- **Digital Competences** (such as Digital Fundamentals and Cybersecurity) are heavily concentrated in the initial units (TU 1, TU 3, TU 11), establishing a necessary baseline.
- **Green Competences** (Sustainability and Systems Thinking) gain prominence in the later stages of the curriculum (TU 21-23), aligning with modules dedicated to circular economy and green technologies.

- **Management Competences** (Quality & Process Management) are consistently distributed, reinforcing the industrial mindset required for 5th-level technicians.

In conclusion, this table demonstrates a **balanced and progressive distribution** of **TRIComp skills**. It moves from foundational digital literacy to complex innovation management and sustainable design, ensuring that by the end of the 24 modules, the student has developed a complete and versatile professional profile.

1.5 Student Admission Requirements

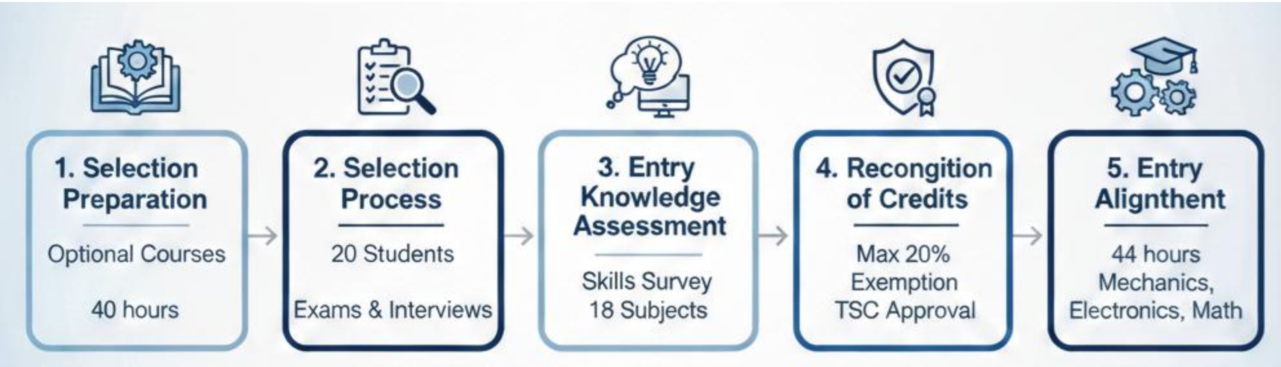
Access to ITS Academy programs is open to young people and adults holding a **High School Diploma** or a **Professional Diploma** obtained through a four-year vocational training path (IeFP), supplemented by a Higher Technical Specialization (IFTS) course.

Entry Competences for the 5th Level Pathway

- **STEM Foundation:** Solid basic knowledge in Mathematics, Physics, and Logic applied to technical problems.
- **Technical Literacy:** Ability to read and interpret basic technical drawings and blueprints.
- **Digital Skills:** Proficiency in using standard office software (spreadsheets, word processing) and basic familiarity with computer-aided design (CAD) concepts.
- **Language Proficiency:** Sufficient level of English to understand technical documentation and participate in international learning contexts.
- **Industrial Awareness:** Basic understanding of mechanical and electronic principles (Mechatronics) and an awareness of safety standards in a workshop or industrial environment.
- **Learning Mindset:** Proactive attitude toward problem-solving and a willingness to engage in collaborative, project-based learning activities.

1.6 Course Preliminary Activities

The program includes a series of initial preparatory activities, specifically:



1. **SELECTION PREPARATION**

The selection preparation phase includes optional courses in the following disciplines: Computer Science, Mechanical Technology, Industrial Design, and Mathematics. The estimated duration of these preparatory activities is 40 hours.

2. **SELECTION**

The course is intended for 20 students. Admission to the selection process is based on **Exams and Qualifications**. The overall evaluation is conducted based on:

1. **Analysis of qualifications.**

2. **Multidisciplinary written test** (multiple choice) to verify the minimum cultural requirements for access to a post-secondary level training channel, as provided by national regulations regarding ITS (Higher Technical Institutes).
3. **Technical-motivational interview.**
4. **Extra evaluation** for dedicated courses.

The ITS Cuccovillo reserves the right to increase the number of participants based on the project's management and economic-financial criteria.

3. ENTRY KNOWLEDGE ASSESSMENT

The assessment of entry-level knowledge will be carried out through a multiple-choice questionnaire aimed at exploring students' starting levels in the following subjects: mathematics, economics, computer science, statistics, physics, chemistry, Italian language, technical English, production processes, business organization, measurements, technical drawing, materials technology, mechanics, fluidics, Industry 4.0, electrical engineering, and electronics. This survey will allow for the personalization of teaching during the subsequent alignment phase and, more generally, throughout the entire program, accounting for the educational needs of each student.

4. RECOGNITION OF ENTRY CREDITS

Enrolled students are eligible for the recognition of credits for specific training units. This can occur both at the time of entry and during the program to shorten the duration or facilitate transitions to other paths within the Higher Technical Education System.

To this end, the recognition of training credits—which contributes to the minimum attendance requirement of 80% for admission to the final exam—will exempt students from attending the recognized training units, up to a maximum of 20% of the total program hours. Internship hours are excluded from this possibility. The Technical Scientific Committee of the Cuccovillo Foundation is responsible for the recognition of credits.

5. ENTRY ALIGNMENT

Given that candidates come from various types of institutes, an extracurricular alignment activity lasting 44 hours is provided to ensure the class group is as homogeneous as possible and to enable all students to follow the training path without difficulty. This will consist of 4 modules in the following preparatory disciplines: Mechanics, Electronics, and Mathematics.

1.7 Integrative Activities

1. INBOUND ORIENTATION

The first phase of inbound orientation is divided into two key moments:

- **Collective Team Building Session (4 hours):** Through initial ice-breaking and socialising activities, the goal is to foster mutual acquaintance among participants, establish relationships, and create a positive classroom climate. It will also convey the ITS vision, mission, and values, emphasizing the importance of the chosen path for their personal and professional futures.
- **Collective Role Orientation Session (3 hours):** Through testimonies from industry representatives, students will have the opportunity to delve into the exit skills they will acquire. They will learn about the product/service/market contexts in which companies operate and the specific corporate roles where they can apply the skills gained during the course.

2. **CERTIFICATIONS**

Students will have the opportunity to take exams to obtain 5 certifications:

- **CISCO ACADEMY IT ESSENTIALS: PC HARDWARE AND SOFTWARE (3 hours):** Students who achieve a grade of at least 25/30 in the ICT Informatics module (UF) will be admitted to the exam.
- **CISCO IoT CERTIFICATION (3 hours):** Students who achieve a grade of at least 25/30 in the ICT Informatics module (UF) will be admitted.
- **ADVANCED EXCEL CERTIFICATION (3 hours):** Students who achieve a grade of at least 27/30 in the Advanced Office module (UF) will be admitted.
- **3D CAD CERTIFICATION (3 hours):** Students who achieve a grade of at least 25/30 in the Mechanical Drawing and 3D CAD module (UF) will be admitted.
- **LEAN CERTIFICATION (3 hours):** Admission is granted to students who pass an entrance test created by the certifying body and achieve a grade of at least 25/30 in the Lean discipline module (UF).
- **ENGLISH CERTIFICATION:** Students who achieve a grade of at least 25/30 in the dedicated English module (UF) will be admitted to the Cambridge preparation course and certification exam (for the level assessed by the teaching staff).

3. **INCLUSION ORIENTATION**

Regarding inclusion, non-discrimination, and gender equality, two specific actions are planned:

- **Seminar on gender equality and non-discrimination (for STUDENTS):** 3 hours.
- **Conference on the culture of non-discrimination and equality in companies (for COMPANIES and Foundation FACULTY):** 4 hours.

4. **ENTREPRENEURSHIP ORIENTATION**

Based on the European "Key Competences for Lifelong Learning" framework, this activity focuses on the "sense of initiative and entrepreneurship." The goal is to make students aware of the skills and steps required to launch a new business idea, with specific reference to Research and Development (Start-up) projects.

5. **CV WRITING – SELECTION INTERVIEW & OUTBOUND ACCOMPANIMENT**

This seminar prepares students for professional CV drafting and effective interview management for corporate placement. An optional individual orientation meeting with an expert counselor is available upon request. This session supports students in matching their personal and professional profiles with current or potential job opportunities.

1.8 Assessment and Evaluation Framework

1. Grading and Scoring

At the general level, at the completion of **each Teaching Unit (TU),** assessment tests (exams) are administered. These evaluations result in a final **score graded on a 30/30 scale**.

2. Assessment Methodologies

Depending on the specific competencies to be verified and certified within the TU, various examination formats may be utilized:

- **Oral:** Focused on theoretical understanding and communication.
- **Written:** Focused on technical knowledge and problem-solving.
- **Practical:** Focused on "know-how" and laboratory-based application.

3. Instructor and Student Responsibilities

- **The Instructor** is responsible for defining the specific examination criteria and assessment tools.
- **The Students** are informed in advance regarding the format and methodology of the tests. Assessments may consist of **individual or group work** and may require the use of **IT support tools**.

4. Timing of Evaluations

Interim assessments for the training path are conducted and completed by the end of the classroom instruction phase.

5. Final Exam Preparation

The exam preparation path consists of 35 total hours focusing on:

- **3D CAD Drawing; Mechanics; English** (with dedicated practice for presenting final theses in English).
- **Exam Simulations**, covering both written and technical-practical tests.

6. Final Examination Procedures

The final assessment tests consist of the following:

- **a) Theoretical-Practical Test:** This involves the analysis and solution of a technical-scientific problem strictly related to the technological area and the specific scope of the training program.
- **b) Written Test:** Designed to evaluate the knowledge and ability to apply scientific principles and methods within the specific technological context of the program's national professional competencies.
  - The test consists of a **30-question multiple-choice questionnaire**.
  - Questions are divided into **5 sections** covering various thematic areas, both general and specific to the graduate profile.
- **c) Oral Test:** This focuses on the discussion of the **Project Work** developed during the internship, based on a specific theme defined by the host company.
  - Part of the thesis discussion is conducted in **English**.
  - The session is introduced by the **company tutor** who supervised the student, allowing the Examination Board to gain deeper insight into the internship experience.

1.9 Certification and Diploma

Upon successful completion of the exams, the **"Tecnico Superiore" (Higher Technician) Diploma (5° Level EQF)** is issued. In accordance with National Reference Frameworks, the diploma specifies:

- The reference area and scope.
- The professional figure and profile.

International Mobility

To facilitate the movement of students within national and EU borders, the diploma is accompanied by the **"EUROPASS Diploma Supplement"**, which provides detailed information regarding the curriculum and the results achieved.

1.10 HVET/University/Company cooperation model

The HUCO pathway is built upon a robust tripartite cooperation model that involves Higher Vocational Education and Training (HVET) institutions, Universities, and Industry partners in a continuous loop of value creation. The process begins with **Joint Design**, where all three entities collaborate to define learning outcomes and map them to both national standards and specific industrial needs. **HVET institutions** provide the pedagogical framework
and tutoring, while **Universities** contribute theoretical foundations and applied research methodologies, often hosting specialized training modules (such as AI or Research Methods). **Companies** play a critical role by delivering at least the 60% of the training through lectures, on-the-job activities, technical testimonies, real-world simulations, and providing access to industrial laboratories and company visits. This synergy culminates in an intensive **800-hour internship**, co-monitored by academic tutors and company mentors, ensuring that the skills acquired are directly applicable to Industry 5.0 challenges. Through this ecosystem, the model ensures the continuous validation of competencies and the seamless transition of students into high-demand "Innovation Enabler" roles

1.11 Teaching methodologies and learning materials

The **HUCO 5th-level EQF pathway** adopts a highly practical and student-centered pedagogical approach, designed to transform theoretical knowledge into operational "know-how". To achieve this, the curriculum limits traditional lectures, prioritizing active methodologies that foster the development of "Innovation Enablers". Central to this strategy is **Project-Based Learning (PBL)**, where students are assigned specific "missions"—such as redesigning components or optimizing production lines—to force the integration of technical skills like CAD and materials science. This is complemented by **Inquiry-Based Learning**, which encourages students to investigate technical gaps and research "state-of-the-art" solutions, directly supporting the *Applied Innovation Research* competence. Furthermore, **Case-Based Learning** is utilized to analyze real industrial failures or business cases, helping students develop *Systems Thinking* and critical evaluation skills. The pathway also emphasizes **Experiential Learning** and **Teaching from Practice**, particularly during the 800-hour internship and laboratory sessions, where students follow a "learning by doing" cycle to build operational autonomy and reflect on controlled mistakes. These methodologies are supported by intensive use of **Technical Laboratories** and **Workshops**, ensuring that students interact daily with high-tech tools like 3D printers, collaborative robots, and AI-assisted brainstorming software.
While every **EQF Level 5** pathway maintains a strong practical component, the distinctive innovation of this program lies in the intentional synchronization of technical and transversal development. Instructors are required to implement **active and practical methodologies**—such as industrial simulations, role-playing, and case-based learning—not only to deliver the module's core technical requirements but to simultaneously cultivate the specific **TRIComp** (Innovation Management, Quality & Process Management, Entrepreneurial Thinking, and Sustainability Thinking) associated with each unit.
The added value of the teaching materials produced during the **piloting phase** is, therefore, the strategic selection of tools that serve a dual purpose: ensuring technical mastery while fostering the high-level professional autonomy and mindset defined by the TRIComp framework. This integrated approach ensures that practical training is not just a technical exercise, but a comprehensive development of the student's professional profile.

1.12 The ITS Academy Cuccovillo Foundation: Training and Innovation for Industry

The **"A. Cuccovillo" ITS Academy** is a higher education institute specializing in the fields of Mechanics and Mechatronics. The Foundation functions as a true **"technological hub,"** bringing together schools, universities, training bodies, and a vast network of companies to co-design professional profiles that are in high demand in the market.

The Foundation's educational offering is structured around several two-year programs (**EQF Level 5**), covering the various pillars of modern industry: from advanced maintenance and the management of interconnected production lines to mechatronic design. Each program is characterized by:

- **Dual Education:** A strong integration of classroom learning and workplace experience.
- **Intensive Laboratory Use:** Hands-on training in high-tech environments.
- **Mandatory Internships:** Approximately **800 hours** spent within companies to facilitate direct job placement.

It is within this framework that the Foundation has designed this innovative curriculum, aiming to meet the challenges posed by the ITS reform. This program integrates advanced modules on the **ecological transition**, the **digitalization of processes**, and—specifically—**applied research (R&D)**, thereby consolidating the Foundation's role as a driver of technological development for the region.

5th Level Italian Pathway: First year Modules

Module 1 - BASIC ICT AND DIGITAL SECURITY

1. Module Identification	
Module Title	**BASIC ICT AND DIGITAL SECURITY**
Module Code	TU1
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	50 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundamental module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Use of computers, Office Automation, Internet, and email; Ability to follow instructions, solve simple problems, interpret data and technical texts; Basic knowledge of digital security and privacy; Ability to collaborate and organize documents.

3. General overview of learning objectives

- Understand the fundamental concepts of ICT, with reference to hardware, software, and networks.
- Use the main Office Automation tools effectively and productively.
- Recognize the main cybersecurity threats and related risks.
- Apply basic practices for protecting data and digital devices.
- Operate in digital environments in compliance with personal data protection regulations

Operational autonomy at EQF Level 5	Performs digital tasks independently, selects and adapts ICT tools, manages security, and collaborates responsibly in variable contexts.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	DIGITAL FUNDAMENTALS	DATA LITERACY	CYBERSECURITY & PRIVACY	DIGITAL APPLICATION DESIGN
LO1	Apply basic ICT knowledge for the use of hardware, software, and networks in operational contexts.	X			
LO2	Effectively use Office Automation tools for creating, managing, and sharing documents and data.		X		
LO3	Implement basic cybersecurity practices to protect data and digital devices.			X	
LO4	Adapt the use of digital tools to different operational and organizational contexts.				X
LO5	Support work and collaborative activities through the conscious use of digital technologies.		X		X
LO6	Apply personal data protection regulations in activities carried out in digital environments.			X	

LO7	Document digital activities performed and the measures taken for data security and management.		X	X	
LO8	Independently use ICT solutions appropriate for structured but changeable contexts.	X			

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS** and **Companies** and **Technology Suppliers**	***ITS Teacher (30 h):*** Theoretical foundations ***Company Teachers (20 h):*** Theoretical foundations; simulations based on real scenarios and case studies	***ITS:*** Tutoring during classroom training ***Company Teachers*:** Monitoring of classroom progress	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☐ Project-Based Learning
- ☐ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
ICT Laboratory	Turn on/configure PCs, use software, manage networks	**LO1, LO8**	DIGITAL FUNDAMENTALS
Digital Classroom	Create and share documents and spreadsheets	**LO2, LO4**	DATA LITERACY
Safety Simulation	Identify threats, apply antivirus, perform backups	**LO3, LO6**	CYBERSECURITY & PRIVACY
Collaborative Exercise	Work in teams, document activities, present results	**LO5, LO7**	DIGITAL APPLICATION DESIGN

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Theoretical test	**30%**	ITS Teacher; Company Teacher	Alignment with Learning Outcomes (LO)
Project / practical work	**35%**	ITS Teacher; Company Teacher	Alignment with Learning Outcomes (LO); Technical and practical quality; Documentation and reflection skills
Report / documentation	**25%**	ITS Teacher; Company Teacher	Alignment with Learning Outcomes (LO); Technical and practical quality; Documentation and reflection skills
Presentation / discussion	**10%**	ITS Teacher; Company Teacher	Alignment with Learning Outcomes (LO); Documentation and reflection skills

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
DIGITAL FUNDAMENTALS	Theoretical test; Practical laboratory activities	Knows how to turn on a PC, use a mouse/keyboard, and open standard software applications.	Selects and adapts specific hardware/software tools; manages network connections and configurations independently.	Optimizes system performance, troubleshoots complex hardware issues, and integrates emerging technologies.
DATA LITERACY	Project / practical work; Report / documentation	Creates, saves, and organizes files; performs simple data entry and basic searches.	Manages and organizes complex document structures and shared resources for team productivity.	Performs advanced data analysis, designs complex databases, and implements automated data workflows.
CYBERSECURITY & PRIVACY	Practical simulations; Report / documentation	Recognizes common threats (like phishing) and follows basic password protocols.	Identifies risks and actively applies protective measures (antivirus, backups, access management) and GDPR compliance.	Designs security protocols, conducts risk assessments, and manages incident response for an organization.
DIGITAL APPLICATION DESIGN	Collaborative exercises; Presentation / discussion	Uses digital tools as instructed to complete a task; follows a set collaborative workflow.	Configures and adapts tools for specific operational needs; documents activities and facilitates team collaboration.	Develops new digital solutions, customizes software via scripting/coding, and leads digital transformation projects.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher; Company Teacher
Practical Activities	35	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher; Company Teacher
–	**50**	–	
Self-Study	15	Autonomous	Technical tutor
Assessment / Exams	Included in module hours	ITS	ITS Teacher; Company Teacher
Total Hours x ECTS calculation:	**65**		
ECTS Credits Awarded:	**2,6**		

Module 2 – OCCUPATIONAL SAFETY

1. Module Identification	
Module Title	**OCCUPATIONAL SAFETY**
Module Code	TU2
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	20 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Foundational understanding of professional environments, basic communication skills to follow technical instructions, and an awareness of general civic responsibilities regarding health and safety protocols in a structured workplace.

3. General overview of learning objectives

- Describe the fundamental concepts of workplace safety.
- Illustrate the current legislation on workplace safety.
- Classify the different types of workplace injuries, analyzing their causes and consequences for both the worker and the organization.
- Explain the internal organization of workplace safety, including the roles involved and their specific responsibilities.
- Apply the basic principles of risk assessment, identifying the most appropriate prevention and protection measures in different contexts.
- Describe the ergonomic principles applicable to the workplace to support workers' well-being.
- Illustrate the principles of fire prevention and protection, including emergency management techniques and the correct use of fire-fighting equipment.

Operational autonomy at EQF Level 5	To be able to autonomously oversee safety protocols and manage risk prevention tasks, demonstrating the ability to adapt procedures to changing contexts and supervise technical compliance within their scope of work.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	INTERDISCIPLINARY COLLABORATION	QUALITY & PROCESS MANAGEMENT	SELF & TIME MANAGEMENT	SYSTEMS THINKING
LO1	**Risk management and safety:** ability to assess risks, apply regulations, and develop action plans.		X		X
LO2	**Collaboration and responsibility in safety:** ability to collaborate effectively with company personnel responsible for safety, respecting their roles and responsibilities.	X			X
LO3	**Ergonomics:** ability to adopt correct ergonomic postures and behaviors in the workplace.			X	

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LO4	**Emergency management:** ability to handle emergency situations and intervene promptly, using equipment correctly.	X	X		

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS** and **Companies** *Companies provide simulations based on real-world scenarios*	***ITS Teacher with experience in applying the subject matter in real work contexts (20 h):*** Theoretical foundations and practical applications	***ITS:*** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Simulated Workplace Assessment	Conduct a technical walkthrough of a workplace (real or simulated) to identify hazards and draft a preliminary action plan.	**LO1**	SYSTEMS THINKING
Safety Meeting Role-Play	Simulate a periodic safety meeting to resolve conflicts between production and safety.	**LO2**	INTERDISCIPLINARY COLLABORATION
Ergonomic Station Setup	Assess and configure a VDT workstation, correcting posture and lighting.	**LO3**	SELF & TIME MANAGEMENT
Emergency Response Drill	Execute first-response procedures and use of PPE/extinguishers under pressure.	**LO4**	QUALITY & PROCESS MANAGEMENT

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Theoretical test	30%	ITS Teacher (Safety Expert)	**Alignment with LO** (Core knowledge) & **Technical quality** (Safety standards/compliance).
Project / practical work	40%	ITS Teacher (Safety Expert)	**Technical and practical quality** (Execution) & **Alignment with LO** (Application of theory).
Report / documentation	15%	ITS Teacher (Safety Expert)	**Documentation and reflection skills** (Writing/Analysis) & **Alignment with LO** (Evidence of learning).
Presentation / discussion	15%	ITS Teacher (Safety Expert)	**Documentation and reflection skills** (Communication) & **Alignment with LO** (Critical understanding).

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
INTERDISCIPLINARY COLLABORATION	Role-play (Safety Meeting) & Final Discussion	Follows instructions from safety officers and reports obvious hazards to supervisors.	Negotiates and facilitates safety culture; interacts effectively with roles like RSPP/RLS to resolve technical conflicts.	Leads safety committees and designs cross-departmental safety training programs and communication strategies.
QUALITY & PROCESS MANAGEMENT	Theoretical Test & Emergency Response Drill	Recalls basic safety laws and knows where the emergency exits and fire extinguishers are.	Correctly applies legal standards and operational protocols with precision during simulated emergencies and drills.	Audits safety processes, implements ISO 45001 standards, and continuously improves organizational safety protocols.
SELF & TIME MANAGEMENT	Practical Station Setup & Observation	Maintains a tidy desk and takes breaks when told to avoid fatigue.	Independently organizes their own ergonomic workstation and manages response times effectively under pressure.	Models healthy work behaviors for others and designs ergonomic workflows for entire production lines.
SYSTEMS THINKING	Project (Risk Assessment) & Technical Report	Understands that an accident has a direct cause (e.g., "I slipped because the floor was wet").	Identifies causal links between hazards and organizational consequences; proposes integrated prevention plans.	Analyzes long-term trends in safety data to predict risks and develops holistic strategies for organizational resilience.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	10	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher (Safety Expert)
Practical Activities	10	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher (Safety Expert)
–	**20**	–	
Self-Study	6	Autonomous	Technical tutor
Assessment / Exams	Included in module hours	ITS	ITS Teacher (Safety Expert)

Total Hours x ECTS calculation:	**26**
ECTS Credits Awarded:	**1,04**

Module 3 – TECHNICAL ENGLISH

1. Module Identification	
Module Title	**TECHNICAL ENGLISH**
Module Code	TU3
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	60 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Learners should have a **B1 level of English (CEFR)**, enabling them to understand the main points of clear standard input and produce simple connected text on topics which are familiar or of personal interest.

3. General overview of learning objectives

- Understand and correctly use technical vocabulary in English related to components, materials, tools, and production processes.
- Read and interpret technical documentation in English (manuals, specifications, procedures).
- Write clear and accurate professional communications (emails, reports, brief instructions).
- Interact orally in international work settings, presenting projects, products, or technical solutions.
- Understand audio and video content in English related to processes, technologies, and technical presentations.

Operational autonomy at EQF Level 5	The learner will be able to **autonomously manage technical communication** in international contexts, interpreting complex documentation and selecting appropriate terminology to interact with foreign partners or clients without constant supervision.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	DIGITAL FUNDAMENTALS
LO1	Use technical vocabulary to describe products, components, and processes.		X		
LO2	Understand technical texts in English and extract operational information.		X		X
LO3	Write formal emails and short technical documents in English.		X		
LO4	Present a technical project orally in English using slides or diagrams.	X	X		
LO5	Actively participate in simulations of meetings, calls, and interactions with foreign counterparts.		X	X	
LO6	Listen to and understand videos, explanations, or conversations on technical topic		X		X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS** and **Companies** *Companies provide simulations based on real-world scenarios*	***ITS Teacher (60 h):*** Theoretical foundations and practical applications *Presence of industry experts during some hours of simulation*	***ITS:*** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
International Project Pitch	Present a product innovation project in English using visual aids.	**LO4**	CREATIVE PROBLEM-SOLVING
Mock Technical Meeting	Role-play a coordination meeting with foreign suppliers to solve a production delay.	**LO5**	INTERDISCIPLINARY COLLABORATION
Technical Documentation Lab	Draft a technical data sheet starting from a CAD model or prototype.	**LO1, LO3**	COMMUNICATION
Digital Research & Reporting	Extract specifications from English webinars or online whitepapers to solve a design issue.	**LO2, LO6**	DIGITAL FUNDAMENTALS

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Theoretical test	**20%**	ITS Teacher	Alignment with LO; Technical and practical quality
Project / practical work	**40%**	ITS Teacher/Company experts	Alignment with LO; Technical and practical quality
Report / documentation	**20%**	ITS Teacher	Documentation and reflection skills; Alignment with LO
Presentation / discussion	**20%**	ITS Teacher	Alignment with LO; Documentation and reflection skills

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Project Presentation	Describes a technical problem using simple terms (e.g., "it is broken").	Proposes and explains alternative solutions using nuanced technical vocabulary and persuasive language.	Leads brainstorming sessions in English to develop entirely new product concepts or system architectures.
COMMUNICATION	Writing & Speaking Tests	Understands the general meaning of a manual; writes simple, short emails with some errors.	Communicates accurately and fluently; uses professional etiquette (formal/informal tone) and specific technical terminology.	Negotiates complex contracts or delivers keynote speeches at international conferences with high rhetorical skill.
INTERDISCIPLINARY COLLABORATION	Mock Meeting Simulation	Understands instructions from a foreign colleague but struggles to contribute to the discussion.	Effectively interacts with different departments (Marketing, R&D, Production) in English to resolve coordination issues.	Acts as a bridge/mediator between international teams, managing cultural nuances and complex team dynamics in English.
DIGITAL FUNDAMENTALS	Digital Research Task	Uses basic online translators (like Google Translate) without checking for technical accuracy.	Critically uses AI translation aids, online technical repositories, and digital tools to solve specific design issues.	Curates digital knowledge bases in English and integrates advanced AI language models into the company's technical workflow.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	20	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher
Practical Activities	40	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher + Company experts
–	**60**	–	
Self-Study	18	Autonomous	Technical tutor
Assessment / Exams	Included in module hours	ITS	ITS Teacher
Total Hours x ECTS calculation:	**78**		
ECTS Credits Awarded:	**3,12**		

Module 4 – COMMUNICATION, TEAMWORKING AND PROBLEM-SOLVING

1. Module Identification	
Module Title	**COMMUNICATION, TEAMWORKING AND PROBLEM-SOLVING**
Module Code	TU4
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	40 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Learners should possess **basic social and civic competences**, including the ability to express personal opinions in a group setting, a fundamental understanding of digital communication tools, and a willingness to engage in collaborative activities.

3. General overview of learning objectives

- Communicate clearly, effectively, and professionally in technical and multidisciplinary work contexts.
- Actively collaborate in teams, contributing to the achievement of common goals.
- Approach and solve problems in a structured way, even in situations of uncertainty or pressure.
- Adapt communication style according to the context, audience, and channel (verbal, written, digital).
- Reflect on one's role in the group and on one's contribution to collective work dynamics.

Operational autonomy at EQF Level 5	The learner will be able to **autonomously manage interpersonal dynamics and project workflows**, taking responsibility for coordinating small teams and applying structured problem-solving methodologies to adapt to unexpected professional challenges.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	SELF & TIME MANAGEMENT
LO1	**Communication and interpersonal skills:** Present technical information clearly and persuasively, both orally and in writing; adapt to different communication styles, mediation, and interaction, including in multicultural environments. Participate constructively in discussions and brainstorming sessions, valuing collective work.		X	X	
LO2	**Team management and leadership skills:** Recognize and manage relational dynamics within a team (inclusion, leadership, role management).			X	X
LO3	**Analytical and operational skills:** Analyze complex problems and identify practical solutions through structured approaches; use digital tools for communication and collaborative activity management.	X			X

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS** and **Companies** *Companies provide simulations based on real-world scenarios*	***ITS language Teacher with technical background (40 h):*** Theoretical foundations and practical applications	***ITS:*** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☒ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice: Linked to the Learning Outcomes	Skills developed in practice: Mapped onto TRIComp
The "Innovation Challenge"	Work in a team to solve a technical/product flaw using brainstorming and lateral thinking techniques.	**LO3**	CREATIVE PROBLEM-SOLVING
Project Coordination Lab	Use digital tools (Trello/Slack/Asana) to plan a 40h project, assigning roles and managing deadlines.	**LO2, LO3**	SELF & TIME MANAGEMENT
Crisis Management Simulation	Handle a simulated workplace conflict between different departments, acting as a mediator.	**LO1, LO2**	INTERDISCIPLINARY COLLABORATION
Public Speaking Session	Present a technical solution to a "Board of Directors" (evaluators), adapting language for non-technical stakeholders.	**LO1**	COMMUNICATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Project / Practical Work (The Innovation Challenge)	**40%**	ITS Teacher	Technical and practical quality Alignment with Learning Outcomes (LO)
Presentation / Discussion (Pitch & Peer Assessment)	**30%**	ITS Teacher	Alignment with Learning Outcomes (LO) Technical and practical quality
Report / Documentation (Self-reflection Diary)	**15%**	ITS Teacher	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Project Coordination Lab (Use of Trello/Slack/Asana)	**15%**	ITS Teacher	Technical and practical quality Documentation and reflection skills

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Team Project & Pitch	Identifies a problem and suggests a standard, known solution.	Uses structured methods (brainstorming) to find practical solutions under pressure.	Generates non-obvious solutions, evaluates feasibility, and uses lateral thinking to innovate.
COMMUNICATION	Presentation & Role-play	Transmits technical information clearly using standard formats.	Adapts the message to be understood by different departments (Marketing vs. Tech).	Persuades stakeholders and masters multi-channel communication (verbal/digital) to drive results.
INTERDISCIPLINARY COLLABORATION	Peer Feedback & Observation	Works well with others and respects assigned roles.	Manages role conflicts and facilitates a shared team culture.	Fosters an inclusive environment, proactively values diversity, and masters mediation in crisis.
SELF & TIME MANAGEMENT	Project Documentation (Tools)	Completes assigned tasks within the given deadline.	Successfully meets project milestones using digital tools (Trello/Asana) and reflects on performance.	Optimizes team-wide workflows, manages high-level stress, and sets long-term strategic priorities.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	10	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher
Practical Activities	30	ITS	ITS Module Coordinator / Technical tutor / ITS Teacher
–	**40**	–	
Self-Study	12	Autonomous	Technical tutor
Assessment / Exams	Included in module hours	ITS	ITS Teacher
Total Hours x ECTS calculation:	**52**		
ECTS Credits Awarded:	**2,08**		

Module 5 – CREATIVITY, AI AND PROACTIVE MINDSET

1. Module Identification	
Module Title	**CREATIVITY, AI AND PROACTIVE MINDSET**
Module Code	TU5
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	30 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Learners should demonstrate **basic digital literacy**, a functional understanding of standard software, and an openness to non-conventional thinking. No prior knowledge of AI programming is required, but a **disposition for logical reasoning and curiosity** is essential.

3. General overview of learning objectives

- Stimulate and apply creative thinking to generate innovative solutions in product development processes.
- Understand the fundamental principles of artificial intelligence (AI) and its impact on industrial innovation.
- Use digital and AI tools to support brainstorming, design, and problem solving.
- Develop a proactive mindset oriented toward continuous improvement, experimentation, and active learning.
- Value failure as part of the creative process and as an opportunity for learning.

Operational autonomy at EQF Level 5	The learner will be able to **autonomously select and leverage AI tools** to optimize creative workflows and technical research, demonstrating a proactive approach in identifying product improvements and managing iterative design cycles with minimal guidance.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	APPLIED INNOVATION RESEARCH	INNOVATION MANAGEMENT	AI-LITERACY & APPLICATION
LO1	Actively participate in the process of generating innovative ideas and alternative solutions to design or technical problems.	X			
LO2	Apply structured creativity methods to concrete cases within one's sector.	X		X	
LO3	Interact with artificial intelligence tools (e.g., chatbots, content generators, predictive analytics tools) to explore new design possibilities, applying methods to protect confidentiality and intellectual property.				X
LO4	Adopt a proactive attitude at work, anticipating needs and proposing improvements.			X	
LO5	Reflect on one's creative process and develop autonomy in self-directed learning.		X		
LO6	Overcome fear of mistakes as a barrier to innovation.	X			

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1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint Design **ITS** and **DHBW** *Companies provide simulations based on real-world scenarios*	***DHBW Professor (20 h):*** Theoretical and applied basics ***(co-teaching with ITS professor)*** ***Company Teacher (10 h):*** Application of creative AI and industrial products for variant development; final feedback	***ITS:*** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Training implemented at ITS by DHBW*** ***Partners involved during the monitoring and evaluation phase***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☒ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
AI-Assisted Brainstorming	Use Generative AI to produce 10 concepts for a product feature, then filter them using technical constraints.	**LO1, LO3**	AI-LITERACY & APPLICATION
The "Fail Forward" Lab	Present a failed design iteration, analyze the root cause, and pivot to a new solution using creative techniques.	**LO6**	CREATIVE PROBLEM-SOLVING
Innovation Sprint	Apply "Design Thinking" to an industrial case study provided by the partner company.	**LO2, LO4**	INNOVATION MANAGEMENT
Self-Learning Journal	Map and document a 2-week "discovery journey" of a new digital tool or AI model.	**LO5**	APPLIED INNOVATION RESEARCH

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Innovation Sprint (Design Thinking Project)	**35%**	**DHBW Professor** & Company Partner	Technical and practical quality Alignment with Learning Outcomes (LO)
AI-Assisted Task Portfolio (Prompt Engineering & Concepts)	**30%**	**DHBW Professor** + ITS Professor	Technical and practical quality Alignment with Learning Outcomes (LO)
Self-Learning Journal (Lifelong Learning Discovery)	**20%**	**DHBW Professor** + ITS Professor	Documentation and reflection skills Alignment with Learning Outcomes (LO)
"Fail Forward" Presentation (Analysis of Iterative Failure)	**15%**	**DHBW Professor** + ITS Professor & Peers	Documentation and reflection skills Technical and practical quality

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	**Intermediate Level**	**Advanced Level (Expertise/Innovation)**
CREATIVE PROBLEM-SOLVING	Practical Design Project	Brainstorms standard ideas; follows linear paths; fears or hides technical mistakes.	Uses structured methods (like Design Thinking) to find practical solutions to sector-specific cases.	Generates non-obvious solutions; uses unconventional methods to bypass bottlenecks; treats failure as data.
APPLIED INNOVATION RESEARCH	Self-Learning Journal	Searches for info using basic engines; waits for directed reading lists.	Identifies relevant technical resources to stay updated on industry trends.	Autonomously identifies and tests new AI models and technical tools to fill specific design gaps.
INNOVATION MANAGEMENT	Innovation Sprint	Understands that design has stages but requires guidance to move through them.	Organizes creative steps effectively, moving from an abstract concept to a feasibility check.	Leads the entire innovation lifecycle, managing strategic implementation and cross-functional teams.
AI-LITERACY & APPLICATION	AI-Assisted Tasks	Uses simple chatbots for general info; ignores data privacy or bias issues.	Selects appropriate AI tools to optimize standard workflows and technical research.	Executes advanced prompt engineering; maintains strict IP protection and critically identifies AI bias.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	10	ITS	DHBW Professor / ITS Tutor
Practical Activities	20	ITS	DHBW Professor / ITS Tutor
–	**30**	–	
Self-Study	9	Autonomous	DHBW Professor
Assessment / Exams	Included in module hours	ITS	DHBW Professor / Company Teacher
Total Hours x ECTS calculation:	**39**		
ECTS Credits Awarded:	**1,56**		

Module 6 – TECHNICAL DRAWING & CAD MODELLING

1. Module Identification	
Module Title	**TECHNICAL DRAWING & CAD MODELLING**
Module Code	TU6
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	120 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Learners should have a **basic knowledge of plane and solid geometry**, familiarity with using a PC in a Windows/Cloud environment, and a fundamental understanding of **metric units**. Previous experience with manual sketching or basic technical drawing is an advantage but not mandatory.

3. General overview of learning objectives

- Use traditional measuring instruments for dimensional inspection of components according to technical drawings.
- Understand the fundamental principles of traditional technical drawing and the relevant standards.
- Read and create sketches and two-dimensional technical drawings using standardized representations.
- Use CAD software to produce 2D drawings and model components and assemblies in 3D, following the required technical specifications.
- Apply parametric modelling techniques for the design of products and prototypes.
- Create detailed production drawings and prepare technical documentation usable for manufacturing and quality control.
- Use CAD models as a design communication tool with the technical team.

Operational autonomy at EQF Level 5	The learner will be able to **autonomously translate conceptual ideas into standardized technical models**, managing parametric modifications and quality control of the documentation, while coordinating technical data exchange within a professional workgroup.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	INNOVATION MANAGEMENT
LO1	Prepare measurement reports to support quality control and the technical review process.				X
LO2	Read technical drawings and design specifications.		X		
LO3	Modify and update CAD models parametrically according to design requirements.	X		X	
LO4	Export models and drawings in appropriate formats for prototyping and production.			X	

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	INNOVATION MANAGEMENT
LO5	Collaborate with designers and technicians using digital tools for project sharing and review.		X		
LO6	Apply quality control procedures to the produced technical drawings.				X

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS** and **CMQ** ***Companies*** *provide simulations based on real-world scenarios*	***ITS Teacher (40 h):*** Theoretical and applied basics ***CMQ (30 h):*** Theoretical and applied basics ***(co-teaching with ITS professor)*** ***Company experts (50 h):*** Theoretical and practical foundations; support during the investigation phase; final feedback	***ITS:*** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Study visit to CMQ and training*** ***Partners involved during the monitoring and evaluation phase***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☒ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Reverse Engineering Lab	Measure a physical component using calipers/micrometers and recreate the 3D CAD model.	**LO1, LO3**	DIGITAL MODELLING & SIMULATION
Parametric Design Challenge	Modify an existing assembly model to meet new specifications (e.g., different material or size) without breaking constraints.	**LO3**	CREATIVE PROBLEM-SOLVING
Collaborative Design Review	Share a project via Cloud CAD (e.g., Onshape/Fusion 360), review a peer's work, and implement feedback.	**LO5**	INTERDISCIPLINARY COLLABORATION
Production Blueprinting	Create a complete 2D technical folder (BOM, tolerances, roughness) ready for the workshop.	**LO4, LO6**	INNOVATION MANAGEMENT

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Final CAD Project (Complete 3D Assembly)	**40%**	ITS Teacher / Company experts	Technical and practical quality Alignment with Learning Outcomes (LO)
Technical Portfolio (2D Blueprints & BOM)	**30%**	ITS Teacher / **CMQ Teachers**	Documentation and reflection skills Technical and practical quality
Practical Laboratory Test (Reverse Engineering)	**20%**	ITS Teacher / Company experts	Technical and practical quality Alignment with Learning Outcomes (LO)
Collaborative Design Review (Peer Feedback)	**10%**	ITS Teacher & Peer	Alignment with Learning Outcomes (LO) Documentation and reflection skills

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	**Intermediate Level**	**Advanced Level (Expertise/Innovation)**
CREATIVE PROBLEM-SOLVING	Parametric Challenge	Follows step-by-step tutorials to build simple parts; struggles when constraints conflict.	Modifies CAD models parametrically to meet new specs without breaking the assembly logic.	Optimizes complex assemblies for weight/strength using generative design or topological optimization.
INTERDISCIPLINARY COLLABORATION	Design Review Role-play	Understands technical symbols but needs help interpreting complex assembly drawings.	Effectively coordinates via Cloud CAD (Fusion 360/Onshape), implementing peer feedback into models.	Manages PLM (Product Lifecycle Management) workflows across engineering and manufacturing teams.
DIGITAL MODELLING & SIMULATION	Final CAD Project	Creates basic 3D shapes and 2D views with manual dimensions.	Autonomously translates concepts into standardized 3D models and production-ready technical folders.	Performs advanced FEM/CFD simulations on CAD models to predict real-world performance.
INNOVATION MANAGEMENT	Measurement Reports	Records measurements but lacks understanding of how they affect the final quality.	Applies quality control procedures and prepares reports (BOM, tolerances) to support the technical review.	Integrates Digital Twin strategies to manage continuous product improvement and quality loops.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	40	ITS	ITS Teacher
Practical Activities	80	ITS	ITS Teacher / Company experts / CMQ Teachers
–	**120**	–	
Self-Study	36	Autonomous	ITS Teacher
Assessment / Exams	Included in module hours	ITS	ITS Teacher / Company experts / CMQ Teachers
Total Hours x ECTS calculation:	**156**		
ECTS Credits Awarded:	**6,24**		

Module 7 – PRODUCT DEVELOPMENT AND ADVANCED DESIGN

1. Module Identification	
Module Title	**PRODUCT DEVELOPMENT AND ADVANCED DESIGN**
Module Code	TU7
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	20 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	The learner must have completed the Technical Drawing & CAD (TU6) and Creativity & AI (TU5) modules. Basic knowledge of design principles and the ability to work in small groups are required.

3. General overview of learning objectives

- Understand and apply the fundamental stages of the product development cycle, from concept to final validation.
- Collaborate effectively in multidisciplinary teams to support an integrated co-design process.
- Manage external suppliers within the context of collaborative design.
- Integrate feedback and requirements from different company functions and stakeholders during product development.
- Recognize methods and tools for concept validation, with attention to effectiveness and sustainability.
- Recognize the importance of a systemic and integrated approach in continuous product improvement.

Operational autonomy at EQF Level 5	The learner will be able to understand the specific phases of the product life cycle, knowing how to act as a link between different business functions (production, marketing, quality) and how to validate concepts through sustainability and technical feasibility criteria.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	INNOVATION MANAGEMENT	SUSTAINABLE SYSTEM DESIGN
LO1	Have a detailed understanding of the stages of the product development cycle, identifying objectives and deliverables for each phase.			X	
LO2	Actively participate in co-design sessions, facilitating the integration of diverse skills.	X	X		
LO3	Provide structured and detailed feedback to stakeholders.		X		
LO4	Recognize the appropriate tools for functional and technical product validation.			X	X
LO5	Collaborate proactively in multidisciplinary teams to ensure alignment between design, production, and market requirements.		X		X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS + SSMTP**	***Sunrise Valley Science and Technology Park (SSMTP) (20 h):*** Theoretical and applied basics; Design and implementation of practical context for WBL phases ***(co-teaching with ITS professor)***	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Training in house at ITS implemented by SSMTP*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Stage-Gate Workshop	Simulate the passage of a product through approval "gates," preparing the required deliverables.	**LO1**	INNOVATION MANAGEMENT
Co-Design Sprint	Intensive multi-stakeholder brainstorming session (designer, supplier, end-user).	**LO2, LO5**	INTERDISCIPLINARY COLLABORATION
Stakeholder Feedback Loop	Draft and present a critical report on a prototype intended for an external supplier.	**LO3**	INTERDISCIPLINARY COLLABORATION
Eco-Validation Lab	Analyze an existing product concept, suggesting modifications to improve its lifecycle (simplified LCA).	**LO4, LO5**	SUSTAINABLE SYSTEM DESIGN

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Stage-Gate Project Portfolio (Process Documentation)	**35%**	**SSMTP** Teacher + ITS Professor	Technical and practical quality Documentation and reflection skills
Co-Design Simulation (Multidisciplinary Sprint)	**30%**	**SSMTP** Teacher + ITS Professor & Peers	Alignment with Learning Outcomes (LO) Technical and practical quality
Technical Feedback Report (Stakeholder Communication)	**20%**	**SSMTP** Teacher + ITS Professor	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Eco-Validation Case Study (Sustainability Analysis)	**15%**	**SSMTP** Teacher + ITS Professor	Technical and practical quality Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Co-Design Workshop	Suggests minor aesthetic or functional changes to an existing product.	Participates in co-design, applying structured creativity to specific design technicalities.	Synthesizes diverse requirements (user needs, tech limits) to propose high-impact, validated concepts.
INTERDISCIPLINARY COLLABORATION	Role-play / Feedback	Follows instructions from senior designers and attends team meetings.	Provides structured feedback to stakeholders and manages interactions with external suppliers.	Facilitates the integration of marketing, production, and quality departments to ensure design alignment.
INNOVATION MANAGEMENT	Stage-Gate Documentation	Understands that a product has a lifecycle but lacks control over the phases.	Manages the Stage-Gate process, ensuring all deliverables for approval "gates" are complete and accurate.	Orchestrates complex innovation funnels and adapts the management strategy to high-risk projects.
SUSTAINABLE SYSTEM DESIGN	Eco-Validation Task	Identifies the materials used in a product and knows they should be "green."	Recognizes validation tools for sustainability and suggests improvements for the product lifecycle.	Performs simplified LCAs (Life Cycle Assessments) and redesigns systems to minimize environmental impact.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	5	ITS	SSMTP Teacher
Practical Activities	15	ITS	SSMTP Teacher & ITS Tutor
–	**20**	–	
Self-Study	6	Autonomous	SSMTP Teacher
Assessment / Exams	Included in module hours	ITS	
Total Hours x ECTS calculation:	**26**		
ECTS Credits Awarded:	**1,04**		

Module 8 – MATERIALS AND PRODUCTION TECHNOLOGIES - MRP

1. Module Identification	
Module Title	**MATERIALS AND PRODUCTION TECHNOLOGIES - MRP**
Module Code	TU8
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	60 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	A basic knowledge of **material physics and chemistry** is required, in addition to **mathematical skills** for requirements calculations. Familiarity with **spreadsheets (Excel)** is highly recommended for the **MRP (Material Requirements Planning)** portion of the course.

3. General overview of learning objectives

- Know the main types of materials used in the product development process and their fundamental properties.
- Understand the most common and innovative production technologies, with a particular focus on manufacturing processes.
- Know the materials, their characteristics, and the associated production technologies, taking into account design specifications and production constraints.
- Know the main methods for planning and controlling production activities, ensuring compliance with time, cost, and quality requirements.
- Apply the principles of Material Requirements Planning (MRP) for the efficient management of materials and production.

Operational autonomy at EQF Level 5	The learner will be able to **independently select the most suitable materials and production processes** for a specific component, setting up and managing **Material Requirements Planning (MRP)** systems while monitoring production flows in compliance with **quality and sustainability standards**.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	DIGITAL MODELLING & SIMULATION	QUALITY & PROCESS MANAGEMENT	SUSTAINABILITY THINKING
LO1	Assess the practical suitability of a material for the prescribed manufacturing processes and the expected performance.	X			X
LO2	Use basic MRP tools to plan material orders and monitor inventory in a production context.		X	X	
LO3	Collaborate in defining optimized production plans in terms of time and resources.			X	
LO4	Ensure that sustainability criteria in the procurement and management of materials are met and comply with requirements.				X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***University Professor (20 h):*** Theoretical and applied basics; ***Company experts (40 h):*** Theoretical and applied basics; support in the development of the plans; final feedback	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Materials Selection Lab	Compare different materials (e.g., aluminum vs. composite) for a component, justifying the technical and economic choice.	**LO1**	CREATIVE PROBLEM-SOLVING
MRP Simulation Workshop	Utilize management software (ERP/MRP) to calculate net requirements starting from a Bill of Materials (BOM).	**LO2**	DIGITAL MODELLING & SIMULATION
Production Line Optimization	Analyze a production process to reduce waste and downtime (Lean Thinking).	**LO1**	QUALITY & PROCESS MANAGEMENT
Green Procurement Audit	Evaluate suppliers based on environmental certifications and the carbon footprint of the selected materials.	**LO2**	SUSTAINABILITY THINKING

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
MRP Simulation Task (ERP Software Application)	**35%**	University Professor & Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Materials Selection Report (Technical Analysis)	**25%**	University Professor	Technical and practical quality Documentation and reflection skills
Production Planning Project (Lean Optimization)	**25%**	University Professor & Company Expert	Alignment with Learning Outcomes (LO) Technical and practical quality
Sustainability Audit (Green Procurement Case)	**15%**	Company Expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)

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TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Selection Report	Recognizes common materials (steel, plastic) and their most obvious uses.	Justifies technical and economic choices when comparing materials (e.g., Al vs. Composites) for specific functions.	Develops new material applications or hybrid manufacturing processes to solve extreme design challenges.
DIGITAL MODELLING & SIMULATION	MRP Practical Task	Can enter data into a spreadsheet or view a Bill of Materials (BOM).	Uses ERP/MRP software to calculate net requirements and plan material orders autonomously.	Customizes MRP algorithms or integrates Real-Time IoT data into the supply chain simulation.
QUALITY & PROCESS MANAGEMENT	Production Plan	Follows a production schedule and reports delays to a supervisor.	Optimizes production plans to reduce waste/downtime using Lean Thinking and monitors flows.	Designs entire Lean production systems and manages Total Quality Management (TQM) across the plant.
SUSTAINABILITY THINKING	Procurement Audit	Knows that some materials are more "eco-friendly" than others.	Evaluates suppliers based on environmental certifications and carbon footprint (Green Procurement).	Implements Circular Economy models where waste from one process becomes the raw material for another.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	20	ITS	University Professor
Practical Activities	40	ITS	Company Expert & ITS Tutor
–	**60**	–	
Self-Study	18	Autonomous	University Professor & Company Expert
Assessment / Exams	Included in module hours	ITS	University Professor & Company Expert
Total Hours x ECTS calculation:	**78**		
ECTS Credits Awarded:	**3,12**		

1. Module Identification	
Module Title	**INDUSTRIAL AUTOMATION**
Module Code	TU9
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	150 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Learners should have a solid foundation in **basic physics (electricity and mechanics)**, the ability to read simple technical drawings, and basic logical programming skills. Familiarity with PC operations and safety regulations in technical environments is required.

3. General overview of learning objectives

- Understand the operating principles and applications of mechanical components, fluid systems, and electrical and electronic systems in industrial automation.
- Integrate industrial automatic systems with particular attention to the interaction between mechanics, fluidics, electronics, and electrical systems.
- Use and program electronic control devices, microprocessors, and industrial drives for the automation of machines and processes.
- Interpret electrical, pneumatic, and hydraulic schematics and apply maintenance and diagnostic techniques.
- Collaborate within a multidisciplinary team to develop efficient and reliable automated solutions.
- Software rapid prototyping.

Operational autonomy at EQF Level 5	The learner will be able to **autonomously diagnose and resolve malfunctions** in automated systems, program industrial controllers to optimize specific processes, and coordinate the integration of fluidic, mechanical, and electronic subsystems within a production cell.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	INNOVATION MANAGEMENT
LO1	Identify and describe mechanical, fluidic, electrical, and electronic components in an automated system.				X
LO2	Read and interpret electrical, pneumatic, and hydraulic schematics.		X		
LO3	Integrate and configure industrial automation systems by combining mechanical, electrical, and electronic components.	X		X	
LO4	Program and manage electric drives and industrial control devices.			X	
LO5	Carry out diagnostic, maintenance, and repair operations on automated systems.	X			

N.	Learning Outcomes At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	INNOVATION MANAGEMENT
LO6	Automate and program test plans using specific software.			X	X
LO7	Collaborate effectively with technicians from different specializations to develop and optimize industrial systems.	X			

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***University Professor (50 h):*** Theoretical and applied basics; ***Company experts (100 h):*** Theoretical and applied basics; implementation of practical training methodologies	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice: Linked to the Learning Outcomes	Skills developed in practice: Mapped onto TRIComp
Mechatronics Integration Lab	Assemble a pneumatic actuator controlled by a PLC, including sensor wiring and software logic.	**LO1, LO3, LO4**	DIGITAL MODELLING & SIMULATION
Fault-Finding Simulation	Diagnose a "staged" failure in an automated line using multimeters, schematics, and PLC code.	**LO2, LO5**	CREATIVE PROBLEM-SOLVING
Multidisciplinary Sprint	Design a production cycle where mechanical constraints must meet electronic speed limits.	**LO7**	DIGITAL MODELLING & SIMULATION
Rapid Prototyping Workshop	Create a software simulation of a robot's movement to predict cycle times and prevent collisions.	**LO6**	CREATIVE PROBLEM-SOLVING

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Automation Capstone Project (System Integration)	**40%**	University Professor & Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Diagnostic & Troubleshooting Test (Live Simulation)	**25%**	University Professor & Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
PLC Programming & Simulation Portfolio	**20%**	Company Expert	Technical and practical quality Documentation and reflection skills
Maintenance & Test Plan Documentation	**15%**	Company Expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	**Intermediate Level**	**Advanced Level (Expertise/Innovation)**
CREATIVE PROBLEM-SOLVING	Diagnostic Exam	Fixes a machine by replacing parts until it works (Trial & Error).	Diagnoses failures using a structured method (schematics + PLC code) to identify root causes.	Anticipates failures through predictive analysis and redesigns control logic to prevent reoccurrence.
INTERDISCIPLINARY COLLABORATION	Team Lab Project	Identifies a component as "broken" and waits for a specialist to arrive.	Coordinates with specialized technicians (mechanical, electrical, fluidic) to optimize a shared production cell.	Manages the full integration of multi-domain systems, acting as the technical lead for automation projects.
DIGITAL MODELLING & SIMULATION	PLC/Software Task	Can open a PLC program and monitor simple I/O status (On/Off).	Programs industrial controllers and simulates robot movements to predict cycle times and avoid collisions.	Develops "Digital Twins" of entire production lines to optimize real-time throughput and energy efficiency.
INNOVATION MANAGEMENT	Maintenance & Test Plans	Performs maintenance only when a machine stops (Reactive).	Automates test plans and manages maintenance schedules to ensure system reliability and quality.	Implements Industry 4.0 strategies (AI-driven maintenance) to innovate the management of the shop floor.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	50	ITS (use of ITS Technological Labs)	University Professor
Practical Activities	100	ITS (use of ITS Technological Labs)	University Professor & Company Expert
–	**150**	–	
Self-Study	45	Autonomous	University Professor & Company Expert
Assessment / Exams	Included in module hours	ITS	University Professor & Company Expert
Total Hours x ECTS calculation:	**195**		
ECTS Credits Awarded:	**7,8**		

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ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

Module 10 – MECHANICAL MACHINING AND CNC

1. Module Identification	
Module Title	**MECHANICAL MACHINING AND CNC**
Module Code	TU10
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	80 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Technical drawing (TU6), Materials properties (TU8), and basic metrology. Ability to read ISO/GPS geometric and dimensional tolerances.

3. General overview of learning objectives

- Describe the main machining cycles and the related work programs, understanding their structure and purpose.
- Interpret and set the technological parameters of the process appropriately for the type of machining.
- Know and correctly use the workpiece-holding equipment to ensure precision and safety.
- Identify and manage the tool-setting systems, understanding the role of tool sheets.
- Navigate and effectively use the menus of the CNC system's user interface, organizing work programs correctly.
- Manage tools in chip-removal machining operations, maintaining operational efficiency and safety.
- Apply the basic principles of fire prevention and protection in the workplace, recognizing risk situations and emergency measures.

Operational autonomy at EQF Level 5	To be able to independently set up and manage a CNC station, selecting optimal tools and parameters; To be able to correct process deviations to ensure part quality and workplace safety.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	QUALITY & PROCESS MANAGEMENT
LO1	Plan and set up CNC machining cycles and programs in an effective and safe manner.				X
LO2	Adjust technological parameters based on material and machining characteristics to optimize the process.	X			X
LO3	Use and correctly install work-holding equipment to ensure stability and precision during machining.				X
LO4	Interpret tool sheets and select the appropriate tools for the required machining operations.	X			
LO5	Interact with the CNC user interface autonomously and accurately to manage work programs.				X
LO6	Carry out proper tool management and maintenance, preventing wear and failures.				X

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	QUALITY & PROCESS MANAGEMENT
LO7	Recognize fire hazards and adopt the necessary prevention and protection measures in the production environment.				X
LO8	Create CNC programs for machine tools, managing the machining phases.	X			
LO9	Perform CNC machine setup and maintenance operations safely and efficiently.			X	

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***University Professor (80 h):*** Theoretical and applied basics; ***Companies:*** support in developing teaching materials (simulations, case studies, role-playing) and participate in some simulation activities	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☒ Inquired-Based Learning
- ☐ Project-Based Learning
- ☐ Case-Based Learning
- ☒ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
CNC Setup Challenge	Set up the machine from scratch: vice mounting, tool zeroing, and program loading.	**LO1, LO3, LO5**	QUALITY & PROCESS MANAGEMENT
Process Optimization	Modify cutting parameters "on the fly" to eliminate vibrations or improve surface finish.	**LO2, LO9**	CREATIVE PROBLEM-SOLVING
The "Technical Dialog"	Explain setup choices to the workshop manager using tool sheets correctly.	**LO4**	COMMUNICATION
Safety Role-Play	Simulate a fire outbreak or mechanical failure, applying isolation and protection procedures.	**LO7, LO11**	INTERDISCIPLINARY COLLABORATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
CNC Setup Practical Exam (Machine zeroing & mounting)	**40%**	University Professor & Company Partner	Technical and practical quality Alignment with Learning Outcomes (LO)
Process Optimization Task (Live parameter adjustment)	**25%**	University Professor	Technical and practical quality Alignment with Learning Outcomes (LO)
Technical Briefing & SOPs (Standard Operating Procedures)	**20%**	University Professor	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Safety & Maintenance Role-Play (Emergency simulation)	**15%**	Company Partner	Alignment with Learning Outcomes (LO) Technical and practical quality

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Process Optimization Task (Live modification of cutting parameters)	Follows a pre-set program and stops the machine if anything sounds "wrong."	Modifies parameters "on the fly" to eliminate vibrations or improve surface finish based on observations.	Redesigns the entire machining strategy to reduce cycle time by 20% while maintaining tolerance.
COMMUNICATION	Technical Briefing & Setup Documentation	Uses basic terminology but needs help explaining technical errors.	Explains setup choices clearly to managers using tool sheets and technical documentation.	Drafts complex Standard Operating Procedures (SOPs) that guide the entire workshop team.
INTERDISCIPLINARY COLLABORATION	Collaborative Maintenance Simulation	Understands safety signs and stays within the designated work area.	Collaborates on maintenance and simulates emergency procedures (fire/failure) effectively.	Leads the safety committee, integrating production needs with strict HSE (Health, Safety, Environment) protocols.
QUALITY & PROCESS MANAGEMENT	Statistical Process Control (SPC) Lab	Measures parts after machining to see if they are "good" or "bad."	Sets up and manages a CNC station independently, correcting process deviations before they become waste.	Implements Real-time Statistical Process Control (SPC) to predict tool wear and prevent defects.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	30	ITS (use of ITS Technological Labs)	University Professor
Practical Activities	50	ITS (use of ITS Technological Labs)	University Professor & Company Partner
–	**80**	–	
Self-Study	24	Autonomous	University Professor
Assessment / Exams	Included in module hours	ITS	University Professor
Total Hours x ECTS calculation:	**104**		
ECTS Credits Awarded:	**4,16**		

1. Module Identification

Module Title	**AUTOMATED PRODUCTION SYSTEMS**
Module Code	TU11
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	60 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Industrial Automation (TU9). Basic logic programming and electrical schematic interpretation.

3. General overview of learning objectives

- Understand the operation and application of PLCs and communication networks in industrial automation.
- Program and configure PLCs for the control of automated production processes.
- Know the main types and functions of industrial robots and their applications in automated production.
- Collaborate in the design, implementation, and maintenance of integrated automated production systems.

Operational autonomy at EQF Level 5	The student will be able to autonomously configure a small-scale integrated production cell, ensuring data communication between robots and PLCs while maintaining system security and efficiency.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	DIGITAL FUNDAMENTALS	CYBERSECURITY & PRIVACY
LO1	Program PLCs to control operational sequences in automated production systems.		X	X	
LO2	Configure and integrate industrial communication networks to connect automated devices.			X	X
LO3	Program and operate industrial robots in specific production processes.		X	X	
LO4	Analyze and troubleshoot technical issues related to automated production systems.	X			X
LO5	Work in multidisciplinary teams to optimize automated production processes.	X			

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (60 h):*** develops both theoretical and practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase..***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☒ Study / Workshop
- ☒ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Robot-PLC Integration Lab	Synchronize a 6-axis robot with a conveyor belt controlled by a PLC via Profinet.	**LO1, LO2, LO3** Systems integration and real-time data handling.	DIGITAL FUNDAMENTALS
Virtual Commissioning	Use simulation software to test the robot path and PLC logic before physical deployment.	**LO1, LO3** Risk reduction through digital simulation.	DIGITAL MODELLING & SIMULATION
Network Security Audit	Configure a secure industrial gateway and set access permissions for remote maintenance.	**LO2, LO4** Protection of industrial assets from digital threats	CYBERSECURITY & PRIVACY
Multidisciplinary Sprint	Optimize a production cell as a team, balancing cycle time (robot) with safety logic (PLC).	**LO5** Collaborative optimization and technical negotiation.	INTERDISCIPLINARY COLLABORATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Integrated Cell Project (Robot-PLC Synchronisation)	**40%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Virtual Commissioning Report (Digital Simulation)	**25%**	Company expert	Documentation and reflection skills Technical and practical quality
Industrial Network Task (Profinet & Security Setup)	**20%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Collaborative Sprint (Cycle Time Optimization)	**15%**	Company expert & Peers	Alignment with Learning Outcomes (LO) reflection skills

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
INTERDISCIPLINARY COLLABORATION	Team Cell Optimization	Works within a single domain (e.g., only mechanical or only electrical).	Coordinates with others to ensure a robot doesn't hit a conveyor belt during a cycle.	Optimizes a production cell as a team, balancing technical trade-offs between robot speed and safety logic.
DIGITAL MODELLING & SIMULATION	Virtual Commissioning Report	Uses simulation to visualize a single part moving.	Performs Virtual Commissioning to verify PLC logic and robot paths before physical startup.	Creates a full "Digital Twin" to simulate entire production shifts and predict maintenance needs.
DIGITAL FUNDAMENTALS	Hardware Interfacing Task	Understands basic I/O (Inputs/Outputs) and simple wiring.	Synchronizes robots with PLCs via industrial protocols (Profinet/EtherCAT) and handles real-time data.	Configures complex edge-computing devices and manages data flow from the shop floor to the cloud.
CYBERSECURITY & PRIVACY	Secure Network Setup	Knows he should use a password for the PLC interface.	Configures secure gateways and manages access permissions for remote maintenance.	Implements "Defense in Depth" strategies to protect the entire industrial network from external threats.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	30	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	30	ITS (use of ITS Technological Labs)	Company expert / Technical tutor
–	**60**	–	
Self-Study	18	Autonomous	Company expert
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**78**		
ECTS Credits Awarded:	**3,12**		

Co-funded by the European Union

ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

Module 12 – APPLIED R&D – APPLIED RESEARCH METHODOLOGIES

1. Module Identification	
Module Title	**APPLIED R&D – APPLIED RESEARCH METHODOLOGIES**
Module Code	TU12
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	60 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Technical reporting basics and logical-analytical skills developed in previous modules (TU1-TU11).

3. General overview of learning objectives

- Understand the main approaches and methods used in industrial applied research.
- Design and implement effective test plans for product development.
- Apply quantitative and qualitative methods for data collection and analysis.
- Select and use appropriate tools and techniques to validate working hypotheses.
- Manage documentation and technical reporting to communicate research results.
- Collaborate in a structured and systematic way within multidisciplinary research projects.

Operational autonomy at EQF Level 5	The student will be able to autonomously design a test plan for a new component, execute the experimental phase, analyze the resulting data, and compile a technical report that supports industrial decision-making.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	APPLIED INNOVATION RESEARCH	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	INNOVATION MANAGEMENT
LO1	Define an applied research problem in a technical-industrial context and formulate operational hypotheses.	X			
LO2	Design effective tests, selecting the most appropriate methods and tools.	X			X
LO3	Collect data accurately using suitable techniques and instruments.				X
LO4	Analyze quantitative and qualitative data to validate or refute hypotheses.	X			
LO5	Critically interpret the results obtained, highlighting limitations and opportunities.	X			X
LO6	Prepare clear and detailed research reports, with supported data and conclusions.		X		
LO7	Participate in R&D teams using a methodical and collaborative approach.			X	

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***UPV Professor (20 h):*** Theoretical and applied basics; final feedback ***(co-teaching with ITS professor)*** ***Company expert (40 h):*** theoretical and practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Study visit at UPV (Spain)*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☒ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice: Linked to the Learning Outcomes	Skills developed in practice: Mapped onto TRIComp
Hypothesis Testing Lab	Set up a "Design of Experiments" (DoE) to find the optimal balance between cost and performance.	**LO1, LO2**	APPLIED INNOVATION RESEARCH
UPV Experimental Visit	Observe and document high-level research protocols in university labs.	**LO3, LO5**	INNOVATION MANAGEMENT
Technical Reporting Sprint	Draft a 5-page research summary including charts, data interpretation, and next steps.	**LO6**	COMMUNICATION
Peer-Review Seminar	Present research findings to a "scientific board" (peers and instructors) and handle questions.	**LO7**	INTERDISCIPLINARY COLLABORATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Applied Research Project (DoE & Test Execution)	40%	**UPV Professor** + ITS Professor	Technical and practical quality Alignment with Learning Outcomes (LO)
Final Technical Report (Data Synthesis & Charts)	30%	Company Expert	Documentation and reflection skills Technical and practical quality
Peer-Review Defense (Oral Presentation)	15%	Company Expert & Peers	Alignment with Learning Outcomes (LO) Documentation and reflection skills
UPV Lab Journal (Observation & Protocol Log)	15%	**UPV Professor** + ITS Professor	Documentation and reflection skills Alignment with Learning Outcomes (LO)

Co-funded by the European Union

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
APPLIED INNOVATION RESEARCH	Test Plan Design	Collects data using a pre-defined checklist; follows existing lab protocols.	Designs a test plan (DoE), selects appropriate tools, and validates working hypotheses.	Develops entirely new experimental frameworks to test products in extreme or unknown conditions.
COMMUNICATION	Final Report	Summarizes data in a simple table; describes what happened during a test.	Drafts detailed technical reports with charts and data synthesis that support industrial decision-making.	Publishes findings in industrial journals or presents "white papers" to high-level stakeholders.
INTERDISCIPLINARY COLLABORATION	Peer-Review Session	Works within the lab team; shares equipment and follows basic safety rules.	Handles a "Peer-Review" seminar, defending findings and managing technical questions from experts.	Leads multi-center research projects, coordinating between university labs (UPV) and factory R&D.
INNOVATION MANAGEMENT	Results Interpretation	Observes experiments and notes down results chronologically.	Critically interprets results, identifying limitations, opportunities, and the "Next Steps" for the product.	Manages the R&D budget and strategic "Go/No-Go" decisions based on experimental ROI.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	20	UPV facilities	UPV Professor
Practical Activities	40	ITS (use of ITS Technological Labs)	UPV Professor & Company Expert
–	**60**	–	
Self-Study	18	Autonomous	UPV Professor & Company Expert
Assessment / Exams	Included in module hours	ITS	UPV Professor & Company Expert
Total Hours x ECTS calculation:	**78**		
ECTS Credits Awarded:	**3,12**		

Module 13 – PROTOTYPING, 3D PRINTING AND TESTING

1. Module Identification	
Module Title	**PROTOTYPING, 3D PRINTING AND TESTING**
Module Code	TU13
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	90 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Technical Drawing & CAD (TU6), Applied R&D (TU12)

3. General overview of learning objectives

- Understand the role of rapid prototyping in innovation and product development processes.
- Create functional prototypes in short timeframes to test and validate design ideas.
- Apply additive technologies and digital tools following an iterative design-test-redesign process.
- Integrate prototyping into R&D processes to reduce time-to-market.
- Use rapid prototyping to improve communication and collaboration among multidisciplinary teams.

Operational autonomy at EQF Level 5	The student will be able to autonomously manage the transition from a 3D CAD model to a functional 3D-printed prototype, performing quality tests and proposing design iterations based on observed failures.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	INNOVATION MANAGEMENT
LO1	Produce functional or conceptual physical models to validate design solutions.	X			
LO2	Prepare digital files for 3D printing, optimizing key parameters (speed, quality, function).			X	
LO3	Integrate prototyping into iterative development processes.				X
LO4	Collect and interpret feedback to support design and technical decisions.		X		
LO5	Prepare concise technical documentation focused on prototype optimization and scalability.				X
LO6	Effectively communicate design choices in technical and multidisciplinary contexts.		X		
LO7	Automate and program test plans using specific software.	X		X	

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***University Professor (30 h):*** Theoretical and applied basics; final feedback ***Company expert (60 h):*** theoretical and practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☒ Experiential Learning
- ☒ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Rapid Iteration Lab	Print a component, test it for fit/function, identify a flaw, and re-print an improved version.	**LO1, LO3**	INNOVATION MANAGEMENT
Slicer Optimization	Configure advanced support structures and infill patterns to minimize material waste.	**LO2**	DIGITAL MODELLING & SIMULATION
Failure Mode Testing	Subject prototypes to stress tests and document the exact point and cause of failure.	**LO7**	CREATIVE PROBLEM-SOLVING
Multidisciplinary Review	Present the prototype to a mock "Sales & Production" team to gather feedback.	**LO4, LO6**	INTERDISCIPLINARY COLLABORATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Iterative Prototyping Project (Sprint)	**40%**	University professor & Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Mechanical Stress & Failure Report	**25%**	University professor	Technical and practical quality Documentation and reflection skills
Slicer & Print Optimization Portfolio	**20%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Mock Stakeholder Presentation	**15%**	Company expert & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Stress Test Analysis	Identifies that a part broke during a test but doesn't know how to fix the design.	Analyzes failure modes through stress tests and autonomously proposes design iterations to fix flaws.	Uses "Design for Additive Manufacturing" (DfAM) to create complex geometries impossible with traditional methods.
INTERDISCIPLINARY COLLABORATION	Stakeholder Feedback Session	Shows a 3D print to the team and says, "Here it is."	Collects and interprets feedback from sales and production to align the prototype with market needs.	Facilitates "Co-Design" sprints where the physical prototype acts as the central communication hub for the team.
DIGITAL MODELLING & SIMULATION	Slicer & Print Setup	Uses default slicer settings (Standard Quality) for every print.	Optimizes slicer parameters (infill, supports, layer height) to balance print speed, strength, and material waste.	Integrates advanced simulation (FEA) to predict where a 3D printed part will fail before hitting the "Print" button.
INNOVATION MANAGEMENT	Time-to-Market Evaluation	Understands that 3D printing is faster than traditional machining.	Integrates prototyping into an iterative cycle, managing "Time-to-Market" by producing functional models.	Implements "Rapid Tooling" strategies (printing molds/jigs) to innovate the entire production workflow.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	30	ITS (use of ITS Technological Labs)	University professor
Practical Activities	60	ITS (use of ITS Technological Labs)	University professor & Company expert
–	**90**	–	
Self-Study	27	Autonomous	University professor & Company expert
Assessment / Exams	Included in module hours	ITS	University professor & Company expert
Total Hours x ECTS calculation:	**117**		
ECTS Credits Awarded:	**4,68**		

Module 14 – DESIGN FOR MANUFACTURING & CONCURRENT ENGINEERING

1. Module Identification	
Module Title	**DESIGN FOR MANUFACTURING & CONCURRENT ENGINEERING**
Module Code	TU14
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	40 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Mechanical Machining (TU10), Automated Production Systems (TU11), Prototyping (TU13).

3. General overview of learning objectives

- Understand the fundamental principles of Design for Manufacturing (DfM) and Concurrent Engineering (CE).
- Apply design strategies focused on manufacturability, quality, and cost reduction.
- Analyze a project from a DfM perspective, identifying critical issues and opportunities in the concept phase.
- Work effectively in interdisciplinary teams throughout the product development cycle.
- Know methods and tools for the simultaneous management of design, production, and quality control phases.

Operational autonomy at EQF Level 5	The student will be able to review a product design and propose technical modifications that simplify production, reduce assembly time, and minimize material waste, acting as a liaison between the design office and the shop floor.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	QUALITY & PROCESS MANAGEMENT	SUSTAINABILITY THINKING
LO1	Analyze and improve the manufacturability of a project using a systemic approach.	X		X	
LO2	Actively participate in interdisciplinary teams.		X		
LO3	Prepare technical documentation consistent with production requirements.			X	
LO4	Apply quality concepts in industrial design.			X	X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (40 h):*** theoretical and practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Assembly Reduction Sprint	Analyze an assembly of 10+ parts and redesign it to use only 4 parts (Integrated Design).	**LO1**	CREATIVE PROBLEM-SOLVING
Concurrent Engineering Simulation	Work in a group where one student is "Production," one is "Quality," and one is "Design" to finalize a part.	**LO2**	INTERDISCIPLINARY COLLABORATION
Tolerance Stack-up Analysis	Prepare technical drawings where tolerances are optimized for the specific machine tools available.	**LO3, LO4**	QUALITY & PROCESS MANAGEMENT
Material Circularity Audit	Redesign a part to use a single type of recyclable material instead of a multi-material composite.	**LO4**	SUSTAINABILITY THINKING

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
DfM Redesign Challenge (Complexity Reduction)	**40%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Concurrent Engineering Simulation (Peer Lab)	**25%**	Company expert & Peers	Alignment with Learning Outcomes (LO) Documentation and reflection skills
Production Readiness Review (Technical Audit)	**20%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Sustainability & Circularity Brief	**15%**	Company expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Redesign Challenge	Fixes a design flaw but adds more parts or complexity to do so.	Reduces complexity by merging parts (e.g., 10 parts down to 4) without losing functionality.	Invents new assembly methods that eliminate the need for specialized tools or fasteners entirely.
INTERDISCIPLINARY COLLABORATION	CE Simulation	Understands the roles of other departments but only communicates after the design is finished.	Acts as a liaison between the design office and the shop floor, ensuring everyone provides input simultaneously.	Orchestrates the entire CE workflow, resolving technical conflicts between "Production" and "Marketing" early.
QUALITY & PROCESS MANAGEMENT	Production Readiness Review	Follows quality checklists and notes when a part is out of tolerance.	Performs Tolerance Stack-up Analysis to ensure parts fit together even with machine variations.	Develops "Fool-Proofing" (Poka-Yoke) design features that make incorrect assembly physically impossible.
SUSTAINABILITY THINKING	Life Cycle Brief	Chooses materials based on cost, checking if they are recyclable at the end.	Optimizes for circularity by redesigning multi-material parts into mono-material components for easy recycling.	Implements "Design for Disassembly," ensuring every gram of material can be recovered with minimal energy.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	25	ITS (use of ITS Technological Labs)	Company expert ITS tutor
–	**40**	–	
Self-Study	12	Autonomous	Company expert ITS tutor
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**52**		
ECTS Credits Awarded:	**2,08**		

Module 15 – VIRTUAL SIMULATION AND DIGITAL VALIDATION

1. Module Identification	
Module Title	**VIRTUAL SIMULATION AND DIGITAL VALIDATION**
Module Code	TU15
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	40 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Advanced CAD (TU6), Materials (TU8), DfM principles (TU14).

3. General overview of learning objectives

- Use digital tools to support design for manufacturability.
- Virtually simulate and validate components and production processes.
- Interpret simulation outputs to anticipate production and assembly issues.
- Integrate simulation data into design decision-making processes.
- Collaborate with technical teams using digital platforms (CAD, PLM).

Operational autonomy at EQF Level 5	The student will be able to perform a linear static analysis or a kinematic simulation of an assembly, identifying high-stress areas or interference issues, and documenting the necessary design changes before physical prototyping.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	INNOVATION MANAGEMENT	QUALITY & PROCESS MANAGEMENT
LO1	Use CAD software for functional modeling and preliminary checks.		X		
LO2	Perform basic simulations of assembly and mechanical behavior.		X		X
LO3	Identify and correct design issues using digital tools.		X		X
LO4	Produce technical reports to support design validation.			X	X
LO5	Use digital collaborative tools to share and document project data.	X			
LO6	Integrate simulation analyses into design review phases.	X		X	

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (40 h):*** theoretical and practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
FEA Stress Test Lab	Apply loads to a CAD part, perform meshing, and identify hotspots (Von Mises stress).	**LO2, LO3**	DIGITAL MODELLING & SIMULATION
Digital Assembly Check	Simulate the kinematic movement of a mechanism to find interferences/clashes.	**LO1, LO2**	QUALITY & PROCESS MANAGEMENT
PLM Collaboration	Manage version control and share simulation results via a shared digital platform.	**LO5**	INTERDISCIPLINARY COLLABORATION
Validation Report	Compare simulation data with theoretical safety factors to justify design choices.	**LO4, LO6**	INNOVATION MANAGEMENT

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
CAE Simulation Project (FEA & Motion)	**40%**	Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Digital Validation Report (Data justification)	**25%**	Company Expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Interference & Clash Analysis (Assembly check)	**20%**	Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Collaborative PLM Task (Version control)	**15%**	Company Expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
INTERDISCIPLINARY COLLABORATION	Cloud-based Design Review	Can run a simulation but doesn't know if the "mesh" is accurate.	Performs FEA and Kinematic simulations, identifying high-stress hotspots and interference.	Conducts non-linear or dynamic simulations and creates automated optimization loops.
DIGITAL MODELLING & SIMULATION	CAE Analysis Task	Uses a 3D viewer to check if parts look like they fit together.	Executes Clash and Interference Analysis in complex assemblies to ensure perfect fitment.	Implements "Six Sigma" virtual validation to predict quality yields based on tolerance spreads.
INNOVATION MANAGEMENT	Optimization Brief	Sends a static file via email for others to look at.	Manages version control and data sharing via PLM/Cloud platforms during design reviews.	Leads real-time collaborative "Virtual Design Reviews" with global teams using VR/AR tools.
QUALITY & PROCESS MANAGEMENT	Interference Analysis	Reports that a part failed the simulation.	Provides a Validation Report that justifies design changes with data, accelerating time-to-market.	Uses simulation data to pivot product strategy, suggesting new materials or geometries to beat competitors.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	25	ITS (use of ITS Technological Labs)	Company expert ITS tutor
–	**40**	–	
Self-Study	12	Autonomous	Company expert ITS tutor
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**52**		
ECTS Credits Awarded:	**2,08**		

Module 16 – ERGONOMIC SIMULATION AND HUMAN-CENTERED DESIGN

1. Module Identification	
Module Title	**DESIGN FOR MANUFACTURING & CONCURRENT ENGINEERING**
Module Code	TU16
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	40 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Digital Modelling (TU6), Virtual Simulation (TU15).

3. General overview of learning objectives

- Understand the basic principles of ergonomics and user-centered design in the context of product development.
- Use digital tools to simulate and evaluate human-product interaction.
- Test interfaces that meet functional, comfort, accessibility, and user safety requirements.
- Integrate ergonomic considerations into decision-making during the concept, design, and testing phases.
- Identify usability issues during testing and propose improvements.

Operational autonomy at EQF Level 5	The student will be able to set up a digital ergonomic simulation using anthropometric data, evaluate the biomechanical load or reachability of a workstation/product, and suggest design improvements based on human factor analysis.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	QUALITY & PROCESS MANAGEMENT
LO1	Analyze a product or interface considering ergonomic factors and user needs.	X			
LO2	Verify compliance with ergonomic principles in the design.				X
LO3	Use digital simulation tools to evaluate posture, visual field, reachability, and biomechanical load.			X	
LO4	Conduct basic usability tests or human-product interaction simulations.	X		X	
LO5	Collaborate with multidisciplinary teams in evaluating and improving the user experience.		X		
LO6	Prepare documentation and reports that integrate ergonomic data into design validation.				X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (40 h):*** theoretical and practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☒ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Digital Manikin Setup	Insert a 5th and 95th percentile digital manikin into a CAD cockpit to check visibility and reach.	**LO1, LO3**	DIGITAL MODELLING & SIMULATION
Biomechanical Load Lab	Simulate a lifting task and analyze spinal compression using NIOSH-style digital tools.	**LO2, LO3**	QUALITY & PROCESS MANAGEMENT
HCD Design Sprint	Redesign a tool handle based on user feedback to reduce localized pressure points.	**LO1, LO4**	CREATIVE PROBLEM-SOLVING
UX Design Review	Present ergonomic findings to "Production" and "Marketing" to balance comfort with costs.	**LO5, LO6**	INTERDISCIPLINARY COLLABORATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
DHM Simulation Project (Visibility & Reach Analysis)	**40%**	Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Ergonomic Audit Report (Standard Compliance)	**25%**	Company Expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Usability Design Sprint (Iterative Redesign)	**20%**	Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
UX Stakeholder Presentation (Cross-team Defense)	**15%**	Company Expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
DIGITAL MODELLING & SIMULATION	DHM Simulation Task	Navigates interfaces and visualizes components; performs standard operations following instructions.	Models technical systems and tests alternatives virtually; uses results to support technical decisions.	Optimizes iterative development by integrating advanced simulations to reduce real-world testing costs.
QUALITY & PROCESS MANAGEMENT	Ergonomic Audit	Applies basic standards and follows predefined checklists to monitor performance.	Aligns process efficiency with quality assurance; analyzes interferences and fosters improvement.	Designs complex quality frameworks and acts as a bridge between design and production.
CREATIVE PROBLEM-SOLVING	Interface Redesign	Identifies and defines simple practical problems in technical environments.	Applies structured methods (root cause/design thinking) to develop feasible, innovative solutions.	Leads iterative development in complex contexts, learning from failures to optimize final outcomes.
INTERDISCIPLINARY COLLABORATION	Multidisciplinary UX Workshop	Understands different expert perspectives and contributes to basic knowledge exchange.	Works effectively across disciplinary boundaries to co-develop solutions and manage exchange.	Leads complex problem-solving by integrating diverse perspectives and assuming shared ownership.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	25	ITS (use of ITS Technological Labs)	Company expert ITS tutor
–	**40**	–	
Self-Study	12	Autonomous	Company expert ITS tutor
Assessment / Exams	Included in module hours	ITS	Company expert

Total Hours x ECTS calculation:	**52**
ECTS Credits Awarded:	**2,08**

Module 17 – STATISTICAL METHODS AND PROCESS OPTIMIZATION

1. Module Identification	
Module Title	**STATISTICAL METHODS AND PROCESS OPTIMIZATION**
Module Code	TU17
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**1° - 2026/2027**
Module Contact hours	40 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Applied R&D (TU12), Mechanical Machining (TU10).

3. General overview of learning objectives

- Understand and apply the main statistical methods for the analysis and control of production and experimental processes.
- Use quantitative tools to interpret technical data and identify variations, trends, and anomalies.
- Apply statistical techniques for process optimization in testing contexts.
- Contribute to product and process improvements through a data-driven approach.
- Read and compile process reports and statistical charts in industrial contexts.

Operational autonomy at EQF Level 5	The student will be able to autonomously extract a dataset from a production line, calculate capability indices, and generate control charts to determine if a process is "in control" or requires intervention.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	APPLIED INNOVATION RESEARCH	QUALITY & PROCESS MANAGEMENT	SYSTEMS THINKING	DATA LITERACY
LO1	Collect, organize, and represent technical data in meaningful tables and charts.				X
LO2	Calculate basic statistical indices to describe a process.				X
LO3	Apply control charts to monitor the stability of a production process.		X		
LO4	Evaluate the capability of a production process based on specification limits.		X		
LO5	Use spreadsheets for statistical analysis and optimization.				X
LO6	Identify causes of variability and propose corrective actions for continuous improvement.	X	X	X	
LO7	Support technical decisions with data-driven reasoning.	X		X	

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***University professor (20 h):*** Theoretical and applied basics; ***Company expert (20 h):*** practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☒ Inquired-Based Learning
- ☐ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
SPC Workshop	Create an X-bar and R chart based on 50 measurement samples to detect "Special Cause" variation.	**LO3, LO5**	QUALITY & PROCESS MGT
Capability Audit	Compare machine tolerances with process spread to calculate C_{pk} and predict scrap rates.	**LO4**	DATA LITERACY
Root Cause Hackathon	Use Pareto charts and Ishikawa diagrams to trace a defect back to a specific process variable.	**LO6, LO7**	SYSTEMS THINKING
Experimental Optimization	Use a "Taguchi" approach or simplified DoE to find the most stable process settings.	**LO6, LO7**	APPLIED INNOVATION RESEARCH

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Statistical Process Control (SPC) Lab (Chart generation)	**40%**	University professor & Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Root Cause Hackathon (Ishikawa & Pareto analysis)	**25%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Data Literacy Portfolio (Capability & Dataset management)	**20%**	University professor	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Optimization Proposal (Technical justification)	**15%**	University professor	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
APPLIED INNOVATION RESEARCH	Optimization Proposal	Identifies and reports technical failures; contributes to specific test phases following set protocols.	Plans and guides testing phases; documents statistical results to justify technical choices and process stability.	Integrates research data to guide long-term strategy; uses complex DoE to optimize "time-to-market."
QUALITY & PROCESS MANAGEMENT	Control Chart Analysis	Applies basic standards and follows predefined checklists; monitors performance within standard parameters.	Aligns process efficiency with quality assurance; analyzes technical interferences (variability) and fosters improvement.	Designs complex quality frameworks and prevents process errors before they occur via predictive modeling.
SYSTEMS THINKING	Root Cause Analysis	Identifies simple cause-effect relationships in isolated technical tasks.	Analyzes technical systems by tracing defects to their roots; understands how variables interact within the production line.	Optimizes entire system lifecycles; manages complex interdependencies between design, production, and supply chain.
DATA LITERACY	Dataset Management	Collects and enters data into spreadsheets; creates basic charts following specific templates.	Organizes and interprets complex datasets; uses statistical indices to support technical decision-making.	Critically engages with big data and AI diagnostics; uses data to automate real-time production adjustments.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	University professor
Practical Activities	25	ITS (use of ITS Technological Labs)	University professor & Company expert
–	**40**	–	
Self-Study	12	Autonomous	University professor & Company expert
Assessment / Exams	Included in module hours	ITS	University professor & Company expert
Total Hours x ECTS calculation:	**52**		
ECTS Credits Awarded:	**2,08**		

INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 1

INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 1 "FROM DIGITAL DESIGN TO TESTED AND VALIDATED PROTOTYPE" (1 MONTH)	
Year / Semester	**1° - 2026/2027**
Hours	**160**

MODULE POSITIONING WITHIN THE TRAINING PROGRAM			
Role of the module within the ITS curriculum	☐ Foundational module	☐ Professionalizing module	☒ Integrative module

Objective: To transform an idea into a tangible product by optimizing its production, ergonomics, and durability.

Week	Main focus	Practical Activities
1. Physical Prototyping	3D printing and material testing.	Prototype creation, resistance/functionality testing, and corrective modifications.
2. Digital Validation	Structural and thermal analysis.	Analysis via software; optimization based on the cross-referencing of real and virtual data.
3. Design for Mfg (DFM)	Industrial optimization.	Design modifications to reduce costs and production time while simplifying assembly.
4. Advanced Testing	Refinement and alternative solutions.	Advanced DFM optimization and comparison of different design variants to maximize quality.

THE 3 PILLARS OF THE COURSE

- **Continuous Feedback Cycle:** Utilizing physical and virtual test results to constantly perfect the design.
- **Industrial Efficiency (DFM):** A rigorous focus on manufacturing feasibility to reduce costs without sacrificing quality.
- **Digital-Physical Integration:** The ability to validate performance in a digital environment before proceeding with new physical iterations.

Final Output: Creation of a validated physical prototype, optimized for industrial production and tested both virtually and physically.

Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☒ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	**Mapped onto TRIComp**
Rapid Prototyping Shop	Printing components with different infills/materials and performing mechanical load tests to find the point of failure.	Material selection and physical failure analysis.	APPLIED INNOVATION RESEARCH
CAE Simulation Suite	Running FEA (Finite Element Analysis) on the CAD model and comparing virtual stress maps with real-world physical cracks.	Correlation between virtual simulation and physical reality.	DIGITAL MODELLING & SIMULATION

DfM Workshop	Analyzing the prototype to identify "over-engineered" parts, reducing component count, and optimizing for injection molding.	Production cost reduction and assembly simplification.	QUALITY & PROCESS MANAGEMENT
Peer Validation Session	Presenting the validated prototype to "clients" (teachers/experts) and defending design choices based on test data.	Technical advocacy and evidence-based reporting.	COMMUNICATION

Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Final Validated Prototype (Project Output)	**40%**	Lab Committee (Uni + Company)	Technical and practical quality Alignment with Learning Outcomes (LO)
Iteration Diary & Testing Log	**25%**	Module Instructor	Documentation and reflection skills Alignment with Learning Outcomes (LO)
DfM & Industrial Optimization Report	**20%**	Company Partner	Technical and practical quality Alignment with Learning Outcomes (LO)
Technical Pitch & Peer Defense	**15%**	Instructor & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Excpeted Level (EQF 5)
APPLIED INNOVATION RESEARCH	Testing Log & Iteration Diary	Formulates a research question based on a prototype failure and uses experimental data to validate the corrective design change.	**Intermediate**
DIGITAL MODELLING & SIMULATION	Virtual vs. Physical Comparison	Uses CAD and FEA tools to simulate behavior and accurately identifies why the physical prototype differed from the digital model.	**Intermediate**
CREATIVE PROBLEM-SOLVING	Prototyping Hacks	Develops "out-of-the-box" physical solutions or assembly workarounds to overcome technical limitations encountered during the lab.	**Intermediate**
QUALITY & PROCESS MANAGEMENT	DfM Optimization Report	Successfully reduces manufacturing complexity (e.g., fewer parts, easier assembly) while maintaining or improving product performance.	**Intermediate**
CRITICAL & SYSTEMS THINKING	Root Cause Analysis (RCA)	Analyzes how a change in one component (e.g., material stiffness) affects the performance of the entire assembly (interdependencies).	**Intermediate**
COMMUNICATION	Technical Pitch & Documentation	Presents the final validated prototype using heatmaps, stress charts, and technical evidence to convince "stakeholders" of the product's readiness.	**Intermediate**

This integrative activity will be carried out entirely within the **FabLab (Fabrication Laboratory)** that the ITS is currently establishing.

The added value of this training environment:

- **Unfiltered Experimentation:** Unlike a traditional laboratory, the FabLab provides a "democratic rapid prototyping" environment. Students have immediate access to 3D printers, laser cutters, and CNC routers, significantly reducing the time between error detection and correction.

- **"Fail Fast" Culture:** The FabLab promotes the idea that a prototype's failure is not an error but a technical data point. This environment breaks down the psychological barrier toward making mistakes, thereby accelerating the learning process.

- **Cross-Fertilization:** As an open and shared space, it encourages the meeting of students from different backgrounds, stimulating the **Interdisciplinary Collaboration** required by TRIComp in a way that a traditional classroom cannot achieve.

- **Project Ownership:** The less formal FabLab atmosphere empowers students to take responsibility for material management and machine maintenance, bringing them closer to a *Shop Floor Manager* mindset.

Evaluation and Assessment (Non-ECTS Module)

Since this is an integrative module outside the standard credit-bearing curriculum, the evaluation focuses on **professional certification** and **technical validation**:

Type of activity	Weight (%)	Evaluators	Supervision
Final Validated Prototype	**40%**	**Lab Committee (University + Company)**	Assessment of the physical model's functionality and its alignment with industrial standards.
Iteration Diary & Testing Log	**25%**	**Module Instructor**	Evaluation of the "Inquiry" process: how the student used failures to drive design improvements.
DfM & Industrial Optimization Report	**20%**	**Company Partner**	Focus on manufacturing feasibility and cost-reduction logic.
Technical Pitch & Peer Defense	**15%**	**Instructor & Peers**	Communication skills and the ability to defend technical choices using data.

Who evaluates?

The evaluation is conducted by a **Joint Validation Board** consisting of the **FabLab Manager** (overseeing safety and machine autonomy), a **University Professor** (verifying scientific methodology), and a **Company Expert** (validating industrial readiness).

Certification: Upon successful completion, students will receive a **"Rapid Prototyping & Digital Validation Specialist" Open Badge** (or Certificate). This document officially recognizes their ability to manage a full product development cycle within a FabLab environment, providing a powerful addition to their professional portfolio.

Webinar Series: "European R&D Excellence in the HUCO Model"

*4 online modules oganized with the support of **BVMW** (German Federal Association of Small and Medium-Sized Businesses)*

These four online modules serve as a privileged window into the best European industrial practices. These are not traditional lecturers, but "Industrial Storytelling" sessions accompanied by a moderating teacher where leaders of European manufacturing explain how the Higher Technician has become the engine of incremental innovation. Digital rooms will help to get visual access to real labs and production environments.

Module 1: The organisational structure and process organisation mid-sized companies and the role of middle management technicians in the German "Mittelstand" (Automotive Sector)

- **Focus:** How German SMEs design their organisational structures and production process and integrate technicians into the early stages of product design, product implementation, production processes and quality assurance.
- **Testimonial:** A German "Hidden Champion" (e.g., an EV component supplier) will illustrate how technicians participate in the whole process of product development and application in the value-added processes of the company/factory combining theoretical and practical experience and knowledge.
- **Value for the Student:** Understanding that technical expertise, organisational and process understanding is a form of applied and strategic consultancy.

Module 2: Agile R&D and Rapid Prototyping in the Renewable Energy field

- **Focus:** Utilizing the "Fail Fast" methodology to accelerate the development of new components.
- **Testimonial:** A leading company in the wind/solar sector will demonstrate how their technicians use Rapid Prototyping to test design variants in record time, reducing development costs significantly.
- **Value for the Student:** Learning the importance of execution speed and the courage to fail quickly to innovate effectively.

Module 3: Quality and Statistical Optimization in Manufacturing

- **Focus:** The technician as a data analyst for sustainability and efficiency.
- **Testimonial:** A manufacturing entity will present how integrating statistical methods such as statistical process control (SPC), Design of Experiments (DoE), Six Sigma / DMAIC, Life Cycle Assessment (LCA) or Multivariate Statistics & Machine Learning.
- **Value for the Student:** Seeing the potential of statistics as a tool for technical improvement, effectiveness and efficiency as well as economic and environmental sustainability.

Module 4: Concurrent Engineering and Transnational Collaboration

- **Focus:** Managing R&D projects in multidisciplinary and multilingual teams.
- **Testimonial:** A case study of a company operating in European business and production networks will explain how technicians collaborate daily via shared PLM platforms, managing project versions that are modified simultaneously across different countries. The case study involves cultural differences which influence management approaches, use of technologies and understanding of project management philosophy, too.
- **Value for the Student:** Understanding the importance of digital standards, technical communication and cultural differences in an international context.

The modules are implemented in the first year in order to achieve the following objectives:

1. Professional Orientation in terms of where do I move and what role do I have: Students immediately realize that their profile (EQF 5) is highly demanded and respected throughout Europe.

2. Contextualizing Technical Modules: These webinars give a concrete purpose to what they study in TU 4 (Communication), TU10 (Machining), TU13 (Prototyping), and TU17 (Statistics).

3. International Networking: Thanks to the BVMW support, students get an idea of different cultures also with respect to the understanding of technology, company organisation and role of technicians. They begin to build a Global Mindset before their internships or study-abroad experiences.

5th Level Italian Pathway: Second year Modules

Co-funded by
the European Union

Module 18 – METROLOGY AND QUALITY CONTROL

1. Module Identification	
Module Title	**METROLOGY AND QUALITY CONTROL**
Module Code	TU18
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**2° - 2027/2028**
Module Contact hours	40 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Statistical Methods (TU17), Virtual Simulation (TU15), Technical Drawing/GD&T (TU6).

3. General overview of learning objectives

- Apply concepts of metrology and quality during product development and validation.
- Support the integration between CAD design and physical prototype verification.
- Analyze measurement data with a focus on continuous improvement and optimization.
- Collaborate in metrological validation processes and testing of new products.
- Critically interpret defects, deviations, and non-conformities for design iterations.

Operational autonomy at EQF Level 5	The student will be able to plan a dimensional testing strategy, use advanced measurement tools (CMM, 3D scanners), compare point clouds with the nominal CAD model, and draft a non-conformity report that suggests modifications to the process or design.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	APPLIED INNOVATION RESEARCH	COMMUNICATION	BENCHMARK & STANDARDS	QUALITY & PROCESS MANAGEMENT
LO1	Correlate actual measurement results with the technical project specifications.			X	X
LO2	Collaborate in tests and verifications on prototypes, supporting the technical validation phase.	X			
LO3	Prepare dimensional validation documentation with a critical approach.		X		X
LO4	Identify significant deviations and contribute to their functional analysis.	X			X
LO5	Facilitate communication between designers, technologists, and quality personnel.		X		

LO6	Integrate metrological data into product development feedback cycles.	X		X	

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (40 h):*** Theoretical and applied basics; practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Metrology Lab (3D Scanning)	Acquire the geometry of a 3D printed prototype and overlay it on the CAD to map thermal deformations.	**LO1, LO4**	QUALITY & PROCESS MGT
GD&T Audit	Verify complex geometric tolerances (flatness, cylindricity) on real mechanical parts.	**LO1, LO3**	BENCHMARK & STANDARDS
Design Feedback Loop	Draft a report explaining to the designer why a tolerance is too tight for current technology.	**LO5, LO6**	COMMUNICATION
Root Cause Validation	Design a measurement experiment to confirm if a design change resolved a non-conformity.	**LO2, LO4**	APPLIED INNOVATION RESEARCH

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Metrology Lab Project (3D Scan & CAD Comparison)	**40%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Non-Conformity & Functional Analysis Report	**25%**	Company expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)

GD&T Compliance Test (ISO/GPS Standards)	**20%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Interdisciplinary Feedback Presentation	**15%**	Company expert & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
APPLIED INNOVATION RESEARCH	Functional Deviation Analysis	Identifies and reports technical problems; contributes to testing phases following set protocols.	Plans and guides validation tests; documents metrological results to justify design iterations or process changes.	Integrates research data to guide long-term strategy; optimizes prototyping via advanced correlation studies.
COMMUNICATION	Validation Documentation	Expresses simple technical info; demonstrates active listening and follows established feedback protocols.	Collaborates across roles (Design/Prod) to transfer technical knowledge; manages digital data sharing for quality reviews.	Facilitates complex communication in multidisciplinary teams; ensures innovative ideas are accepted via data defense.
BENCHMARK & STANDARDS	Standard Compliance Test	Identifies basic safety and quality standards (ISO/UNI) applicable to the specific task.	Uses industrial benchmarks and GD&T standards (ISO/GPS) to guide and compare technical performance.	Evaluates complex benchmarks to drive innovation; ensures reliability in high-profile technical projects.
QUALITY & PROCESS MANAGEMENT	Loopback Integration	Applies basic standards and follows checklists; monitors performance within standard parameters.	Aligns process efficiency with quality; analyzes interferences (deviations) and fosters continuous improvement.	Designs complex quality frameworks; acts as a strategic bridge to prevent errors across the entire lifecycle.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	25	ITS (use of ITS Technological Labs)	Company expert / ITS Tutor
–	**40**	–	
Self-Study	12	Autonomous	Company expert
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**52**		
ECTS Credits Awarded:	**2,08**		

Module 19 – PLM AND TECHNICAL DOCUMENTATION

1. Module Identification	
Module Title	**PLM AND TECHNICAL DOCUMENTATION**
Module Code	TU19
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**2° - 2027/2028**
Module Contact hours	30 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Digital Modelling (TU6), Prototyping (TU13), DfM (TU14).

3. General overview of learning objectives

- Understand the role and main functionalities of Product Lifecycle Management (PLM).
- Use PLM systems to manage and share technical documentation collaboratively.
- Create and update bills of materials (BOM) and related technical documents.
- Prepare and manage technical documentation supporting design and production.
- Integrate information flow between the engineering office, production, and quality departments using digital tools.

Operational autonomy at EQF Level 5	The student will be able to manage the entire lifecycle of a technical document within a PLM environment, ensuring that the latest approved version of a drawing or BOM is accessible to production, while maintaining full traceability of changes.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	QUALITY & PROCESS MANAGEMENT
LO1	Navigate a PLM system and manage versions of CAD files and technical documents.			X	X
LO2	Create and update bills of materials (BOM) and link them to documentation.		X		X
LO3	Prepare technical sheets, work cycles, and basic reports.	X			X
LO4	Verify consistency between drawings, CAD models, and associated documentation.			X	X
LO5	Collaborate in the digital management of document processes and revisions.	X	X		

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (30 h):*** Theoretical and applied basics; practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
The Digital Vault	Check-in/Check-out of CAD files, managing assemblies and part numbering systems.	**LO1, LO4**	DIGITAL MODELLING & SIMULATION
BOM Structuring	Transform a CAD assembly into a multi-level Manufacturing BOM (MBOM).	**LO2**	QUALITY & PROCESS MGT
Revision Workflow	Simulate an Engineering Change Order (ECO) where multiple departments must approve a change.	**LO5**	INTERDISCIPLINARY COLLABORATION
Technical Datasheet	Generate automated technical reports from metadata stored in the PLM system.	**LO3**	COMMUNICATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
PLM Practical Simulation (Vault & Workflow)	**40%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
BOM & Technical Documentation Portfolio	**25%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Engineering Change Order (ECO) Case Study	**20%**	Company expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Data Integrity Audit (Consistency Check)	**15%**	Company expert & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
COMMUNICATION	Documentation Set	Expresses simple technical info; follows established feedback protocols and standard report templates.	Collaborates across roles to transfer technical knowledge; manages digital data sharing and automated reporting.	Facilitates complex communication in multidisciplinary teams; ensures data-driven ideas are accepted via technical defense.
INTERDISCIPLINARY COLLABORATION	Workflow Management	Understands different expert perspectives; contributes to basic knowledge exchange within the team.	Works effectively across disciplinary boundaries; manages digital workflows (ECO/ECR) and shared data platforms.	Leads complex problem-solving by integrating diverse perspectives; assumes shared ownership of lifecycle outcomes.
DIGITAL MODELLING & SIMULATION	Version Control Task	Navigates interfaces and visualizes components; performs standard operations (open/save) following instructions.	Models technical systems and manages their digital lifecycle; uses version control to support technical decisions.	Optimizes iterative development by integrating PLM with advanced simulations to reduce lifecycle costs.
QUALITY & PROCESS MANAGEMENT	BOM Consistency Check	Applies basic standards and follows predefined checklists; monitors document status within standard parameters.	Aligns process efficiency with quality assurance; analyzes document interferences and fosters continuous improvement.	Designs complex quality frameworks; acts as a bridge between design and production to optimize the entire system.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	15	ITS (use of ITS Technological Labs)	Company expert / ITS Tutor
–	**30**	–	
Self-Study	9	Autonomous	Company expert
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**39**		
ECTS Credits Awarded:	**1,56**		

Module 20 – PROJECT MANAGEMENT (WATERFALL AND AGILE)

1. Module Identification	
Module Title	**PROJECT MANAGEMENT (WATERFALL AND AGILE)**
Module Code	TU20
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**2° - 2027/2028**
Module Contact hours	40 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	None (Integrates with all concurrent 2nd-year technical modules).

3. General overview of learning objectives

- Understand the fundamental principles of traditional (Waterfall) and iterative (Agile) project management.
- Recognize and apply essential tools for planning, executing, and monitoring a technical project.
- Work effectively within a multidisciplinary team, adopting roles and tools specific to both approaches.
- Manage activities, resources, and timelines within a product development project.
- Monitor project progress and risks in relation to technical and time objectives.
- Enhance collaboration and communication among students through the use of digital collaborative platforms.

Operational autonomy at EQF Level 5	The student will be able to lead a small work package, breaking down a technical objective into tasks, estimating effort, and using a Kanban board or Gantt chart to report progress and escalate risks to stakeholders.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	COMMUNICATION	PROJECT LEADERSHIP	QUALITY & PROCESS MANAGEMENT	SELF & TIME MANAGEMENT
LO1	Create a simple WBS and represent a project with a Gantt chart.			X	X
LO2	Plan activities and resources according to deadlines and technical constraints.				X
LO3	Manage operational activities within an Agile workflow, collaborating with the team.		X		
LO4	Understand the roles of Agile teams and the associated ceremonies.	X	X		
LO5	Define and evaluate user stories.	X		X	
LO6	Monitor project progress using basic indicators (time, cost, quality, deviations).			X	X
LO7	Identify and communicate major risks or issues promptly.	X	X		
LO8	Use digital tools for monitoring and collaboration.				X
LO9	Actively participate in team meetings for updates, planning, and review.	X	X		

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (40 h):*** Theoretical and applied basics; practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☒ Experiential Learning
- ☒ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Project Launch (Waterfall)	Create a WBS for a new product launch, identifying the "Critical Path" on a Gantt chart.	**LO1, LO2**	SELF & TIME MGT
Sprint Simulation (Agile)	Manage a 2-week technical task using a Kanban board and Daily Scrums.	**LO3, LO4, LO9**	PROJECT LEADERSHIP
Risk Management Lab	Identify 5 technical risks in a prototype design and create a mitigation plan.	**LO6, LO7**	QUALITY & PROCESS MGT
User Story Mapping	Translate customer requirements into technical "User Stories" and estimate effort.	**LO5, LO8**	COMMUNICATION

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Project Planning Portfolio (WBS & Gantt)	**30%**	Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Agile Sprint Simulation (Kanban & Scrum)	**30%**	Company Expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Risk & Dashboard Audit (KPI Tracking)	**20%**	Company Expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Sprint Review & Stakeholder Pitch	**20%**	Company Expert & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5):

		The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
COMMUNICATION	Sprint Review Presentation	Expresses simple technical info; demonstrates active listening and follows established feedback protocols.	Collaborates across roles to transfer knowledge; manages digital data sharing and leads technical updates in meetings.	Facilitates complex communication in multidisciplinary teams; ensures innovative ideas are accepted via stakeholder defense.
PROJECT LEADERSHIP	Team Coordination	Follows assigned tasks and understands the basic roles within a project team.	Plans and coordinates small work packages; guides team members through technical phases and manages operational workflows.	Leads complex projects with shared ownership; integrates diverse perspectives to solve systemic project roadblocks.
QUALITY & PROCESS MANAGEMENT	Monitoring Dashboard	Applies basic standards and follows checklists; monitors personal task status within standard parameters.	Aligns process efficiency with quality; analyzes deviations in project timelines and fosters continuous improvement.	Designs complex quality frameworks; acts as a bridge between design and production to optimize the entire project lifecycle.
SELF & TIME MANAGEMENT	Individual Task Tracking	Organizes own tasks following a given schedule; identifies and reports basic personal time constraints.	Proactively manages own workload and resources; estimates effort accurately and adjusts priorities to meet technical deadlines.	Optimizes personal and team productivity through strategic time-boxing; balances multiple high-pressure project goals autonomously.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	25	ITS (use of ITS Technological Labs)	Company expert / ITS Tutor
–	**40**	–	
Self-Study	12	Autonomous	Company expert
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**52**		
ECTS Credits Awarded:	**2,08**		

Co-funded by the European Union

ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

1. Module Identification	
Module Title	**LEAN MANUFACTURING AND PROCESS SUSTAINABILITY**
Module Code	TU21
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**2° - 2027/2028**
Module Contact hours	30 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Statistical Methods (TU17), Project Management (TU20).

3. General overview of learning objectives

- Understand the fundamental principles of Lean Manufacturing and sustainable production.
- Identify the main forms of waste in production processes and propose improvement solutions.
- Apply basic Lean tools (such as 5S, VSM, Kaizen) to analyze and optimize processes.
- Evaluate the environmental, energy, and organizational impacts of processes with a sustainability perspective.
- Collaborate on continuous improvement projects in production and logistics.

Operational autonomy at EQF Level 5	The student will be able to perform a workplace audit, map a value stream to identify non-value-added activities, and lead a "Kaizen event" to improve a specific process step while reducing its environmental footprint.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	INTERDISCIPLINARY COLLABORATION	QUALITY & PROCESS MANAGEMENT	SUSTAINABILITY THINKING
LO1	Identify and classify waste within a production or logistics process.			X	
LO2	Apply 5S methodologies for efficient workplace organization.			X	
LO3	Create and interpret a simple VSM (Value Stream Map), identifying critical points in the production flow.			X	X
LO4	Propose solutions for continuous improvement following the Kaizen approach.	X			
LO5	Analyze production processes with a focus on efficiency and environmental sustainability.				X
LO6	Collaborate in collecting and interpreting data to monitor performance (KPIs).		X	X	
LO7	Participate in process improvement activities while considering objectives for reducing environmental impacts.	X			X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (30 h):*** Theoretical and applied basics; practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☒ Experiential Learning
- ☐ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	**Student tasks and activities** (concrete and observable examples)	**Skills developed in practice**	
		Linked to the Learning Outcomes	**Mapped onto TRIComp**
Value Stream Audit	Map the current state of a process, identifying bottlenecks and energy-intensive steps.	**LO1, LO3, LO5**	Sustainability Thinking
5S Implementation	Reorganize a laboratory/workshop tool area to reduce motion waste and improve safety.	**LO2**	Quality & Process Mgt
Kaizen Blitz	Brainstorm and implement a low-cost solution to speed up a setup change (SMED).	**LO4, LO7**	Creative Problem-Solving
KPI Dashboard	Set up a visual board tracking lead time, defect rate, and CO2 emissions per unit.	**LO6**	Interdisciplinary Collab.

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Value Stream Mapping (VSM) Project	**35%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Kaizen Blitz / Lean Game Simulation	**30%**	Company expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Sustainability & Waste Audit	**20%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
5S & KPI Visual Board	**15%**	Company expert & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5):

		The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
CREATIVE PROBLEM-SOLVING	Kaizen Proposal	Identifies and defines simple practical problems in technical environments.	Applies structured methods (root cause/Kaizen) to develop feasible, innovative solutions for process optimization.	Leads iterative development in complex contexts; learns from failures to optimize entire value streams.
INTERDISCIPLINARY COLLABORATION	Team Lean Game	Understands different expert perspectives; contributes to basic knowledge exchange within the team.	Works effectively across boundaries (Production/Logistics) to co-develop solutions and manage exchange.	Leads complex problem-solving by integrating diverse perspectives and assuming shared project ownership.
QUALITY & PROCESS MANAGEMENT	5S / VSM Audit	Applies basic standards and follows checklists; monitors performance within standard parameters.	Aligns process efficiency with quality; analyzes technical interferences (bottlenecks) and fosters improvement.	Designs complex quality frameworks; acts as a strategic bridge to optimize the system-wide lifecycle.
SUSTAINABILITY THINKING	Green Lean Analysis	Identifies basic environmental or social impacts of technical tasks and products.	Evaluates processes through a sustainability lens; proposes improvements that balance efficiency with eco-impact.	Integrates long-term sustainability into strategic technical decisions; advocates for systemic "Green Lean" changes.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	15	ITS (use of ITS Technological Labs)	Company expert / ITS Tutor
–	**30**	–	
Self-Study	9	Autonomous	Company expert
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**39**		
ECTS Credits Awarded:	**1,56**		

1. Module Identification	
Module Title	**GREEN TECHNOLOGIES AND CIRCULAR ECONOMY**
Module Code	TU22
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**2° - 2027/2028**
Module Contact hours	30 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	Materials Science (TU4), Lean Manufacturing (TU21).

3. General overview of learning objectives

- Understand the basic concepts of circular economy and ecological transition applied to production sectors.
- Recognize low-environmental-impact technologies and materials in product development processes.
- Integrate sustainability principles into design, material selection, and end-of-life phases of a product.
- Identify opportunities to reduce environmental impacts throughout the product lifecycle.
- Collaborate on projects focused on eco-innovation and valorization of waste.

Operational autonomy at EQF Level 5	The student will be able to perform a simplified environmental audit of a product, propose bio-based or recycled material alternatives, and design for disassembly (DfD) to ensure components can be recovered at the end of their lifecycle.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	INNOVATION MANAGEMENT	SUSTAINABILITY THINKING	SYSTEMS THINKING	SUSTAINABLE SYSTEM DESIGN
LO1	Analyze a product or process from a lifecycle and environmental impact perspective.		X	X	
LO2	Identify more sustainable alternatives for materials, treatments, and production phases.		X		X
LO3	Collaborate in selecting eco-friendly design solutions during product development.	X			X
LO4	Integrate sustainability criteria into technical datasheets or project proposals.			X	X
LO5	Collect and summarize environmental or circularity data for internal use or documentation.	X	X		
LO6	Participate in defining strategies for product end-of-life management (disassembly, recovery, reuse).			X	X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (30 h):*** Theoretical and applied basics; practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☒ Experiential Learning
- ☒ Teaching from / in practice
- ☒ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
LCA Workshop	Use simplified software tools to calculate the carbon footprint of a mechanical assembly.	**LO1, LO5**	SUSTAINABILITY THINKING
Material Substitute Challenge	Replace high-impact plastics or alloys with bio-polymers or recycled alternatives in a CAD model.	**LO2, LO3**	SUSTAINABLE SYSTEM DESIGN
Design for Disassembly (DfD)	Modify a product's joining methods (e.g., from glue to snap-fits) to reduce disassembly time.	**LO3, LO6**	SUSTAINABLE SYSTEM DESIGN
Circularity Audit	Evaluate a local company's waste stream and propose a "Industrial Symbiosis" solution.	**LO4, LO6**	SYSTEMS THINKING

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Eco-Redesign Project (DfD & Material Swap)	**40%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
LCA Impact Report (Carbon Footprint Analysis)	**25%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Circular Strategy Pitch (Market Opportunity)	**20%**	Company expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Disassembly Lab Portfolio (Physical Evidence)	**15%**	Company expert & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5):

		The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
INNOVATION MANAGEMENT	Strategic Pitch	Identifies technical problems; contributes to specific phases of structured innovation processes.	Plans and guides testing or applied research; documents results to justify technical choices and accelerate green development.	Integrates research data to guide strategy; optimizes time-to-market via critical feedback interpretation.
SUSTAINABILITY THINKING	Impact Analysis	Identifies basic environmental or social impacts of technical tasks and products.	Evaluates processes/products through a sustainability lens; proposes improvements balancing efficiency with eco-impact.	Integrates long-term sustainability into strategic decisions; advocates for systemic environmental changes.
SYSTEMS THINKING	Lifecycle Mapping	Identifies simple cause-effect relationships in isolated technical tasks.	Analyzes technical systems by tracing impacts across the lifecycle; understands how design choices affect end-of-life recovery.	Optimizes entire system lifecycles; manages complex interdependencies between design, production, and the environment.
SUSTAINABLE SYSTEM DESIGN	Prototyping for Recovery	Understands basic eco-design principles and follows standard green checklists.	Integrates sustainability criteria into design (DfD, Material Swap); creates technical solutions that facilitate circularity.	Leads the design of complex sustainable systems; validates long-term circular performance to reduce environmental costs.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	15	ITS (use of ITS Technological Labs)	Company expert / ITS Tutor
–	**30**	–	
Self-Study	9	Autonomous	Company expert
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**39**		
ECTS Credits Awarded:	**1,56**		

1. Module Identification

Module Title	**INDUSTRIAL ECONOMICS AND SUSTAINABLE INNOVATION**
Module Code	TU23
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**2° - 2027/2028**
Module Contact hours	30 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	None (Integrates with Project Management TU20 and Green Tech TU22).

3. General overview of learning objectives

- Understand the basic economic and organizational principles of an industrial enterprise.
- Understand the basic economic and organizational functioning of an industrial enterprise.
- Analyze the competitive and sectoral context in which manufacturing companies operate.
- Learn models and strategic levers for sustainable innovation in processes and products.
- Recognize the main costs, organizational structures, and production dynamics of an industrial company.
- Collaborate in the development of ideas and projects considering economic value and environmental impact.
- Understand the methods and KPIs (e.g., NPV, IRR) used to evaluate initiatives and investments.

Operational autonomy at EQF Level 5	The student will be able to perform a basic cost-benefit analysis for a technical innovation, evaluate the financial feasibility of an investment using standard KPIs, and present a business case that aligns with corporate sustainability goals.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	INNOVATION MANAGEMENT	QUALITY & PROCESS MANAGEMENT	ENTREPRENEURIAL THINKING	SUSTAINABILITY THINKING
LO1	Read and interpret the basic structure and functions of an industrial company.		X	X	
LO2	Recognize the main economic and organizational factors influencing the management of a technical project.			X	
LO3	Identify the main cost items and link them to business processes.		X	X	
LO4	Analyze a product or process in terms of economic value and sustainability.				X
LO5	Contribute to defining a project idea or proposal that considers technical, organizational, and economic constraints.	X		X	
LO6	Collaborate on an R&D project, understanding its industrial, commercial, and environmental impacts.	X			X

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS, University** and **Companies**	***Company expert (30 h):*** Theoretical and applied basics; practical training, integrating activities based on real-world cases.	**ITS:** Tutoring during classroom training	***Support during the co-design and validation phase*** ***Partners involved during the monitoring and evaluation phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☒ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	**Student tasks and activities** (concrete and observable examples)	**Skills developed in practice**	
		Linked to the Learning Outcomes	**Mapped onto TRIComp**
Investment Appraisal	Calculate the Net Present Value (NPV) and Payback period for replacing an old machine with an eco-efficient one.	**LO2, LO3**	ENTREPRENEURIAL THINKING
Business Case Pitch	Present a technical improvement proposal to a simulated "Board of Directors," justifying costs and benefits.	**LO5, LO6**	INNOVATION MANAGEMENT
Cost Center Analysis	Map the direct and indirect costs of a production line to identify "invisible" waste.	**LO1, LO3**	QUALITY & PROCESS MGT
Sustainability ROI	Evaluate the "Triple Bottom Line" (Profit, People, Planet) for a new circular product line.	**LO4, LO6**	SUSTAINABILITY THINKING

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Business Case & Investment Pitch	**40%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Financial KPI Practical Test (NPV/IRR/ROI)	**25%**	Company expert	Technical and practical quality Alignment with Learning Outcomes (LO)
Industrial Cost Mapping Project	**20%**	Company expert	Documentation and reflection skills Alignment with Learning Outcomes (LO)
Sustainable Value Report (Triple Bottom Line)	**15%**	Company expert & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence Expected Level (EQF 5): The expected TRIComp levels are considered achieved when the student demonstrates the ability to:		
		Basic Level (Foundational)	Intermediate Level	Advanced Level (Expertise/Innovation)
INNOVATION MANAGEMENT	R&D Proposal	Identifies technical problems; contributes to specific phases of structured innovation processes.	Plans and guides research phases; documents results to justify technical choices and accelerate development.	Integrates research data to guide strategy; optimizes time-to-market via critical feedback interpretation.
QUALITY & PROCESS MANAGEMENT	Process Cost Map	Applies basic standards and follows checklists; monitors performance within standard parameters.	Aligns process efficiency with quality; analyzes technical interferences (costs) and fosters improvement.	Designs complex quality frameworks; acts as a bridge between design and production to optimize the system.
ENTREPRENEURIAL THINKING	Financial KPI Test	Understands basic economic concepts (revenue, cost) and identifies simple market opportunities.	Evaluates the feasibility of technical projects using financial KPIs; manages resources to achieve economic value.	Leads the development of innovative business models; assumes calculated risks to drive systemic industrial growth.
SUSTAINABILITY THINKING	Sustainable Value Map	Identifies basic environmental or social impacts of technical tasks and products.	Evaluates processes through a sustainability lens; proposes solutions that balance profit with eco-social impact.	Integrates long-term sustainability into strategic decisions; advocates for systemic "Triple Bottom Line" changes.

Note: The expected level of competence at the end of the TU is highlighted in green

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ITS (use of ITS Technological Labs)	Company expert
Practical Activities	15	ITS (use of ITS Technological Labs)	Company expert / ITS Tutor
–	**30**	–	
Self-Study	9	Autonomous	Company expert
Assessment / Exams	Included in module hours	ITS	Company expert
Total Hours x ECTS calculation:	**39**		
ECTS Credits Awarded:	**1,56**		

INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 2

INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 2 "DESIGNING EFFICIENT, SAFE, AND SUSTAINABLE INDUSTRIAL PRODUCTS" (1 MONTH)	
Year / Semester	2° - 2027/2028
Hours	160

MODULE POSITIONING WITHIN THE TRAINING PROGRAM			
Role of the module within the ITS curriculum	☐ Foundational module	☐ Professionalizing module	☒ Integrative module

Objective: Transform an idea into a real product by optimizing its production, ergonomics, and durability.

Week	Main focus	Practical activity
1. CAD & Technical	3D Design and industrial optimization.	Creation of the CAD model and Design for Assembly (DfA) study.
2. Advanced Design	Functionality, ergonomics, and safety.	Design refinement and usability and performance testing.
3. Materials & Tech	Choice of materials and production processes (CNC, 3D Printing).	Cost/performance analysis and production simulation.
4. Sustainability	Circular economy, AI, and final presentation.	Use of AI for generative design and environmental impact analysis.

THE 3 PILLARS OF THE COURSE:

- **Productive Efficiency:** Designing not only for aesthetics but also to make production simple, economical, and safe.
- **Informed Choice:** Technical evaluation of materials (plastics, metals, composites) based on performance and environmental impact.
- **Green Innovation:** Integration of modern technologies (AI) and circular economy principles to minimize the product's impact over time.

Final Deliverable (Output): Presentation of a complete prototype accompanied by its technical documentation and a sustainability analysis.

Teaching Methodologies

- ☐ Lectures
- ☒ Technical Laboratory
- ☒ Inquired-Based Learning
- ☒ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

Description of Practical / Work-Based Learning Phases (if applicable)			
Practical Context	**Student tasks and activities** (concrete and observable examples)	**Skills developed in practice**	
		Linked to the Learning Outcomes	**Mapped onto TRIComp**
Product Engineering (Weeks 1-2)	Developing CAD models with DfA (Design for Assembly) constraints; conducting virtual stress tests and ergonomic simulations.	LO1, LO2 Technical precision, iterative design, and virtual validation.	**6. Digital Modelling** (Advanced), **1. Creative Prob. Solving** (Advanced)

Manufacturing Simulation (Week 3)	Selecting production processes (CNC vs 3D Printing) based on cost/performance analysis and material properties.	LO3 Industrial cost-awareness and process feasibility assessment	**11. Quality & Process Mgmt** (Intermediate), **12. Entr. Thinking** (Intermediate)
Innovation & Sustainability (Week 4)	Using Generative AI to optimize weight/material; performing Lifecycle Assessment (LCA) for the final prototype.	LO3 Data-driven innovation and environmental impact reduction	**20. AI Literacy** (Intermediate), **14. Sustainability Thinking** (Advanced)
Final Delivery	Presenting a technical dossier and a physical/digital prototype to a mock "industrial board."	LO1, LO2, LO3 Technical communication and professional synthesis.	**4. Communication** (Advanced)

Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Comprehensive Technical Dossier (CAD, DfA, LCA)	**35%**	Lab Committee (Uni + Company)	Technical and practical quality Alignment with Learning Outcomes (LO)
Optimized Prototype (Physical or High-Fidelity Digital)	**30%**	Company Partners	Technical and practical quality Alignment with Learning Outcomes (LO)
AI & Generative Design Portfolio	**20%**	Module Instructor	Documentation and reflection skills Alignment with Learning Outcomes (LO)
"Industrial Board" Final Pitch	**15%**	External Experts & Peers	Documentation and reflection skills Alignment with Learning Outcomes (LO)

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Excpeted Level (EQF 5)
1. Creative Problem-Solving	Prototype Review	Ability to iterate a design to solve ergonomic or safety flaws identified during testing.	**Advanced**
6. Digital Modelling & Simulation	Technical Dossier	Creation of a functional CAD model that integrates DfA principles and passes virtual stress tests.	**Advanced**
14. Sustainability Thinking	Environmental Analysis	Quantitative justification of material choices based on recyclability and energy footprint.	**Advanced**
20. AI-Literacy & Application	Technical Dossier	Successful use of AI tools (e.g., Generative Design) to optimize product geometry or performance.	**Intermediate**
2. Applied Innovation Research	Inquired-Based Tasks	Evidence of systematic experimentation to determine the best material-process combination.	**Intermediate**
4. Communication Competence	Final Presentation	Ability to explain complex technical decisions clearly to a non-specialist professional audience.	**Advanced**

This integrative activity will be carried out entirely within the **FabLab (Fabrication Laboratory)** that the ITS is currently establishing.

The added value of this training environment:

- **Democratization of Rapid Prototyping:** The FabLab breaks down the barriers between an idea and a physical object. Students have immediate access to technologies such as 3D printers, laser cutters, and CNC routers. This drastically shortens the "feedback loop": a CAD error is discovered, tested, and corrected on the same day, rather than weeks later.

- **"Fail Fast" Culture:** In an industrial context, a mistake is a cost; in a FabLab, a mistake is a **technical data point**. This psychologically safe environment encourages bold experimentation. Students learn that a prototype that doesn't work is a necessary stepping stone toward innovation.
- **Peer-to-Peer Learning & Cross-Fertilization:** A FabLab is, by nature, an open space. Students do not work in isolation but interact with colleagues, makers, and professionals, fostering the interdisciplinary collaboration required by the TRIComp framework that rarely emerges in a traditional lecture setting.
- **"Shop Floor Manager" Mindset:** Autonomously managing machines, handling maintenance, and optimizing material waste within the FabLab empowers the student. They are no longer just designers, but resource managers, acquiring a 360-degree vision of the production chain.

Who evaluates?

The evaluation is conducted by a **Joint Validation Board**:

1. **FabLab Manager:** Assesses autonomy in machine usage and compliance with safety protocols.
2. **University Professor:** Verifies the rigor of the scientific methodology and the accuracy of simulations.
3. **Company Expert:** Validates the "Industrial Readiness" of the project—determining how producible and marketable the product actually is.

Certification Issued: Upon successful completion, the student receives the **"Rapid Prototyping & Digital Validation Specialist" Open Badge**. This digital badge is metadata-rich: it contains links to the works produced and the validated TRIComp skills (Creative Problem Solving, Sustainability Thinking, AI-Literacy), making it a verifiable and valuable asset on LinkedIn and in recruiting processes.

Module 24 – CURRICULAR INTERNSHIP

1. Module Identification	
Module Title	**CURRICULAR INTERNSHIP**
Module Code	TU24
ITS Professional Profile	HIGHER TECHNICIAN IN PRODUCT INNOVATION AND DEVELOPMENT
Year / Semester	**2° - 2027/2028**
Practical hours	800 hours
EQF Level	EQF 5

2. Module positioning within the training pathway

Role of the module within the ITS curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module

Required entry competences

Area	Description of Competence
Technical Drafting & Design	Basic proficiency in 2D/3D CAD software (e.g., SolidWorks, AutoCAD) and the ability to read and interpret complex mechanical drawings.
Industrial Technologies	Foundational knowledge of manufacturing processes (subtractive/additive), materials science, and industrial automation components (sensors, actuators).
Digital Literacy	Ability to use standard office productivity tools and basic understanding of PLM (Product Lifecycle Management) concepts and data structure.
Regulatory Knowledge	Basic understanding of workplace safety (Italian Legislative Decree 81/08 or equivalent) and general industrial quality standards (ISO 9001).
Soft Skills	Ability to work in a group, basic time management, and the capacity to follow technical instructions from a supervisor.
Analytical Skills	Basic knowledge of physics and mathematics applied to mechanics and the ability to perform simple data collection/tabulation.

3. General overview of learning objectives

The 800-hour curricular internship serves as a core **work-based learning** pillar of the 5th-level industrial technology program. Designed as a rigorous professionalizing experience, it allows students to bridge the gap between classroom theory and industrial practice. Through this **work-based learning** model, students cultivate the technical-operational expertise and professional mindset essential for high-level roles in advanced manufacturing, product development, quality control, and industrial automation.

- Integrate classroom and laboratory learning with real industrial practices.
- Provide hands-on experience in R&D environments, production, quality, automation.
- Reinforce technical competencies such as CAD modelling, prototyping, metrology, and process optimization.
- Develop problem-solving abilities through participation in continuous improvement and innovation projects.
- Enhance teamwork, communication, and professional autonomy.
- Promote safety awareness and adherence to company procedures.
- Foster a sustainable approach to industrial processes through green and circular economy principles.

Operational autonomy at EQF Level 5	Upon completion of the module, the student demonstrates a professional profile characterized by: **1. Autonomous Management of Technical Workflows** The student independently organizes and executes complex tasks related to product development, such as CAD modelling, simulation, and quality testing. They are capable of selecting the appropriate methodologies and tools without constant instruction, ensuring that outputs meet both company standards and project requirements. **TRICOMP Focus:** *Self & Time Management (13)* and *Digital Modelling & Simulation (6)*. **2. Proactive Problem-Solving in R&D Contexts**

In the face of unpredictable technical challenges (e.g., prototype failure or data anomalies), the student identifies root causes and proposes innovative solutions. Instead of merely reporting a problem, they present evaluated alternatives, demonstrating an "innovation-driven" mindset.
TRICOMP Focus: *Creative Problem-Solving (1)* and *Applied Innovation Research (2)*.

3. Responsibility for Process Improvement & Sustainability
The student takes ownership of the quality and environmental impact of their work. They proactively suggest optimizations for "Lean" manufacturing or material efficiency, reflecting a systemic understanding of how technical choices influence the broader industrial and ecological system.
TRICOMP Focus: *Quality & Process Management (11)* and *Sustainability Thinking (14)*.

4. Integrative Collaborative Leadership
The student acts as a bridge between different functional areas (e.g., Design, Production, and Quality). They demonstrate the autonomy to lead small sub-tasks within a multidisciplinary team, facilitating communication and ensuring knowledge transfer across the project lifecycle.
TRICOMP Focus: *Communication Competence (4)* and *Interdisciplinary Collaboration (5)*.

From (Entry Level)	To (Exit Level - EQF 5)
Executing instructions.	**Managing** tasks and small projects.
Reporting problems.	**Solving** problems and proposing innovations.
Applying known tools.	**Optimizing** tools and workflows.
Individual technical focus.	**Systemic** and collaborative focus.

4. Specific learning Outcomes (EQF5 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	Primary TRICOMP Competence	Secondary TRICOMP Competence
LO1	Perform measurements, inspections, and quality controls using appropriate instruments and standards.	**Quality & Process Management**	**Benchmark & Standards**
LO2	Support technical documentation and PLM data creation and review processes.	**Communication Competence**	**Data Literacy**
LO3	Use CAD tools and simulation environments for drafting, validation, or analysis.	**Digital Modelling & Simulation**	**Digital Fundamentals**
LO4	Contribute to prototyping and testing activities within the industrial environment.	**Applied Innovation Research**	**Creative Problem-Solving**
LO5	Collaborate in automation, robotics, and troubleshooting of production systems.	**Creative Problem-Solving**	**Cloud-Based Manufacturing**
LO6	Apply Lean Manufacturing and process improvement methodologies.	**Quality & Process Management**	**Entrepreneurial Thinking**
LO7	Analyze data using statistical techniques to support industrial decision-making.	**Data Literacy**	**Responsible Research**
LO8	Participate in R&D and innovation projects using concurrent engineering principles.	**Innovation Management**	**Applied Innovation Research**
LO9	Integrate sustainability and circular economy concepts into technical tasks.	**Sustainability Thinking**	**Sustainable System Design**
LO10	Work in multidisciplinary teams and communicate technical information clearly.	**Interdisciplinary Collaboration**	**Communication Competence**
LO11	Manage tasks independently, demonstrating initiative and time-management.	**Self & Time Management**	**Project Leadership**
LO12	Apply safety regulations and correct operational behaviors in the workplace.	**Benchmark & Standards**	**Cybersecurity & Privacy**
LO13	Demonstrate a proactive and problem-solving attitude in the workplace.	**Creative Problem-Solving**	**Entrepreneurial Thinking**

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Implementation & Mentoring	3. Monitoring & Feedback	4. Cooperation inside HUCO
ITS & University: - Define Learning Outcomes (LOs) aligned with EQF 5; - Map technical tasks to the TRIComp framework; - Ensure academic validation of the work plan. ***Company:*** - Provide detailed Job Descriptions; identify specific industrial challenges; assign a dedicated **Company Mentor.**	***Company:*** - Host the student; - Provide access to i - ndustrial tools; - Integrate the student into R&D or Production teams. ***ITS & University:*** - Provide ITS and Academic Tutor for continuous scientific support; - Deliver "just-in-time" theoretical modules if specific technical gaps emerge.	***ITS:*** - Tripartite evaluation: student performance, company satisfaction, academic coherence. - Review of skills acquired vs. intended learning outcomes. - Update the partnership and internship model based on feedback for the next cycle.	The HUCO Ecosystem provides the digital infrastructure and the network of trust (MoUs) necessary to validate hours and competencies acquired abroad, ensuring that a project developed in a German or Spanish industrial lab is fully recognized within the Italian ITS curriculum. ***Joint Board for Final Validation*** ***Evaluate the Final exam;*** ***Certify the achievement of professional skills***

The **HUCO Ecosystem** elevates the standard internship by offering **Research-Project Internships (RPI)**. This model allows for a unique collaboration:

Cross-Border Research Projects

- **The Concept:** Instead of traditional tasks, the internship is built around a specific **Industrial Research Question**.
- **International Mobility:** Through the HUCO network, students will perform their internship in **partner companies in other countries**. This fosters the *Interdisciplinary Collaboration* and *Global Mindset* essential for an EQF 5 Higher Technician.
- **Virtual & Physical Hybridization:** Students can work on a project hosted by a foreign company while being mentored by a University professor in Italy and a local technician abroad, using cloud-based PLM and digital twin technologies.

Value for the Student

1. **Applied Innovation Research:** Direct involvement in European or international R&D pipelines.
2. **Cultural Agility:** Exposure to different industrial standards (ISO, DIN, ANSI) and work cultures.
3. **Advanced Certification:** Recognition of an "International Research-Based Internship" within their professional portfolio.

5. Teaching Methodologies

☐ Lectures	☒ Experiential Learning
☒ Technical Laboratory	☒ Teaching from / in practice
☒ Inquired-Based Learning	☒ Study / Workshop
☒ Project-Based Learning	☒ Study visit / mobility experiences abroad
☒ Case-Based Learning	☒ Other (specify) **Mentoring & Job Shadowing**

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Technical Design & Documentation	Using CAD software to modify industrial drawings; updating PLM databases; drafting technical manuals for new prototypes.	**LO2, LO3** Digital precision, technical reporting, and systematic data organization.	**Digital Modelling & Simulation** (6); **Digital Fundamentals** (17)
Quality Control & Metrology	Performing dimensional checks on mechanical parts; using calipers and micrometers; recording data for statistical quality reports.	**LO1, LO7, LO12** Mastery of measurement tools, adherence to industry standards, and data accuracy.	**Benchmark & Standards** (7); **Data Literacy** (18)
Production & Innovation Lab	Troubleshooting automated PLC-controlled lines; participating in "Kaizen" events for Lean optimization; assembling test prototypes.	**LO4, LO5, LO6, LO8, LO13** Technical problem-solving, collaborative R&D, and industrial agility.	**Creative Problem-Solving** (1); **Quality & Process Mgmt** (11)
Sustainable Operations	Monitoring energy consumption of machinery; assisting in waste reduction programs; evaluating material recyclability in product design.	**LO9** Lifecycle awareness and environmental responsibility in a manufacturing setting.	**Sustainability Thinking** (14)
Project & Team Integration	Attending daily "Stand-up" meetings; managing personal project deadlines; presenting technical results to the supervisor.	**LO10, LO11** Autonomy, professional ethics, and cross-functional communication.	**Communication Competence** (4); **Self & Time Mgmt** (13); **Entrepreneurial Thinking** (12)

Implementation Note for the 800-Hour Pathway

At **EQF Level 5**, these phases should not be purely observational. The student should transition from **shadowing** (first 100 hours) to **assisted execution** (next 300 hours), and finally to **supervised autonomy** (final 400 hours) to fully consolidate the **Self & Time Management** and **Entrepreneurial Thinking** competences.

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
On-site Performance Appraisal (Evaluation of technical reliability, safety compliance, and team integration based on daily activities).	**40%**	Company Tutor	ITS Internship Coordinator
Internship Final Report / Logbook (Technical documentation of projects managed, including data analysis and sustainability impact).	**30%**	ITS Scientific Committee	Company Tutor
Competence Self-Assessment & Viva Voce (Final interview to discuss the 10 Core TRICOMP Skills and professional growth).	**20%**	Exam Board (ITS + Industry Experts)	ITS Quality Manager
Attendance & Procedural Compliance (Validation of hours completed, safety	**10%**	Company Tutor & Registrar	ITS Administrative Office

certifications, and adherence to company regulations).			

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Excpeted Level (EQF 5)
APPLIED INNOVATION RESEARCH	Technical validation report and testing logs (LO4, LO8)	Plan and conduct applied research and experiments to support technical innovation, documenting outcomes and integrating feedback into development.	**Advanced**
CREATIVE PROBLEM-SOLVING	Industrial troubleshooting case study (LO5, LO13)	Identify and define complex practical problems in technical environments and develop feasible, innovative solutions using structured methods.	**Advanced**
DIGITAL MODELLING & SIMULATION	CAD model review and simulation reports (LO3)	Use digital tools to design, model, and simulate technical systems, testing virtual alternatives to support decision-making.	**Intermediate**
PROJECT LEADERSHIP	Project monitoring logs and Gantt charts (LO11)	Plan, coordinate, and monitor technical projects, defining goals and managing timelines and resources reliably.	**Intermediate**
QUALITY & PROCESS MANAGEMENT	Process audit or Lean improvement proposal (LO1, LO6)	Manage and improve technical processes and quality frameworks, aligning efficiency with quality and fostering continuous improvement.	**Intermediate**
ENTREPRENEURIAL THINKING	Business Case or cost-benefit analysis (LO6, LO13)	Recognize opportunities, evaluate technical risks, and propose improvements that align technical work with business value and strategic goals.	**Intermediate**
SELF & TIME MANAGEMENT	Internship logbook and tutor evaluation (LO11)	Reflect on own behavior to structure, plan, and control work processes, acting responsibly and with initiative.	**Advanced**
SUSTAINABILITY THINKING	Environmental impact/LCA analysis report (LO9)	Evaluate the environmental and social impact of technical decisions using lifecycle thinking and aligning actions with long-term ecological goals.	**Intermediate**
DATA LITERACY	Data analysis report and statistics (LO7)	Read, interpret, and validate technical data, detecting errors and drawing meaningful conclusions to support data-informed reasoning.	**Intermediate**
INTERDISCIPLINARY COLLABORATION	360° Team feedback and peer review (LO10)	Work effectively across disciplinary boundaries, managing knowledge exchange between fields like mechanics, IT, and sustainability.	**Advanced**

8. Workload Structure and Hour Distribution

Type of Activity	**Hours**	**Location**	**Supervision**
Theoretical activities / Lectures	**-**	-	-
Practical Activities	800	Company	Company mentor / ITS & Academic tutors
–	**800**	–	
Self-Study	400	Autonomous	Company mentor / ITS & Academic tutors
Assessment / Exams	Included in module hours	ITS	Company mentor / ITS & Academic tutors
Total Hours x ECTS calculation:	**1200**		
ECTS Credits Awarded:	**48**		

RECOGNIZABILITY AND TRANSFERABILITY (ITS 5° LEVEL → ESJO 6° LEVEL)

This framework provides a detailed mapping of the training modules to facilitate a clear comparison between the current curriculum and French academic standards. The objective is to establish a transparent "bridge" that allows the French partner institution to validate the competencies acquired by students, ensuring a seamless transition into a **6th-level integrative year (Top-up/License 3)** in France. To ensure clarity in the recognition process, the modules have been categorized as follows:

- **Recognizable:** Modules that align fully with the French curriculum in terms of learning outcomes and credit hours.
- **Partially Recognizable:** Modules that share core similarities but may require minor integration or supplementary work.
- **Non-Recognizable:** Modules specific to the local context or distinct from the target French qualification.

This systematic identification is essential for defining the individual learning path and ensuring the academic legitimacy of the international progression.

Note on Current Status

Please Note: This phase of analysis and verification is currently in progress. The final mapping and validation of all modules will be fully completed and finalized before the starting of the pilot phase.

	1° YEAR - 5TH LEVEL	Hours	FULLY RECOGNIZABLE	PARTIALLY RECOGNIZABLE	NON-RECOGNIZABLE	**Possible required integrations** (if applicable)
TU 1	**Basic ICT and Digital Security**	**50**	☐	☐	☐	
TU 2	**Occupational Safety**	**20**	☐	☐	☐	
TU 3	**Technical English**	**60**	☐	☐	☐	
TU 4	**Communication, Teamworking and Problem solving**	**40**	☐	☐	☐	
TU 5	Creativity, AI and Proactive Mindset	30	☐	☐	☐	
TU 6	**Technical Drawing and CAD Modeling**	**120**	☐	☐	☐	
TU 7	Product Development and Advanced Design	20	☐	☐	☐	
TU 8	**Materials and Production Technologies – MRP**	**60**	☐	☐	☐	
TU 9	**Industrial Automation**	**150**	☐	☐	☐	
TU 10	**Mechanical Machining and CNC**	**80**	☐	☐	☐	
TU 11	**Automated Production Systems**	**60**	☐	☐	☐	
TU 12	Applied R&D – Metodologie di Ricerca Applicata	60	☐	☐	☐	
TU 13	**Prototyping, 3D Printing and Testing**	**90**	☐	☐	☐	
TU 14	Design for Manufacturing & Concurrent Engineering	40	☐	☐	☐	
TU 15	Virtual Simulation and Digital Validation	40	☐	☐	☐	
TU 16	Ergonomic Simulation and Human-Centered Design	40	☐	☐	☐	
TU 17	Statistical Methods and Process Optimization	40	☐	☐	☐	
	TOTAL HOURS 1st YEAR	1.000				
INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 1		160				
4 ONLINE Modules with testimonies of companies		16				

	2° YEAR - 5TH LEVEL	Hours				
TU 18	**Metrology and Quality Control**	**40**	☐	☐	☐	
TU 19	**PLM and Technical Documentation**	**30**	☐	☐	☐	
TU 20	**Project Management (Waterfall and Agile)**	**40**	☐	☐	☐	
TU 21	**Lean Manufacturing and Process Sustainability**	**30**	☐	☐	☐	
TU 22	Green Technologies and Circular Economy	30	☐	☐	☐	
TU 23	Industrial Economics and Sustainable Innovation	30	☐	☐	☐	
TU 24	**Final Practical Internship**	**800**	☐	☐	☐	
	TOTAL HOURS 2nd YEAR	1.000				
INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 2		160				

Section 2- Certification of competencies through Micro credentials

What are Micro credentials:

The Piloting of the HUCO EQF 5 and & dual training pathways supply chain, will foresee the testing of Micro-credentials as European certification scheme for competencies achieved by learners (R&D technicians) after attendance of training modules and passing of a structured evidence-based assessment.

In 2022, the European Commission published the Council Recommendation on a European approach to micro-credentials for lifelong learning and employability as an approach to implement micro-credentials to complement and enhance education, training and lifelong learning and employability ecosystems without undermining and replacing existing qualifications and degrees. As outlined in the Council Recommendation:

A micro-credential is a small, certified learning achievement that recognizes specific skills, competencies, or knowledge gained through short, targeted courses. Unlike traditional degrees, micro-credentials are more flexible, stackable, and often tailored to specific industry or personal development needs. They can be issued by universities, training providers, or professional organizations and are typically verified with digital badges or certificates.

In the European Union's lifelong learning strategy, micro-credentials are seen to play a key role in making education more accessible, inclusive, and adaptable to the rapidly changing job market and supporting lifelong learning across Europe. Their role includes:

- **Upskilling and Reskilling** – Helping individuals update their skills in response to labor market changes, technological advancements, and industry demands.
- **Flexibility and Accessibility** – Enabling learners to acquire skills at their own pace, often through online or blended learning formats.
- **Recognition and Portability** – Promoting standardized, transparent, and cross-border recognition of skills, facilitating employment and mobility within the EU.
- **Support for Inclusion** – Providing opportunities for learners from diverse backgrounds, including disadvantaged groups, to access education and improve employability.
- **Stackability** –Allowing learners to combine multiple micro-credentials towards larger qualifications, such as degrees or professional certifications.

According to the Council Recommendation, Micro-credentials should be designed as distinct, targeted learning achievements, and learning opportunities leading to them are updated as necessary, to meet identified learning needs.

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How Micro credentials work in HUCO

Cooperation between education and training organisations, employers, social partners, other providers, and users of micro-credentials is encouraged to increase the relevance of micro credentials for the labour market.

Given these premises, HUCO works as very promising framework to test micro-credentials' release for learners attending the training modules of the EQF 5 and & pathways for R&D technicians. Those learners can be, respectively:

- Former trainees attending previous editions of EQF 5 pathway and willing to improve their skills to further reinforce their employability and professional attractiveness in the labour market. Under this perspective, they will be able to choose the most responsive modules according to their skills needs. This implies prior learning assessment and validation mechanisms, as well as the structuring of individual training plans for each candidate (Continuous professional development – CDP).
- Professionals and workers of manufacturing companies, in need of upskills to adapt their competencies to the new challenges brought by the twin transitions, rapid technological innovation and AI disruption (Lifelong learning- LLL).

To release micro credentials, it is necessary to collect evidence demonstrating that the learners possess those competencies (so-called "evidence-based assessment"). In practice, during training delivery, teachers/trainers/evaluators will carry out a summative evaluation through practice, collaborative working session, tests, and other methodologies they will adopt and all those results/feedback will contribute to collecting proofs attesting in an objective way the possession of expected competencies by learners.

Achieved skills are certified via Micro-Credentials on the [the Europass Platform](), linked to the ESCO framework, the European Framework for Competencies and Occupations. Certificates are accessible in 29 languages, and stored in a personal digital wallet (Fig. 1 below).

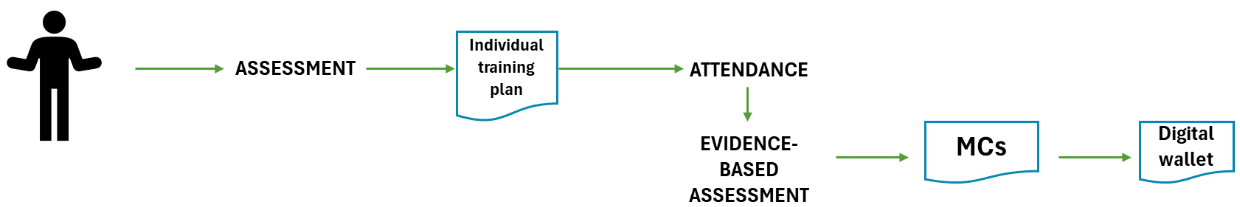

Figure 1- from individual training plan to competencies 'certification through micro credentials (MCs)

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How Micro credentials work in HUCO

Under the HUCO piloting, a specific innovation in the testing of micro credentials certification scheme will regard the TRIcomp, namely a set of enabling 22 soft skills mapped in deliverable 2.1 of the project, which can be trained while attending the various modules according to different levels of expected proficiency. Below, table 1 visualises for the Training Module – the achievable TRicomp, and the expected proficiency level at the end of the module's attendance for each of them.

Table 2 – reference Module - INTEGRATIVE MODULE - INQUIRY-BASED PRACTICAL LABORATORY 2

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Level (EQF 5)
1. Creative Problem-Solving	Prototype Review	Ability to iterate a design to solve ergonomic or safety flaws identified during testing.	**Advanced**
6. Digital Modelling & Simulation	Technical Dossier	Creation of a functional CAD model that integrates DfA principles and passes virtual stress tests.	**Advanced**
14. Sustainability Thinking	Environmental Analysis	Quantitative justification of material choices based on recyclability and energy footprint.	**Advanced**
20. AI-Literacy & Application	Technical Dossier	Successful use of AI tools (e.g., Generative Design) to optimize product geometry or performance.	**Intermediate**
2. Applied Innovation Research	Inquired-Based Tasks	Evidence of systematic experimentation to determine the best material-process combination.	**Intermediate**
4. Communication Competence	Final Presentation	Ability to explain complex technical decisions clearly to a non-specialist professional audience.	**Advanced**

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6th Level Course: General Presentation and Module Description

HUCO LABS

Collaborative **H**vet-**U**niversity-**Co**mpany **Labs** for Research

Co-funded by the European Union

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Executive Summary

Context & Purpose

Europe is currently facing many challenges, both economic and technological. The continent's ambition is to reindustrialise and compete, while also embracing digital and ecological transitions. Every employee therefore has a role to play in meeting these challenges. This is particularly pertinent for mid-level technicians, who act as a bridge between production and engineering.

The HUCO Labs project (Collaborative HVET-University-Company Laboratories for Research) aims to address the evolving competence requirements of mid-level technicians in Europe.

This ambitious project takes us in two directions:

1. Enabling technicians to become co-creators of knowledge and contribute to the design and development of products/processes.
2. Build students' capacity to make a significant contribution to the continuous improvement of products, processes and technologies.

This involves technical teaching in the strict sense of the term but goes beyond that.

Actually, the scope of the project encourages us to create a curriculum that closely reflects the realities of working life:

« Design a specific training offer for Mid-Level Technicians as aligned as possible to real company needs in the fields of R&D and innovation »[1]

« Combining « classroom » lessons and moments of applied research activity in « work contexts », and which will foster the young people attitude to face student-centred and powerful form of research-based education. »[2]

Furthermore, the scope of the project clearly encourages us to develop resilience skills for both students and teachers and their teaching methods.

« A key role will be addressed to teachers/professors/mentors/tutors in developing resilience skills in students. »[3]

[1] P7 - 2024-09-HUCO-Tpl_ApplicationForm-PartB-HUCO-ERASMUSBBandLSII-07_03_2024_060324
[2] P8 - 2024-09-HUCO-Tpl_ApplicationForm-PartB-HUCO-ERASMUSBBandLSII-07_03_2024_060324
[3] P10 - 2024-09-HUCO-Tpl_ApplicationForm-PartB-HUCO-ERASMUSBBandLSII-07_03_2024_060324

Section 1 - Methodological Design

1. Starting Point

The first phase of our work involved analysing the fieldwork carried out in D2.1: 'Future Skills for Applied Innovation in Technical Professions: The TriComp Framework'.

We identified three main areas of focus.

1. the definition of future skills;
2. the skills needed by European companies;
3. the skills need expressed by European companies; and the gaps between current training programmes and companies' expectations.

With regard to future skills, here is what we have retained from their intrinsic definition:

'The Future Skills approach emphasizes that these competencies extend **beyond technical knowledge,** incorporating **adaptability, critical thinking, interdisciplinary collaboration** to address global challenges.'[4]

'They **combine technical expertise** with the capability to **innovate, integrate sustainability goals, leverage digital technologies for enhanced problem-solving G value creation**.'[5]

'Future Skills are **dispositions for action** that enable individuals to respond effectively to highly dynamic & complex professional environments (Ehlers, 2020).'

'Future Skills unfold through the interplay of two core dimensions:

1. **Capacity to act**, grounded in knowledge & skills;
2. **Disposition to act**, shaped by values & attitudes.'[6]

'Future Skills are neither static nor merely acquired through instruction; **they evolve through active learning, engagement in real-world challenges, interdisciplinary practice.'**[7]

In summary, Future skills include adaptability, critical thinking, interdisciplinary collaboration, as well as the ability to innovate and address tomorrow's major challenges.
In short, future skills are above all a 'readiness to act' : a concrete ability to take action, but also a mindset geared toward action. These skills are neither static nor acquired through traditional education models. They require a shift in how we view education, by reintroducing learning through experience.

[4] Future Skills for Applied Innovation in Technical Professions - The TRIComp Framework (HUCO Labs – D2.1)
[5] Future Skills for Applied Innovation in Technical Professions - The TRIComp Framework (HUCO Labs – D2.1)
[6] Future Skills for Applied Innovation in Technical Professions - The TRIComp Framework (HUCO Labs – D2.1)

[7] Future Skills for Applied Innovation in Technical Professions - The TRIComp Framework (HUCO Labs – D2.1)

Key transversal Skills

Nine key transversal skills have been identified, with **problem-solving and root cause analysis being central.**

To develop these, other skills are also essential: **communication, adaptability, creativity, resilience, and the ability to embrace change.**

Mismatch with current program

A discrepancy has been identified between market expectations and the content of the current educational programme. This discrepancy highlights the difference between what is taught and what is actually required for R&D projects. This emphasises the importance of promoting **hands-on experience and strengthening collaboration with businesses to design content that reflects real-world challenges.**

Recommendations:
Foster practical experience, hybrid profiles, interdisciplinary skills, data competence and economic responsibility. This requires a shift in pedagogical philosophy, industry integration and institutional collaboration.

In Summary

- Future skills are a readiness to act.
- Businesses are asking for practical, interdisciplinary skills grounded in reality.
- Students are seeking meaning, flexibility, creativity, and human-centered guidance.

Consequently, we design a new program called: Experimenting with innovation.
Actually, teaching R&D inherently involves the application of experimental methods:
teaching is more about doing than about transmitting content.

- R&D responds to real issues at work, so experimentation in business is essential.
- R&D follows an iterative process, consisting of project advancement phases & feedback loops; it is a long-term process.
- R&D requires a place for creativity & experimentation, i.e., a laboratory leading to ideation, design, & prototyping.

2. Contextual information concerning the Level 6 pathway

The Saint-Joseph Group is a school group that includes a higher education department called **"ESJO".** Specialized and recognized for its industrial training programs, **ESJO** has been collaborating with CNAM Bourgogne Franche-Comté since 2016.
ESJO belongs to the **CMQ MSI** network as an associated partner.
The French Level 6 training programme, provided by the Conservatoire National des Arts et Métiers

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(CNAM), is a Bachelor's degree in Electromechanical Engineering deployed by ESJO.
CNAM is a public higher education institution under the supervision of the French Ministry of Higher Education, operating in a similar manner to universities.
This has the following implications:

- The current modules are de facto awarded ECTS credits.
- The structure of the degree and any changes to it remain the prerogative of the CNAM. No changes to the course content can be made without the agreement of the national degree representative.

Training modules may be added. These are proposed by the teaching institution and are referred to in France as 'colouring' or 'options'. However,

1. They must not distort the initial objective of the licence in terms of teaching and employment.
2. The overall percentage of hours for the new training modules must not exceed 50% of those initially planned for the Bachelor's degree programme.
3. It must not correspond to a Bachelor's degree already offered by the CNAM, as this would create competition between the programmes.
4. It must be approved by the **CNAM.**

The Bachelor's degree in Electromechanical Engineering is an apprenticeship programme. Students are employees who are receiving training. Therefore, the programme is subject to French labour law and must comply with the Labour Code in terms of its organisation and the conditions of practice[8]
The apprentice's professional experience with the company is taken into account when validating the Bachelor's degree. Validation is conditional upon completing 10 months of apprenticeship in the company and submitting an activity report.

[8] Livre II, 6e partie

Section 2 - Create an enhanced 6th level pathway

1. Transforming TriComp into training content

The following methodology was used to transform TriComp into training content:

- Identification of the 22 TriComps
- Comparison with the skills already taught and the associated training content
- Mapping of missing skills

The current Level 6 course is organised as follows:

MODULES	HOURS LECTURES/ PRACTICAL WORK/ ASSESMENT	HOURS STUDENT'S PERSONAL STUDY	TOTAL	ECTS
ELECTRIC ACTUATORS AND MOTORS	60	90	150	6
SOLID MECHANICS	60	90	150	6
INTRODUCTION TO FINITE ELEMENTS	30	45	75	3
FLUID THERMODYNAMICS	30	45	75	3
FUNDAMENTAL CONCEPTS IN MATERIAL SCIENCE	30	45	75	3
MATHEMATICS FOR ENGINEERS	60	90	150	6
CHALLENGES OF ECOLOGICAL TRANSITIONS	30	45	75	3
TECHNICAL ENGLISH	30	45	75	3
LIFE CYCLE ANALYSIS AND PRODUCT ECO DESIGN	30	45	75	3
SCIENTIFIC COMMUNICATION AND SEARCHING METHODS	30	45	75	3
COMPUTER AIDED DESIGN	60	90	150	6
PROFESSIONAL EXPERIENCE		375	375	15
			1500	60

CNAM use the standard format for the French/European Higher Education Area, whereby one ECTS credit equates to 25–30 hours of work for the student. This includes lectures, assessments, and 'personal' work to validate the ECTS.

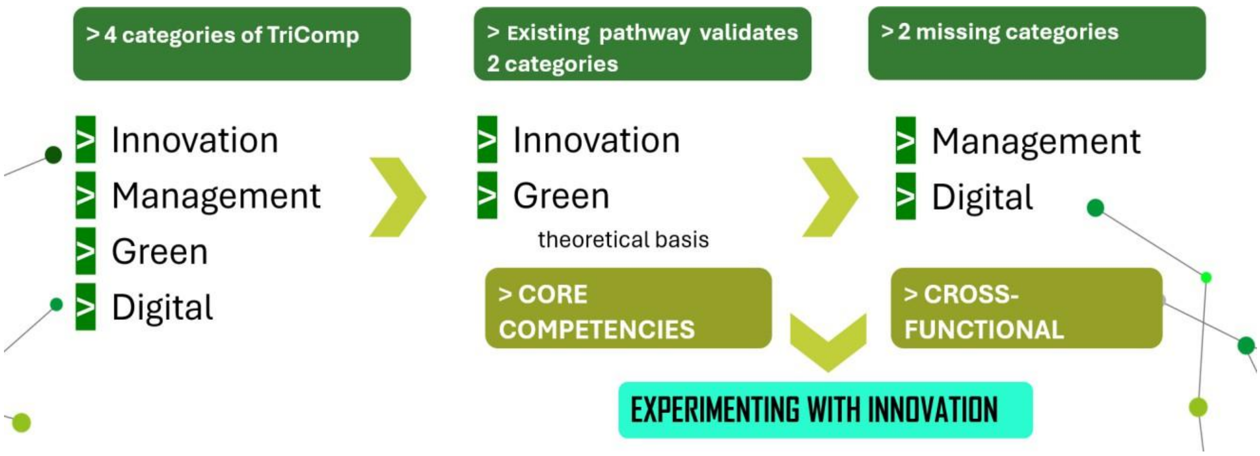
https://op.europa.eu/fr/publication-detail/-/publication/da74c7ec-8450-11e5-b8b7-01aa75ed71a1.

Each training module covers one or more Future Skills.
But some modules are more significant than others because they enable the validation of at least three skills out of the 22 TriComp.

The following existing modules are particularly highlighted as a basis for training in the 22 Future Skills:

MODULES	HOURS LECTURES/ PRACTICAL WORK/ ASSESMENT	HOURS STUDENT'S PERSONAL STUDY	TOTAL	ECTS
LIFE CYCLE ANALYSIS AND PRODUCT ECO DESIGN	30	45	75	3
SCIENTIFIC COMMUNICATION AND SEARCHING METHODS	30	45	75	3
COMPUTER AIDED DESIGN	60	90	150	6
PROFESSIONAL EXPERIENCE		375	375	15

The 'Professional Experience' component, which can take the form of an internship or apprenticeship, aims to validate technical skills specific to the targeted professions in a business context. There is a close link between the expected skills for the qualification and those required in the 22 future skills.
The first three modules specifically validate categories related to innovation and sustainability. While our current programme covers these topics theoretically, these modules provide a more practical approach.
However, the areas of management and digital were ones that needed strengthening. (Cf : Summary Matrix)



This led to the creation of our new program:

"Experimenting with Innovation"

This program is based on several key principles:

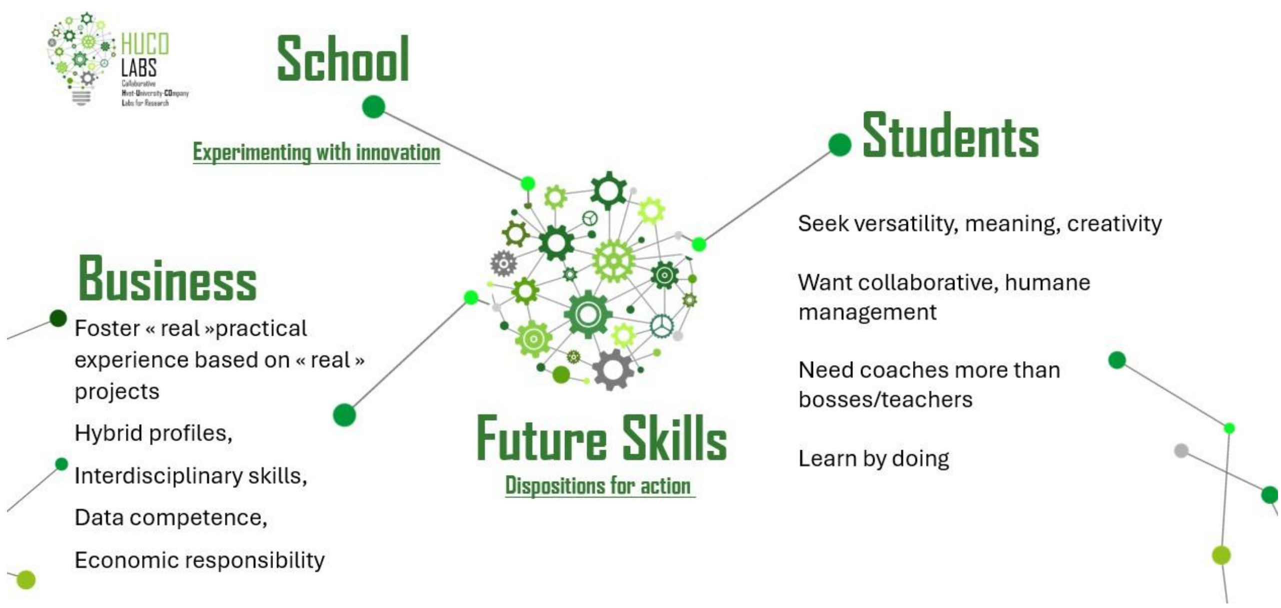
- Teaching R&D must involve **hands-on experimentation**.
- Learning happens more through **doing** than through content delivery.
- R&D addresses **real-world business challenges**.
- It follows an **iterative, long-term process.**
- It requires a **dedicated space for creativity and experimentation**—a true lab for ideation and design.

Finally, teaching future skills in **management** and **digital** must be integrated with innovation and sustainability skills, through **two concrete projects, and using a FabLab.**

In Summary

- Future skills are a readiness to act.
- Companies demand practical and interdisciplinary skills based on reality. They wish to recruit technicians capable of solving concrete technical problems.
- Students are seeking meaning, flexibility, creativity, and human-centred guidance.

Consequently, we design a new program called: **Experimenting with innovation**



2. Programme's overall structure

This new training programme aims to strengthen the links between academic education, needs in technical skills of companies, training institutions and the University. The cooperation model to be presented showcases the potential for collaboration between various stakeholders. Each stakeholder is an essential link in the chain. Following the spirit of the HUCO LABS project, the programme also incorporates outgoing and incoming European mobility programmes. The proposal below outlines a "revised programme" that builds on the existing curriculum and incorporates additional modules.
As part of the HUCO LABS project, there will also be incoming and outgoing mobility. This mobility will also be referred to in the following proposal. As a reminder, the current programme already awards ECTS credits. The new modules will therefore be validated by **micro credentials.**
In addition, the Europass will be delivered to the students participating in mobilities abroad. Validated competences in the Europass wil be based on the dedicated modules where mobility takes place (Module 28 – INNOVATION SPRINT, Module 29 - INDUSTRIAL DESIGN JAM, Module 30 - DIGITIZATION OF THE DESIGN FUNCTION and the 1 month placement in Germany and Spain as part of the

professional experience).

This section presents the following:

- the programme's overall structure;
- the descriptions of the modules that validate the 22 future skills;
- the mobility proposals.
-

A new training program including HUCO LABS mobilities

MOBILITIES FOR 8 STUDENTS

Outgoing mobility (FR → partners)
- 1 week in DE for 8 students
- 1 week in IT (COMAU) for 8 students
- 1 month in DE for 4 students
- 1 month in ES for 4 students

Incoming mobility (partners → FR)
- 1 week for LT teachers and ES teachers

Indeed, the European dimension is also highlighted in the HUCO Labs project, where incoming and outgoing mobility are to be expected.

Continuum between EQF 5 and EQF 6.

Admission to EQF 6 requires completion of EQF 5 with 120 ECTS credits in mechanical or electrical engineering. Please note that a link between the two programmes may be established in the future, should the CNAM accreditation body recognise the Italian EQF 5 programme as equivalent to 120 ECTS credits.
In this case, future students would be required to complete the entire EQF 6 programme described below in order to earn the full EQF 6 degree.

Programme's overall structure

MODULES		HOURS LECTURES/ PRACTICAL WORK/ ASSESMENT	HOURS STUDENT'S PERSONAL STUDY	TOTAL	ECTS
Fundamental modules	ELECTRIC ACTUATORS AND MOTORS	60	90	150	6
	SOLID MECHANICS	60	90	150	6
	INTRODUCTION TO FINITE ELEMENTS	30	45	75	3
	FLUID THERMODYNAMICS	30	45	75	3
	FUNDAMENTAL CONCEPTS IN MATERIAL SCIENCE	30	45	75	3
	MATHEMATICS FOR ENGINEERS	60	90	150	6

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	CHALLENGES OF ECOLOGICAL TRANSITIONS	30	45	75	3
	TECHNICAL ENGLISH	30	45	75	3
Specializing Modules	LIFE CYCLE ANALYSIS AND PRODUCT ECO DESIGN	30	45	75	3
	COMPUTER AIDED DESIGN	60	45	75	3
	SCIENTIFIC COMMUNICATION AND SEARCHING METHODS	30	90	150	6
	PROFESSIONAL EXPERIENCE	350	25	375	15
	SUBTOTAL			**1500**	**60**
Integrative Modules "EWI"[9]	INNOVATION SPING	35		35	MC[10]
	INDUSTRIAL DESIGN JAM	35		35	MC
	DIGITALISATION OF THE FUNCTION DESIGN / FABLAB	35		35	MC
	TOTAL			**1605**	**60**

[9] The modules called **EWI** '**E**xperimenting **W**ith **I**nnovation' do not require any personal work on the part of students, as they are practice-oriented courses that directly apply the lessons learned.

[10] **MC means Micro credentials**; indeed, these integrative modules are not assessed by ECTS.

The overall structure shows the link between **academic university education** (**Fundamental and Specializing Modules**), **practical education** (**professional experience**) and **a new type of education that bridges the two** (**Integrative Modules**).

It shows also new methods based on project work and concrete experimentation.

Indeed, today's rapid evolution of professions and technologies requires us to rethink traditional teaching approaches. The objective is not just to convey knowledge, but also to empower learners to develop practical skills, adaptability, and genuine professional autonomy.

This is the purpose of a renewed pedagogy that puts project-based learning and hands-on experimentation at the heart of the learning experience.

Project work, through project-based learning (**PBL**), is one of the key pillars of this pedagogical transformation/shift. It invites learners to engage in tasks that mirror real professional situations, such as designing a prototype, analysing a process, solving an industrial problem or developing an innovative concept.

These projects are not mere exercises; they form the driving thread of the learning process, enabling theoretical knowledge and technical skills to be integrated naturally.

Hands-on experimentation plays a central role in this approach. By manipulating, testing, trying, failing, and improving, learners follow a genuine 'learning by doing' cycle.

Laboratories, technical workshops, prototyping spaces, simulated environments and industry-linked projects thus become privileged learning environments.

This active pedagogy immerses learners in authentic settings, where every task, challenge or mission provides an opportunity to develop skills.

This experiential process: reinforces understanding of concepts, develops autonomy and critical thinking, encourages creativity and innovation, and supports real-context decision making.

WHICH LEADS TO FUTURE SKILLS

ON LINE MODULES

INTERVIEWS – TESTIMONIALS IN ENGLISH

The HUCO LABS project offers students enrolled on the Level 6 programme four online modules featuring company testimonials about RCD.
In light of the educational content, it would be beneficial for students to hear about companies' experiences in the following areas:

- a testimonial from a company with an eco-responsible approach (integrated into Module 25);
- a testimonial from a company that has transitioned from fundamental to applied research, (integrated into Module 27);
- a testimonial from a company that collaborates with a FabLab (integrated into Module 26);
- a testimonial from a company with an RCD department (integrated into Module 26).

Who: with support of BVMW.

Students concerned: the entire class

MITTELSTAND BILDUNGSALLIANZ
Eine Initiative des BVMW

When: during the school year 2026 -2027

Where: in Saint-Joseph-La Salle High School – Dijon

Co-funded by the European Union

ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

Section 3 – Template Module Description

Module 25 - INTRODUCTION TO LIFE CYCLE ANALYSIS AND ECO-DESIGN OF PRODUCTS

1. Module Identification	
Module Title	**INTRODUCTION TO LIFE CYCLE ANALYSIS AND ECO-DESIGN OF PRODUCTS**
Module Code	TU25
Year / Semester	**3° - 2026/2027**
Module Contact hours	30 hours
EQF Level	EQF 6

2. Module positioning within the training pathway	
Role of the module within the CNAM curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Anyone with a level 5 degree in the field of materials.

3. General overview of learning objectives

- Raising awareness of the ecological impact of products.
- Implement an eco-design approach within the framework of an industrial project.
- Develop a critical eye with regard to the results of life cycle analysis.
- Master the logic and relevance of digital Life Cycle Analysis tools within the framework of an industrial project.

Operational autonomy at EQF Level 6	▪ Analyse and evaluate a product's environmental performance ▪ Implement and communicate eco-design improvements

Practical application:

- **Awareness of the ecological impact of the products:** Ability to identify and assess the environmental impacts associated with products throughout their entire life cycle.
- **Mastery of Eco-design Principles and Tools:** Ability to recognize and explain the principles, challenges, and methods of eco-design to integrate sustainability into design processes.
- **Life Cycle Analysis (LCA) of Products:** Ability to conduct a comprehensive life cycle analysis of products, including the selection of appropriate material solutions.
- **Use of Digital LCA Tools in an Industrial Context:** Ability to Apply software and digital tools to perform environmental analyses within industrial projects.
- **Developing a Critical Perspective on Material and Process Choices:** Ability to evaluate and compare material solutions and implementation processes to meet both technical and environmental specifications.

4. Specific learning Outcomes (EQF6 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	RESPONSIBLE RESEARCH	SUSTAINABILITY THINKING	SYSTEMS THINKING	SUSTAINABLE SYSTEM DESIGN
LO1	Identify functions, define a functional unit, and create a product nomenclature	X			X	X
LO2	Determine the product life cycle and assess its environmental profile (e.g., ESQCV matrix)		X	X	X	

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N.	Learning Outcomes At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	RESPONSIBLE RESEARCH	SUSTAINABILITY THINKING	SYSTEMS THINKING	SUSTAINABLE SYSTEM DESIGN
LO3	Use eco design tools/software to calculate and interpret environmental impacts			X		X
LO4	Develop critical thinking to understand results and prioritise key environmental issues	X	X	X		X
LO5	Identify and propose strategies to improve environmental performance throughout the life cycle	X	X	X		X
LO6	Simulate the integration of an eco-design approach within a company's organisation	X			X	X
LO7	Develop and apply appropriate methods for environmental communication			X		

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
Joint design **ITS** and **Companies**	● ***HVET (10 h):*** ● Theoretical foundations ***Practice (20h):*** Simulations based on real scenarios	***HVET:*** Tutoring during classroom training ***Companies:*** Monitoring of classroom progress	***Support during the co-design and validation phase*** ***Partners involved during the monitoring phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☐ Inquired-Based Learning
- ☐ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☒ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Internship or apprenticeship	Perform functional analysis of a product or mechanical system as part of an eco-design approach	**LO1 LO2 LO3**	CREATIVE PROBLEM SOLVING RESPONSIBLE RESEARCH
Internship or apprenticeship	Develop all or part of the specifications for a product or mechanical system as part of an eco-design approach	**LO4 LO5**	SUSTAINABILITY THINKING SYSTEMS THINKING
Internship or apprenticeship	Seek technical solutions that meet functional requirements	**LO6 LO7**	SUSTAINABLE SYSTEM DESIGN SYSTEMS THINKING

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Theoretical test	**50%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☐ Documentation and reflection skills ☐
Project / practical work	**25%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒
Report / documentation	**20%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒
Presentation / discussion	**5%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☐ Documentation and reflection skills ☒

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Application Level (EQF 6)
CREATIVE PROBLEM-SOLVING	12-hour teamwork on the implementation of an eco- design project	Apply methods for generating innovative ideas using ESQCV (Simplified Product Life Cycle Assessment) matrix tool. The competence is focused on the ability to find innovative solutions.	**BT FS01- L3/4** Learners apply ideation techniques to generate and refine solutions
RESPONSIBLE RESEARCH	12-hour teamwork on the implementation of an eco- design project	Apply methods for generating innovative ideas supporting a long-term sustainability. The competence is focused on the ability to identify ethical problems and find solutions for them.	**BT FS03- L3/4** Learners apply ethical standards in real-world scenarios
SUSTAINABILITY THINKING	12-hour teamwork on the implementation of an eco- design project	Develop a strong level of competence in using the following tools: eco-design, qualitative and quantitative assessment tools, environmental improvement tools and the eco-design wheel.	**BTFS14- L3/4** Learners apply strategies for ecological innovation in design.
SYSTEMS THINKING	12-hour teamwork on the implementation of an eco- design project	Develop a strong level of competence in applying lifecycle methods in a real-world context.	**BTFS15- L3/4** Learners analyze complex systems and model interaction.
SUSTAINABLE SYSTEM DESIGN	12-hour teamwork on the implementation of an eco- design project	Be able to integrate an eco-design approach into product and process proposals: choice of materials, their durability, choice of energy.	**BTFS16- L3/4** Learners analyze complex systems and model interactions.

Assessment Methods: The examination conditions and assessment methods are determined by the CNAM. The accredited teacher for the subject submits an examination proposal, which must be validated as compliant by the CNAM. The teacher is required to implement these prescribed assessment methods.

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	4	ESJO	ESJO
Practical Activities (Project Work)	14	ESJO/Company	ESJO
–		–	
Self-Study	**45**	Autonomous	
Assessment / Exams	**12**	ESJO	ESJO
Total Hours x ECTS calculation:	**75**		
ECTS Credits Awarded:	**3**		

Module 26 - COMPUTER AIDED DESIGN

1. Module Identification	
Module Title	**INTRODUCTION TO LIFE CYCLE ANALYSIS AND ECO-DESIGN OF PRODUCTS**
Module Code	TU26
Year / Semester	**3° - 2026/2027**
Module Contact hours	60 hours
EQF Level	EQF 6

2. Module positioning within the training pathway	
Role of the module within the CNAM curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Anyone with a level 5 degree in the field of materials.

3. General overview of learning objectives

- Provide the knowledge necessary for product development and functional design
- Understand the design process in terms of its functional and dimensional aspects (SysML methods)
- Ability to implement a design process using CAD software in relation to the manufacturing phase

Operational autonomy at EQF Level 6	Demonstrate effective use of CAD tools as SolidWorks for example

Practical application:

- **Ability to understand the design process in terms of its functional and dimensional aspects:** Definition of mechanical assemblies and their constituent parts: Functional aspects of mechanical assemblies and Geometric and physical aspects of parts
- **Ability to use CAD tools and methods:**
  - Configuration based on functional aspects for the parts comprising the product
  - Volume modelling of functional definitions and business parameters; assembly and parameterized simulation.

4. Specific learning Outcomes (EQF6 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	DIGITAL MODELING & SIMULATION	SUSTAINABILITY THINKING	SUSTAINABLE SYSTEM DESIGN	CLOUD BASED MANUFACTURING	AI LITERACY & APPLICATION
LO1	**Getting started with the software:** Navigating the SolidWorks interface, Managing files and configurations.						X
LO2	**3D modelling:** Creating simple and complex parts (sketch, extrusion, revolution). Using geometric and dimensional constraints. Mastering advanced functions (shells, fillets, chamfers, holes).		X				
LO3	**Assemblies:** Creating and managing assemblies. Applying assembly relationships (coincidence, parallelism, etc.). Detecting interference.	X	X				

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	DIGITAL MODELING & SIMULATION	SUSTAINABILITY THINKING	SUSTAINABLE SYSTEM DESIGN	CLOUD BASED MANUFACTURING	AI LITERACY & APPLICATION
LO4	**Drawing:** Generating 2D drawings from 3D models. Dimensioning and tolerances. Adding annotations and parts lists.		X				
LO5	**Rendering and presentation :** Using realistic rendering tools (textures, materials). Creating images or animations to present a project.		X	X	X		
LO6	**Simulation basics:** Simple static analysis (material strength). Checking stresses and deformations.						
LO7	Develop and apply appropriate methods for environmental communication.			X			
LO8	**Using the materials library :** Know how to navigate the SolidWorks database (metals, plastics, composites). Add or customise materials.					X	
LO9	**Analysing material properties :** Understand characteristics: density, modulus of elasticity, strength. Check compatibility with project constraints.	X	X	X			
LO10	**Applying materials to parts :** Correctly assign a material to a part or assembly. Manage updates to physical properties (mass, centre of gravity). **Simulation and validation :** Use materials in static or thermal studies. Interpret results to confirm your choice.	X	X	X	X		
LO11	**Design optimisation :** Compare multiple materials to reduce weight, cost or improve performance. Use AI or Design Guidance tools for recommendations.		X	X	X		X
LO12	**Cloud file management:** Back up and synchronise parts, assemblies and drawings. Organise projects in collaborative spaces. Understand the concept of versioning (revision management). **Online collaboration:** Share models with other users. Use commenting and validation tools. Work simultaneously on a project (co-design). **Security and confidentiality :** Apply best practices to protect data. Understand access rights and permission management.					X	X
LO13	**Use of AI-powered Design Guidance and Design Assistant objectives** (weight, strength, cost) : Set constraints and conditions for the AI to propose solutions. Interpret recommendations and incorporate them into the model. **Using Design Assistant:** Automate repetitive tasks (adding components, parts list). Use suggestions to improve productivity. Customise preferences for relevant recommendations.		X		X		X

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
HVET in collaboration with university: defines theoretical framework on rotational guidance, translational guidance, power transmission; translates content into practical labs and guided exercises. ***Companies:*** share case studies and practices used in real workplaces. ***Integration:*** joint curriculum co-design to balance theory, practice, and application.	***HVET:*** lectures rotational guidance, translational guidance, power transmission; and digital practices. ***Companies:*** workshops on machine design ***Integration:*** blended learning model (theory + labs + workplace projects).	***HVET:*** provides academic tutoring on rotational guidance, translational guidance, power transmission. Tutors support practice exercises and skills development. ***Companies:*** can mentor monitor application in workplace simulations and projects. ***Integration:*** regular coordination meetings for progress tracking and alignment.	◗ ***For this training unit, the HUCO Labs partners are expected to participate in the co-design and validation phase.*** ◗ ***Support during the delivery of the training is not planned.*** ***Partner involvement is expected during the monitoring phase.***

5. Teaching Methodologies

☒ Lectures	☐ Experiential Learning
☒ Technical Laboratory	☒ Teaching from / in practice
☐ Inquired-Based Learning	☒ Study / Workshop
☒ Project-Based Learning	☐ Study visit / mobility experiences abroad
☒ Case-Based Learning	☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice: Linked to the Learning Outcomes	Skills developed in practice: Mapped onto TRIComp
Internship or apprenticeship	Design a technical solution for a product or mechanical system using CAD software. Conduct all or part of a quality assurance study, taking into account the environmental profile of the product or mechanical system. Draft all or part of a set of specifications. Study and design industrial products using appropriate IT tools. Master mechanical engineering technologies.	**LO1 LO2 LO3 LO4 LO5 LO6 LO7 LO8 LO9 LO10 LO11 LO12 LO13**	CREATIVE PROBLEM-SOLVING DIGITAL MODELING & SIMULATION SUSTAINABILITY THINKING SUSTAINABLE SYSTEM DESIGN CLOUD BASED MANUFACTURING AI LITERACY & APPLICATION

7. Evaluation and assessment methods			
Type of activity	**Weight (%)**	**Evaluators**	**Supervision**
Theoretical test	**30%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☐ Documentation and reflection skills ☐
Project / practical work	**35%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒
Report / documentation	**25%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒
Presentation / discussion	**10%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☐ Documentation and reflection skills ☒

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Application Level (EQF 6)
CREATIVE PROBLEM-SOLVING	Practical exercises application of SysML methods to several practical cases: functional analysis and value analysis Practical work and digital submission	Be able to use ideation methods such as SysMl methods ability to organize solutions;	**BT FS01- L3/4** Learners apply ideation techniques to generate and refine solutions
DIGITAL MODELING & SIMULATION	Application of practical exercises for Using SolidWorks Software (CAD) Practical work and digital submission	Develop a strong level of competence In using a CAD software (SolidWorks or other).	**BTFS06 - L5/6** Learners develop complex simulations for decision-making in dynamic environments.
SUSTAINABILITY THINKING	Practical exercises application of choosing materials in terms of sustainability and environmental impact. Practical work and digital submission	Develop a strong level of competence in choosing materials in terms of sustainability and environmental impact.	**BTFS14- L3/4** Learners apply strategies for ecological innovation in design.

SUSTAINABLE SYSTEM DESIGN	Practical exercises on choosing materials in terms of sustainability and environmental impact. Practical work and digital submission	Develop a strong level of competence in choosing materials in terms of sustainability and environmental impact.	**BTFS16 - L3/4** Learners analyze complex systems and model interactions.
CLOUD BASED MANUFACTURING	Practical exercises on SolidWorks which includes using Cloud 3D CAD and Cloud Storage Practical work and digital submission	Develop a strong level of ability to organize projects in collaborative spaces; understand versioning and revision management. Ability to share models with other users; Ability to apply best practices to protect data.	**BTFS21 – L3/4** Learners operate and configure cloud manufacturing systems in projects.
AI LITERACY APPLICATION	Practical exercises on SolidWorks which includes using AI Assistant. Practical work and digital submission	Develop ability to set constraints and conditions for the AI to propose solutions.	**BTFS20 -L3/4** Learners apply basic AI tools in technical environments.

Assessment Methods: The examination conditions and assessment methods are determined by the certification authority, the CNAM. The accredited teacher for the subject submits an examination proposal, which must be validated as compliant by the CNAM. The teacher is required to implement these prescribed assessment methods.

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	30	ESJO	ESJO
Practical Activities Laboratory Fab Lab	 20 6	 ESJO Lab	ESJO
–	**56**	–	
Self-Study	**90**	Autonomous	
Assessment / Exams	**4**	ESJO	ESJO
Total Hours x ECTS calculation:	**150**		
ECTS Credits Awarded:	**6**		

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ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

Module 27 - RESEARCH AND SCIENTIFIC COMMUNICATION

1. Module Identification	
Module Title	**INTRODUCTION TO LIFE CYCLE ANALYSIS AND ECO-DESIGN OF PRODUCTS**
Module Code	TU27
Year / Semester	**3° - 2026/2027**
Module Contact hours	30 hours
EQF Level	EQF 6

2. Module positioning within the training pathway	
Role of the module within the CNAM curriculum	☒ Foundational module ☐ Professionalizing module ☐ Integrative module
Required entry competences	Have already completed the entire level 5 and have already completed at least 3 scientific course units (i.e., 18 credits) at the level c.

3. General overview of learning objectives

- Provide the knowledge necessary for carry out scientific research on an R&D issue.
- Present scientific topics in a clear and reasoned manner
- Developpe the application of scientific research in a professional context

Operational autonomy at EQF Level 6	▪ Apply methods for generating innovative ideas using scientific research ▪ Ability to carry out detailed scientific research that will support a business application.

Practical application:

- **Ability to understand principles and general methods of scientific research:** Understand the importance of conducting thorough documentary research; Understand the usefulness of technological or legal monitoring; Learn how to use Artificial Intelligence intelligently
- **Ability to write a scientific report on RGD:** How to prioritize information; to diversify information sources and to use a search equation; How to master the writing of a scientific thesis applied to a professional context.
- **Ability to succeed a scientific oral presentation:** introduction to selecting relevant information: information processing; scientific or technical argumentation.
-

4. Specific learning Outcomes (EQF6 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM SOLVING	APPLIED INNOVATION RESEARCH	RESPONSIBLE RESEARCH	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	AILITERACY & APPLICATION
LO1	Devise solutions that address both scientific and practical issues and analyze feasibility of innovations	X	X	X		X	
LO2	Carry out detailed scientific research that will support a business application.	X	X	X	X	X	X
LO3	Identify ethical dilemmas, be able to apply ethical guidelines in practice.	X		X	X		

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ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM SOLVING	APPLIED INNOVATION RESEARCH	RESPONSIBLE RESEARCH	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	AI LITERACY & APPLICATION
LO4	Present findings across a writing report, to tailor language to a specific audience : to be clear and transparent in communication, and to display confidence in public engagement				X	X	
LO5	Integrate diverse perspectives while remaining realistic.	X	X			X	
LO6	Use AI tools ethically and wisely.			X			X

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
HVET: in collaboration with University: defines theoretical framework methods and tools necessary to master scientific communication and information in order to write a scientific report and give an oral presentation. **Company:** Co-define a scientific research issue applicable to reality.	**HVET:** lectures on methods and tools necessary to master scientific communication and information in order to write a scientific report and give an oral presentation. **Company:** Co-define a scientific research issue applicable to reality.	**HVET:** provides academic tutoring on methods and tools necessary to master scientific communication and information in order to write a scientific report and give an oral presentation. **Enterprise:** mentors monitor application in workplace simulations and projects.	***Support during the co-design and validation phase*** ***Partners involved during the monitoring phase.***

5. Teaching Methodologies

- ☒ Lectures
- ☐ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Not applicable			

7. Evaluation and assessment methods			
Type of activity	**Weight (%)**	**Evaluators**	**Supervision**
Theoretical test	**10%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☐ Documentation and reflection skills ☐
Project / practical work	**0%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒
Report / documentation	**50%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒
Presentation / discussion	**40%**	ESJO Teacher ☒ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☐ Documentation and reflection skills ☒

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Application Level (EQF 6)
CREATIVE PROBLEM-SOLVING	Writing a 15- page report on a scientific topic and oral defence of it	Apply methods for generating innovative ideas using scientific research.	**BT FS01- L3/4** Learners apply ideation techniques to generate and refine solutions
APPLIED INNOVATION RESEARCH	Writing a 15- page report on a scientific topic and oral defence of it	Develop the skills needed to carry out detailed scientific research in support of business applications.	**BTFS02- L3/4** Learners construct valid and reliable research designs for innovation
RESPONSIBLE RESEARCH	Writing a 15- page report on a scientific topic and oral efence of it	Develop the skills needed to identify ethical dilemmas, and to apply ethical guidelines in practice.	**BT FS03- L3/4** Learners apply ethical standards in real-world scenarios
COMMUNICATION	Writing a 15- page report on a scientific topic and oral defence of it	Develop the skills needed to identify present findings across a writing report, to tailor language to a specific audience.	**BTFS04- L3/4** Learners apply strategic formats to tailor messages for diverse audiences.
INTERDISCIPLINARY COLLABORATION	Writing a 15- page report on a scientific topic and oral efence of it	Develop the skills needed to integrate diverse perspectives while remaining realistic.	**BTFS05 – L1/2** Learners describe principles of interdisciplinary teamwork.
AI-LITERACY & APPLICATION	Writing a 15- page report on a scientific topic and oral defence of it	Develop the skills needed to use AI tools ethically and wisely.	**BTFS20 – L3/4** Learners apply basic AI tools in technical or research environments

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8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	15	ESJO	ESJO
Practical Activities Project work	14	ESJO/Company	ESJO
–	**29**	–	
Self-Study	**45**	Autonomous	
Assessment / Exams	**1**	ESJO	ESJO
Total Hours x ECTS calculation:	**75**		
ECTS Credits Awarded:	**3**		

1. Module Identification	
Module Title	**INNOVATION SPRINT**
Module Code	TU28
Year / Semester	**3° - 2026/2027**
Module Contact hours	35 hours
EQF Level	EQF 6

2. Module positioning within the training pathway	
Role of the module within the CNAM curriculum	☐ Foundational module ☐ Professionalizing module ☒ Integrative module
Required entry competences	None

Presentation

- **The "Innovation Sprint" course** marks a pivotal moment within the organization's R&D-driven approach. It is designed as a competitive challenge among students, who work in teams to vie for first place.
- **The primary goal is to conceive an innovative product, plan its market launch, and present the strategy.** This training session will take place within a host company abroad.
- **This intensive program** spans one week and includes 35 consecutive hours of training. These hours are structured into eight 4-hour sessions focused on project development, followed by a 3-hour session dedicated to presenting the final projects before a panel of professionals.

The training process is organized into five key stages:

- **Ideation** – Generate a concept for an innovative product to bring to market.
- **Market Research** – Assess the feasibility and potential of the project.
- **Business Planning** – Develop a comprehensive business plan.
- **Marketing** – Define the marketing strategy.
- **Pitching** – Present the project to entrepreneurs and persuade them of its value.

Each half-day is structured according to a specific progression.
First, the educational objectives of the sequence are presented to the students.
Then, they access short training modules directly related to the skills targeted for that half-day.
Throughout the work, coaches accompany the teams and support them in the practical implementation of the various stages of the project.
At the end of the day, students write and present an interim report in which they outline the progress of their work, the results obtained, as well as the difficulties encountered and the solutions they have implemented to overcome them.

The key success factors for this challenge include establishing a project-oriented structure: providing suitable facilities with unrestricted access to the FabLab, ensuring availability of digital resources, and offering guidance from coaches such as teachers and industry professionals.

3. General overview of learning objectives	
▪ Identify the main challenges involved in staring business ▪ Come up with a product with real potential for development ▪ Draw up a business plan ▪ Present the project to a panel of entrepreneurs	
Operational autonomy at EQF Level 6	The students collaborate with complete autonomy. Throughout the week, instructors/teachers/mentors take on the role of coaches rather than traditional teachers. They serve as resources to support and advance the projects.

Practical application:

- The Innovation Sprint enables students to apply:
- Team working and role allocation

- Creativity and ideation methods
- Market analysis as market research
- Feasibility analysis as business planning
- And pitching skills in a real-world challenge where they collaboratively design an innovative product and present its launch strategy to industry professionals.

4. Specific learning Outcomes (EQF6 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	APPLIED INNOVATION RESEARCH	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	PROJECT LEADERSHIP	ENTREPRENEURIAL THINKING	INNOVATION MANAGEMENT
LO1	**Innovation s Ideation Skills** Generate original and feasible innovative product concepts using structured creativity methods. Select and justify the best idea based on relevance, novelty, and market potential.	X	X		X		X	X	X
LO2	**Market Research s Feasibility Analysis** Conduct primary and secondary market research to evaluate customer needs, competitors, and industry trends. Analyze feasibility (technical, commercial, and financial) and use data to refine the innovation.			X	X		X	X	X
LO3	**Business s Strategic Planning** Build a full business model (e.g., using the Business Model Canvas or similar framework). Develop a realistic business plan covering value proposition, target segments, pricing, distribution, and key resources. Produce basic financial estimations (costs, revenue potential, breakeven considerations).			X	X		X	X	X
LO4	**Prototyping s Marketing Execution** Create a functional prototype (physical or digital) using FabLab or digital resources. Formulate a coherent marketing strategy including branding, positioning, and communication approach. Demonstrate the ability to iterate the prototype based on feedback.	X	X		X	X	X	X	X
LO5	**Pitching s Professional Communication** Design and deliver a persuasive pitch tailored to an audience of professionals or entrepreneurs. Use storytelling, visual aids, and data to support the viability of the project. Answer expert questions clearly and convincingly.						X	X	X

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	APPLIED INNOVATION RESEARCH	COMMUNICATION	INTERDISCIPLINARY COLLABORATION	DIGITAL MODELLING & SIMULATION	PROJECT LEADERSHIP	ENTREPRENEURIAL THINKING	INNOVATION MANAGEMENT
LO6	**Teamwork s Project Management** Work autonomously in a collaborative team environment to manage tasks, time, and responsibilities. Apply agile, sprint-based project organization to deliver results within tight deadlines. Demonstrate leadership, conflict resolution, and collective decision-making skills.		X	X	X		X	X	X
LO7	**Use of Professional Resources s Tools** Utilize FabLab facilities and digital tools effectively in service of the project. Seek and integrate feedback from coaches (teachers and industry professionals).		X				X		
L08	**Entrepreneurial Mindset** Show initiative, creativity, and resilience in a competitive and fast-paced environment. Reflect on successes, failures, and learning moments throughout the innovation process.	X		X			X	X	

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment

HVET in collaboration with University: defines theoretical framework on the stages of a marketing plan include defining the product concept, conducting market research, assessing production requirements (technical, material, and human resources), securing medium-term financing, and ultimately implementing the marketing strategy

Company : Provides concrete examples of new product marketing as a case study.

Integration: joint curriculum co-design to balance theory, practice, and application.

2. Learning delivery

HVET: provides on line training modules on the stages of a marketing plan.

Company:
Welcomes students during the training session Defines the project topic Provides coaches/advisors Participates in the assessment panel

Integration: blended learning model (theory + workplace projects).

3. Monitoring & support

HVET: provides academic tutoring on the stages of a marketing plan.

Company : mentors monitor application in workplace simulations and projects.

Integration: regular coordination meetings for progress tracking and alignment.

4. Cooperation inside HUCO

Support during the co-design and validation phase

Partners involved during the monitoring phase.

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During this week we can bring **HUCO LABS'** ambitions to life: bringing together students, businesses, universities and VET providers in the same week to focus on a common theme: **product innovation.**
In summary, the success of this week hinges on the fact that companies can offer students real-world topics to work on. The second key factor is that theoretical and practical input can be provided and transferred directly to each half-day's activities. The proposal is to bring a company, teachers and students together for a week to work on a product innovation project.

INNOVATION SPRINT IN BRIEF

It is a competitive challenge among students, who work in teams to compete for the first place. The primary objective is to design an innovative product, plan its launch on the market and present the strategy. This training session will take place within the company COMAU.
Comau is the host company for this hackathon; its main mission is to define a research topic related to the marketing of a new product. Comau must provide mentors during this week to work in cooperation with the French teachers

Who: COMAU and CMQe MSI - Saint Joseph-La Salle Group: 8 students accompanied by 2 French teachers
When: From 28/06/2027 to 02/07/2027
Where: in via rivalta 30 Grugliasco (Torino) - Italia
Duration: 35 hours

5. Teaching Methodologies

- ☐ Lectures
- ☐ Technical Laboratory
- ☐ Inquired-Based Learning
- ☒ Project-Based Learning
- ☐ Case-Based Learning
- ☒ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☒ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Not concerned			

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators	Supervision
Theoretical test	**0%**	ESJO Teacher ☐ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☐ Technical and practical quality ☐ Documentation and reflection skills ☐
Project / practical work	**0%**	ESJO Teacher ☐ Company ☐ University ☐	Alignment with Learning Outcomes (LO) ☐ Technical and practical quality ☐ Documentation and reflection skills ☐
Report / documentation	**40%**	ESJO Teacher ☒ Company ☒ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒
Presentation / discussion	**60%**	ESJO Teacher ☒ Company ☒ University ☐	Alignment with Learning Outcomes (LO) ☒ Technical and practical quality ☒ Documentation and reflection skills ☒

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Application Level (EQF 6)
CREATIVE PROBLEM-SOLVING	Report demonstrating the use of ideation methods, project management techniques, and the resulting outcomes. The report will also highlight the challenges encountered and how they were overcome.	Being able to devise solutions that address both economic and technical issues, Be able to analyze feasibility of innovations.	**BT FS01- L3/4** Learners apply ideation techniques to generate and refine solutions
APPLIED INNOVATION RESEARCH	Report demonstrating the application from idea to a validated prototype, project management techniques, and the resulting outcomes. The report will also highlight the challenges encountered and how they were overcome.	Being able to devise practical and cost-effective solutions to implement. Be able to analyze feasibility of innovations.	**BTFS02- L3/4** Learners construct valid and reliable research designs for innovation
COMMUNICATION	Analysis of the concrete implementation of teamwork and role distribution within the team. Analysis of concrete implementation of producing interim reports and using project management tools. Analysis of oral presentations	Being able to be clear in communication, being able to be confident in public. Being able to manage conflict within the team.	**BTFS04- L3/4** Learners apply strategic formats to tailor messages for diverse audiences.
INTERDISCIPLINARY COLLABORATION	Analysis of the concrete implementation of a project fostering cross-functional collaboration with key business areas: commercial, financial, and human resources.	Develop the skills needed to integrate diverse perspectives while remaining realistic.	**BTFS05 – L1/2** Learners describe principles of interdisciplinary teamwork.
DIGITAL MODELLING & SIMULATION	Report demonstrating the methods of application of designing and protoyping, and the resulting outcomes. The report will also highlight the challenges encountered and how they were overcome.	Develop the skills required for the practical implementation of digital tools for designing and prototyping new products.	**BTFS06 – L5/6** Learners develop complex simulations for decision- making in dynamic environments.
INNOVATION MANAGEMENT	Analysis of the concrete implementation of planning innovation processes (from concept to reality) within technical and commercial environments, fostering collaboration across business functions. - Evidence : Report demonstrating the methods and the resulting outcomes. The report will also highlight the challenges encountered and how they were overcome.	Develop the skills required for the concrete implementation of planning innovation processes (from concept to reality) within technical and commercial environments, fostering collaboration across business functions.	**BTFS08 – L5/6** Learners evaluate innovation strategies and design.

PROJECT LEADERSHIP	Analysis of the concrete implementation of planning innovation processes (from concept to reality) : KPIs and progress dashboards using, status reporting and interim reports, pitching ideas and persuasive presentations, conflict resolution and communication strategies.	Develop the skills required for strong capability in leading teams, and in managing milestones.	**BTFS0G – L3/4** Learners manage scope, risk and time in technical projects.
ENTREPRENEURIAL THINKING	Analysis of the concrete implementation of conducting a market analysis and strategic scenario planning and impact analysis supported by risk matrix methodologies. Analysis of concrete implementation of translating technical deliverables into business outcomes.	Develop the skills required for strong capability in designing and executing strategic entrepreneurial programmes.	**BTFS12 – L3/4** Learners create value propositions and test business model.

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures			
Study visit abroad	35	ESJO/Company	ESJO
–	**35**	–	
Self-Study		Autonomous	
Assessment / Exams		ESJO	ESJO
Total Hours x ECTS calculation:	**NC**		
ECTS Credits Awarded:	**NC**		

Module 29 - INDUSTRIAL DESIGN JAM

1. Module Identification	
Module Title	**INDUSTRIAL DESIGN JAM**
Module Code	TU29
Year / Semester	**3° - 2026/2027**
Module Contact hours	35 hours
EQF Level	EQF 6

2. Module positioning within the training pathway	
Role of the module within the CNAM curriculum	☐ Foundational module ☐ Professionalizing module ☒ Integrative module
Required entry competences	None

This project runs for one week. It is based on a genuine need identified by a partner company wishing to implement a KAIZEN continuous improvement project. The students will be responsible for defining the project specifications and the various design and implementation phases.

Structure
The project consists of two components:

Theoretical Component (10 hours) : This part provides foundational knowledge on:
- (Kaizen, 5S, Kanban, 5 zeros, etc.) and its extensions (Lean Six Sigma)
- The 10 key competencies of a project manager (ISO 21500 standard)
- Problem-solving methods

Practical Component (25 hours) : Designed to apply the steps of an R&D project to a real-world case:
1. Define the start-up and preparation phases
2. Develop planning (PERT-GANTT) and manage costs (direct and indirect)
3. Produce a specification document including the project framework, planning tools, and impact analysis
4. Draft the implementation specification document for submission to the partner company
5. Presentation of a working prototype to the client company

Each stage will be validated by the partner company to ensure project feasibility. These regular interactions will enable an agile approach and continuous adaptation.
- Develop planning (PERT-GANTT) and manage costs (direct and indirect)
- Produce a specification document including the project framework, planning tools, and impact analysis
- Draft the implementation specification document for submission to the partner company
- Presentation of a working prototype to the client company

Each stage will be validated by the partner company to ensure project feasibility. These regular interactions will enable an agile approach and continuous adaptation.

3. General overview of learning objectives

- Understand the fundamental concepts of ICT, with reference to hardware, software, and networks.
- Define the start-up and preparation phases of an industrial process innovation project
- Produce a scoping document
- Draw up a project management plan
- Implement and analyze feedback.

Practical application	▪ Define and structure the start-up and preparation phases of an R&D project, ensuring clarity of objectives and scope. ▪ Develop a comprehensive scoping document that outlines project requirements, constraints, and deliverables. ▪ Design and implement a project management plan, including scheduling, resource allocation, and risk assessment. ▪ Apply feedback analysis techniques to evaluate project outcomes and integrate lessons learned for continuous improvement.
Operational autonomy at EQF Level 6	At this level, students demonstrate the ability to manage complex technical projects and industrial innovation processes independently. This involves taking responsibility for decision-making in unpredictable work contexts, overseeing the strategic alignment of project specifications with company goals, and leading multidisciplinary teams. The student acts as a bridge between theoretical Lean-Kaizen principles and practical shop-floor implementation, ensuring professional management of resources, risks, and stakeholder expectations.

4. Specific learning Outcomes (EQF6 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	APPLIED INNOVATION RESEARCH	DIGITAL MODELLING & SIMULATION	BENCHMARK & STANDARDS	QUALITY G PROCESS MANAGEMENT	ENTREPRENEURIAL THINKING	SELF G TIME MANAGEMENT	SUSTAINABILITY THINKING	CYBERSECURITY
LO1	**Structured Ideation s Creative Problem-Solving** Apply structured ideation techniques to generate innovative, feasible solutions. Use iterative development cycles to refine concepts based on analysis of errors and feedback.	X	X				X	X	X	
LO2	**Prototyping s Concept Validation** Transform an initial concept into a validated prototype through continuous testing, feedback integration, and iterative improvements. Demonstrate the ability to evaluate prototype performance and adjust the design accordingly.	X	X	X	X	X	X	X	X	
LO3	**Sustainable s Responsible Manufacturing** Implement product development practices that align with Corporate Social Responsibility (CSR) principles. Integrate sustainability criteria into design decisions, material choices, and manufacturing processes.						X	X	X	

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	APPLIED INNOVATION RESEARCH	DIGITAL MODELLING &SIMULATION	BENCHMARK & STANDARDS	QUALITY G PROCESS MANAGEMENT	ENTREPRENEURIAL THINKING	SELF G TIME MANAGEMENT	SUSTAINABILITY THINKING	CYBERSECURITY
LO4	**Teamwork, Roles s Specification Development** Collaborate effectively within a multidisciplinary team by distributing roles and responsibilities in alignment with company or client expectations. Produce clear and structured technical specifications (cahier des charges) that guide the project's development.					X	X	X		
LO5	**Multidisciplinary Project Execution** Carry out a practical project that integrates multiple fields such as mechanics, automation, business, IT, and sustainability. Demonstrate the ability to coordinate interdisciplinary knowledge to solve a complex real-world problem.	X	X		X		X			
LO6	**Digital Tools s Virtual Prototyping** Use digital design and simulation tools to model, prototype, and optimize new processes virtually. Evaluate digital prototypes to anticipate constraints and improve the development workflow.		X	X		X				X
LO7	**Compliance with International Standards s Quality Methods** Produce technical specifications that comply with international standards (ISO) and recognized quality management methodologies, including lean management principles. Assess whether documentation meets required norms and adjust it accordingly.		X		X	X				
LO8	**Agile Project Management s Planning** Develop project specifications and planning documents that incorporate continuous feedback loops. Apply agile methods to organize and manage the project, ensuring adaptability, iteration, and responsiveness to change						X	X		
LO9	**Specification Writing Aligned with Company Strategy** Produce technical and functional specifications (cahier des charges) that align with the company's strategic priorities, operational needs, and long-term goals. Justify design choices based on strategic relevance and measurable business outcomes.				X	X				
LO10	**Teamwork s Collaboration Using Digital Tools** Create effective working conditions within a team by applying collaboration methods and using dedicated digital tools such as Microsoft Teams and MS Project. Coordinate tasks, share information, and monitor project progress through collaborative platforms and project-management software.					X		X		X
LO11	**Quality-Driven Specification Development** Produce specifications that comply with total quality management (TQM) principles and internationally recognized quality frameworks such as Lean Management and Six Sigma. Apply quality standards to reduce variability, improve processes, and ensure client satisfaction.				X	X		X		

N.	**Learning Outcomes** At the end of the module, the student will be able to:	CREATIVE PROBLEM-SOLVING	APPLIED INNOVATION RESEARCH	DIGITAL MODELLING & SIMULATION	BENCHMARK & STANDARDS	QUALITY G PROCESS MANAGEMENT	ENTREPRENEURIAL THINKING	SELF G TIME MANAGEMENT	SUSTAINABILITY THINKING	CYBERSECURITY
LO12	**Strategic Alignment of Specifications (Reinforced Competency)** Develop specifications that consistently reflect the company's priorities, performance objectives, and stakeholder expectations. Integrate strategic considerations such as cost-effectiveness, competitiveness, and sustainability.						X			
LO13	**Time Management s Prioritization** Use time-prioritization tools (e.g., Eisenhower matrix, Gantt charts, MS Project planning features) to organize tasks effectively and meet project milestones. Evaluate urgency and importance to plan workloads and optimize individual and team productivity.						X	X		
LO14	**Sustainability** Develop specifications by applying life cycle assessment methods. Develop specifications by applying life cycle assessment methods and taking systemic risks into account. (Risk matrix) Produce specifications that optimise energy and material efficiency.								X	
LO15	**Digital Skills** Produce specifications that take into account cybersecurity requirements: data protection, high availability, cyber-physical system security. Students will use digital twin technology (i.e. machine learning (AI technology)) to identify the technical solutions required by the client/company. This technology facilitates data storage and processing, as well as scalability and performance, which require expertise in cloud-based systems.			X						X

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment

HVET in collaboration with University: define theoretical framework on the fundamentals of quality, innovation, Lean Management, project management, and problem-solving methods. defines in concrete terms the expectations in terms of specifications for the practical part.

Companies: Provide a real case of R&D Project.

Integration: joint curriculum co-design to balance theory, practice, and application.

2. Learning delivery

HVET: provide on line training modules on the fundamentals of quality, innovation, Lean Management, project management, and problem-solving methods. Provides the expectations in terms of specifications for the practical part.

Companies: Participate in each stage of the project in order to provide constructive feedback ensuring the project's feasibility.

Integration: blended learning model (theory + workplace projects).

3. Monitoring & support

HVET: provide academic tutoring on the fundamentals of governance, strategy, quality, innovation, Lean Management, project management, and problem-solving methods. Produces a set of specifications for the expected specifications.

Companies: mentors monitor application in workplace simulations and projects.

Integration: regular coordination meetings for progress tracking and alignment.

4. Cooperation inside HUCO

Support during the co- design and validation phase

Partners involved during the monitoring phase.

Co-funded by the European Union

ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

The project was organized as a hackathon focused on implementing an innovation project for industrialization processes. The starting point was a real, identified need from a partner company regarding continuous quality improvement (KAIZEN). The Kaizen model aims to help companies gradually and consistently improve their efficiency and reduce waste in their processes.
The goal of this hackathon is to provide the client with both a set of specifications and a prototype that meets their needs.

INDUSTRIAL DESIGN JAM HACKATHON IN BRIEF

The hackathon aims to address a real need for continuous improvement (KAIZEN) identified by a partner company in order to optimize its industrialization processes. It enables us to provide the client with a set of specifications and a functional prototype tailored to their expectations. The mentoring teams are composed of French, Spanish, and Lithuanian instructors, each of whom contributes their expertise at key stages of the project.

Who: SSMTP, UPV and CMQe MSI - Saint Joseph-La Salle Group with 8 students and 2 French teachers
When: From 23/08/27 to 27/08/27
Where: In Saint-Joseph-La SalleGroup- Dijon
Duration: 35 hours

Sunrise Tech Park — UNIVERSITAT POLITÈCNICA DE VALÈNCIA

5. Teaching Methodologies			
☒	Lectures	☐	Experiential Learning
☐	Technical Laboratory	☐	Teaching from / in practice
☐	Inquired-Based Learning	☐	Study / Workshop
☒	Project-Based Learning	☐	Study visit / mobility experiences abroad
☐	Case-Based Learning	☐	Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)			
Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Not concerned			

7. Evaluation and assessment methods					
Type of activity	**Weight (%)**	**Evaluators**		**Supervision**	
Theoretical test	**0%**	ESJO Teacher Company University	☐ ☐ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☐ ☐ ☐
Project / practical work	**50%**	ESJO Teacher Company University	☒ ☒ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☒ ☒ ☒
Report / documentation	**25%**	ESJO Teacher Company University	☒ ☒ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☒ ☒ ☒
Presentation / discussion	**25%**	ESJO Teacher Company University	☒ ☒ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☒ ☐ ☒

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Application Level (EQF 6)
CREATIVE PROBLEM-SOLVING	Report demonstrating the use of ideation methods, project management techniques, and the resulting outcomes.	Devise solutions in a real case that address both economic and technical issues, Be able to analyze feasibility of innovations.	**BT FS01- L3/4** Learners apply ideation techniques to generate and refine solutions
APPLIED INNOVATION RESEARCH	Report demonstrating the application from idea to a validated solution, project management, techniques, and the resulting outcomes.	Devise practical and cost-effective solutions to implement. Be able to analyze feasibility of innovations.	**BTFS02- L5/6** Learners lead complex R&D processes and assess research impact
DIGITAL MODELLING & SIMULATION	Report demonstrating the methods of application of designing and protoyping, and the resulting outcomes.	Simulate solutions virtually.	**BTFS06 – L5/6** Learners develop complex simulations for decision-making in dynamic environments.
BENCHMARK & STANDARDS	Report demonstrating the methods of application of international standards such as ISO 21500 , Lean Management.	Apply best practices and total quality management tools.	**BTFS07 – L5/6** Learners integrate benchmarks into organizatioal learning and innovation cycles.
QUALITY G PROCESS MANAGEMENT	Report demonstrating the methods of application of international standards such as ISO 21500 , Lean Management and Total Quality Management (Agility)	Apply best practices and total quality management tools.	**BTFS11 – L3/4** Learners apply quality checks and control mechanisms.
ENTREPRENEURIAL THINKING	Report demonstrating how students evaluate risks, and how their ability to align technical solutions to strategic goals	Be able to develop the skills required for strong capability in designing and executing strategic entrepreneurial programmes.	**BTFS12 – L3/4** Learners create value propositions and test business model.
SELF & TIME MANAGEMENT	Report demonstrating the methods of time prioritisation tools and self-evaluation strategies, identifying strengths and areas for improvement through planning.(Gantt)	The module develops the skills required for strong capability in prioritising tasks and in maintaining focus.	**BTFS13 – L3/4** Learners apply time management strategies in learning and work scenarios, and analyze personal organization.
SUSTAINABILITY THINKING	Report demonstrating the methods of Life Cycle Assessment. and the resulting outcomes.	The module develops a strong level of competence in using the following tools: eco-design, qualitative and quantitative assessment tools, environmental improvement tools and the eco-design wheel.	**BTFS14- L3/4** Learners apply strategies for ecological innovation in design.
CYBERSECURITY	Report demonstrating that solutions take into account cybersecurity requirements: data protection, high availability, cyber-physical system security.	The module enables to manage diverses digital tools (solutions take into account cybersecurity requirements: data protection, high availability, cyber-physical system security.	**BTFS1G– L1/2** Learners recall types of cyber threats and describe security principles.

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures	10	ESJO	ESJO
Project work	25	ESJO/Company	ESJO
–	**35**	–	
Self-Study		Autonomous	
Assessment / Exams		ESJO	ESJO
Total Hours x ECTS calculation:	**35**		
ECTS Credits Awarded:			

Module 30 - DIGITIZATION OF THE DESIGN FUNCTION

1. ModuleIdentification	
Module Title	**DIGITALIZATION OF THE DESIGN FUNCTION**
Module Code	TU30
Year / Semester	**3° - 2026/2027**
Module Contact hours	35 hours
EQF Level	EQF 6

2. Module positioning within the training pathway	
Role of the module within the CNAM curriculum	☐ Foundational module ☐ Professionalizing module ☒ Integrative module
Required entry competences	None

Teaching in a Fab Lab

Practical Lab : "Learning By Doing" pedagogical method:
As digital skills are useful for projects and cross-disciplinary, they will be taught in an experimental laboratory called a 'Fab Lab'. The principles of openness and collaboration underpin Fab Labs. They use digital manufacturing machines and networks that allow files to be shared around the world. This means that an object can be designed in one Fab Lab, manufactured in another, and improved in a third. Fab labs are based on the principles of openness and collaboration.
Thanks to simplified, user-friendly and increasingly interoperable computer interfaces, it is becoming easier for non-specialist users to take control of technical tools.

The digital tools taught are 3D scanning and digital twins, which are necessary tools for additive manufacturing and prototyping 3D SCANNING (15 hours):

1. **3D Scanning:** Perform accurate static and handheld 3D laser scans and generate usable point-cloud data.
2. **CAD Integration:** Process, organize, and model from point clouds and meshes within CAD software.
3. **Complete Workflow & Collaboration:** Execute a full scan-to-CAD workflow independently and collaborate effectively in group tasks.

Concerning using Digital Twins (20 hours)

- Scan a physical object with a 3D scanner, import the model into the digital twin software, and configure it.
- Install sensors (temperature, vibration) on a prototype and connect their data to the digital twin.
- Simulate the behaviour of a system (e.g. machine, mechanical part) under different conditions (load, temperature).
- Modify the virtual model to improve performance or reduce costs, then validate via simulation.
- Study the risks associated with data protection in connected systems and propose solutions.

3. General overview of learning objectives

3D SCANNING
- Understand and Characterize 3D Laser Scanning Technologies
- Acquire and Structure 3D Scan Data
- Integrate and Manipulate Scan Data in CAD Environments
- Convert Complex Scans into CAD-Ready Digital Models

DIGITAL TWINS
- Define the Concept and Operational Value of a Digital Twin
- Construct and Data-Enable Digital Twin Models
- Conduct Advanced Simulations and Performance Analysis
- Connect Digital Twins to Information Systems While Ensuring Data Security

Practical application	**3D SCANNING** ▪ Perform accurate scans, align multiple captures, generate point clouds, define origins and zones, and create usable meshes. ▪ Import, manage, and manipulate point clouds and meshes in CAD software (Inventor, SolidWorks), and model components based on scan data. ▪ Carry out the full workflow from scanning to CAD modelling, export processed data for engineering use, work autonomously on individual tasks, and collaborate effectively on group scanning activities. **DIGITAL TWINS** ▪ Create or import realistic 3D models for digital twin applications. ▪ Incorporate physical, sensor, or historical data into the digital twin model. ▪ Perform dynamic simulations to replicate real-world conditions and analyse results to anticipate performance and failures. ▪ Connect the digital twin to IoT systems or databases and understand data exchange protocols. ▪ Use the digital twin to test scenarios before manufacturing and propose improvements based on analysis.

4. Specific learning Outcomes (EQF6 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	DIGITAL FUNDAMENTALS	DATA LITERACY	AI- LITERACY & APPLICATION
LO1	**3D SCANNING:** Carry out 3D scanning operations and generate structured point clouds, including alignment, origin definition, and zone creation. Import and manipulate point clouds and meshes in CAD tools (Inventor, SolidWorks) to support engineering workflows. Produce CAD-ready digital models from complex scanned parts, transforming raw scan data into usable engineering geometry.	X	X	X
LO2	**DIGITAL TWINS:** Build functional digital twin models by creating/importing 3D representations and integrating physical, sensor, or historical data. Conduct dynamic simulations and analyse performance, identifying behaviours, failure modes, and optimisation opportunities. Connect a digital twin to IoT systems or databases and apply data-security principles, ensuring compliant and safe data exchange.	X	X	X

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
HVET in collaboration with University: Define the theoretical and practical framework for learning to use two design tools: 3D scanning and digital twins. The educational materials should be aligned with the philosophy of a Fab Lab, which emphasises learning through hands-on experience and reflection. ***Companies:*** Can provide a real case of R&D Project. ***Integration:*** joint curriculum co-design to balance theory, practice, and application.	***HVET:*** provide on line training modules on using 3D scanning and digital twins. ***Companies:*** Can participate in each stage of the project in order to provide constructive feedback ensuring the project's feasibility. ***Integration:*** blended learning model (theory + workplace projects).	***HVET:*** provide academic tutoring on the fundamentals of 3D scanning and digital twins. ***Companies:*** **Integration:** regular coordination meetings for progress tracking and alignment.	***Support during the co-design and validation phase*** ***Partners involved during the monitoring phase.***

Co-funded by the European Union

DIGITIZATION OF THE DESIGN FUNCTION IN BRIEF

Teaching in the Fab Lab uses a learning-by-doing approach where students develop cross-disciplinary digital skills in an open, collaborative environment equipped with shared digital manufacturing tools.
They learn to use technologies such as 3D scanning and digital twins, essential for prototyping and additive manufacturing, enabling them to design, produce, and improve objects across interconnected Fab Labs worldwide.

Who: DHBW and CMQe MSI - Saint Joseph-La Salle Group with 8 students and 2 teachers.
When: From 12/04/2027 to 16/04/2027
Where: DHBW Karlsruhe
Duration: 35 hours

5. Teaching Methodologies

- ☐ Lectures
- ☒ Technical Laboratory
- ☐ Inquired-Based Learning
- ☐ Project-Based Learning
- ☒ Case-Based Learning
- ☐ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice	
		Linked to the Learning Outcomes	Mapped onto TRIComp
Not concerned			

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators		Supervision	
Theoretical test	**0%**	ESJO Teacher	☐	Alignment with Learning Outcomes (LO)	☐
		Company	☐	Technical and practical quality	☐
		University	☐	Documentation and reflection skills	☐
Project / practical work	**100%**	ESJO Teacher	☒	Alignment with Learning Outcomes (LO)	☒
		Company	☐	Technical and practical quality	☒
		University	☒	Documentation and reflection skills	☒
Report / documentation	**0%**	ESJO Teacher	☐	Alignment with Learning Outcomes (LO)	☐
		Company	☐	Technical and practical quality	☐
		University	☐	Documentation and reflection skills	☐
Presentation / discussion	**0%**	ESJO Teacher	☐	Alignment with Learning Outcomes (LO)	☐
		Company	☐	Technical and practical quality	☐
		University	☐	Documentation and reflection skills	☐

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TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Application Level (EQF 6)
DIGITAL FUNDAMENTALS	Students carry out a complete workflow and submit a final prototype or digital artefact. - Scan → Process → CAD model a real object available in the Fab Lab.	Manage diverses digital tools.	**BTFS17 – L3/4** Learners apply safe and effective digital practices in varied technical contexts.
DATA LITERACY	Students carry out a complete workflow and submit a final prototype or digital artefact. - Scan → Process → CAD model a real object available in the Fab Lab.	Manage diverses digital tools (solutions take into account the technologies used in the company)	**BTFS18 – L3/4** Learners apply statistical tools to analyze datasets in varied technical contexts.
AI- LITERACY & APPLICATION	- Create a small digital twin of a machine or Fab Lab environment (ventilation, motor, CNC, etc.).	Take into account the use of digital twin technology (i.e. machine learning (AI technology) to identify the technical solutions required by the client/company.	**BTFS20– L3/4** Learners apply basic AI tools in technical or research environments

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Theoretical activities / Lectures			
Fab Lab	35	Lab	ESJO
–	**35**	–	
Self-Study		Autonomous	
Assessment / Exams		ESJO	ESJO
Total Hours x ECTS calculation:	**NC**		
ECTS Credits Awarded:			

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Module 31 – PROFESSIONAL EXPERIENCE

1. Module Identification	
Module Title	**PROFESSIONAL EXPERIENCE**
Module Code	TU31
Year / Semester	**3° - 2026/2027**
Module Contact hours	375 hours
EQF Level	EQF 6

2. Module positioning within the training pathway	
Role of the module within the CNAM curriculum	☐ Foundational module ☒ Professionalizing module ☐ Integrative module
Required entry competences	To have attended all the mandatory modules.

Professional experience must be validated by both the company tutor and the supervising teacher.
Students must submit a report highlighting the activities they have carried out and undertaken. The supervising teacher is responsible for submitting a normative opinion via an assessment form concerning the quality of the activities presented and the experience acquired.
The reference points for assessment are defined through a list of expected standard skills. Depending on the host company for the internship or apprenticeship, students are directed either towards mechanical product/system design or towards mechatronics and automation design.
For each career path, the expected skills are as follows. Students must validate all or part of the skills listed below.
The professional skills are the result of applying the theoretical teachings defined in the reference framework. The expected skills are used to measure the functional transferability of knowledge into concrete activities.

3. General overview of learning objectives	
▪ **Apply advanced engineering principles** to solve real-world industrial challenges in the fields of mechanical design or mechatronics. ▪ **Manage complex technical projects** from the functional analysis phase through to technical specification and final validation. ▪ **Integrate seamlessly into professional RGD or production teams**, demonstrating the ability to collaborate across different departments and hierarchy levels. ▪ **Utilize industry-standard digital tools** (CAD, simulation software, and PLM systems) to design, optimize, and document technical solutions. ▪ **Evaluate industrial processes** through the lens of quality assurance, economic feasibility, and environmental sustainability. ▪ **Reflect critically on professional practice** by documenting activities and defending technical choices before a committee of experts.	
Operational autonomy at EQF Level 6	At this level, the student is expected to demonstrate a high degree of **professional independence** and **decision-making capability.** Operational autonomy is defined by: - **Self-Directed Management:** The ability to organize their own workload and meet project milestones with minimal supervision, taking responsibility for the progress of assigned mechanical or automated system designs. - **Complex Problem Solving:** Demonstrating the initiative to identify technical malfunctions or design gaps and proposing innovative, data-driven solutions independently. - **Professional Responsibility:** Taking ownership of the quality and safety of the designs produced, ensuring they align with international standards and company-specific norms. - **Collaborative Leadership:** While working within a team, the student acts as a proactive stakeholder, coordinating with internal and external partners (suppliers, clients, or other departments) to ensure project coherence. - **Adaptive Learning:** The capacity to identify their own technical gaps in a fast-paced industrial context and autonomously seek out the necessary information or "just-in- time" training to bridge them.

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4. Specific learning Outcomes (EQF6 – Competence-based) and link with TRIComp

N.	**Learning Outcomes** At the end of the module, the student will be able to:	TRICOMP Competence
LO1	**Analyze and define functional requirements** for a complex mechanical system or automated process by interpreting client needs and technical constraints.	**CREATIVE PROBLEM-SOLVING**
LO2	**Design technical solutions** using advanced CAD/CAE software, ensuring that 3D models and assemblies meet industry standards for manufacturing.	**DIGITAL MODELLING & SIMULATION**
LO3	**Perform structural and functional simulations** to validate the dimensioning, load cases, and stresses of mechanical components before prototyping.	**SYSTEM DESIGN**
LO4	**Integrate mechatronic components** (sensors, actuators, and controllers) into a unified system, ensuring hardware-software compatibility.	**INTERDISCIPLINARY COLLABORATION**
LO5	**Develop and manage project schedules,** coordinating tasks and resources to meet industrial deadlines and production milestones.	**SELF & TIME MANAGEMENT**
LO6	**Implement quality assurance protocols,** including FMEA (Failure Mode and Effects Analysis) and functional analysis, to ensure product reliability.	**QUALITY G PROCESS MANAGEMENT**
LO7	**Apply sustainability principles** to the design process, considering life- cycle assessment (LCA) and the environmental impact of chosen materials.	**SUSTAINABILITY THINKING**
LO8	**Diagnose malfunctions** related to the automated system. **Perform a standard exchange** of a functional subset of the installation. **Identify possible areas** for improvement and propose solutions.	**SYSTEMS THINKING**
LOG	**Communicate technical data effectively** to diverse stakeholders through professional reports, technical manuals, and oral presentations.	**COMMUNICATION**
LO10	**Evaluate the economic feasibility** of technical choices, balancing high-Performance engineering with production costs and market competitiveness.	**BENCHMARK & STANDARDS**
LO10	**Use theoretical and computer tools** to calculate and size the components. Work in different IT environments	**DIGITAL FUNDAMENTALS COMPETENCES**
LO12	**Easily use tools and methods for data collection,** processing and analysis to observe and analyze the phenomena and/or behaviors of a subset. **Analyze and synthesize data** for their exploitation.	**DATA LITERACY**

Co-funded by the European Union

ERASMUS-EDU-2024-PI-ALL-INNO – **HUCO LABS** – Project number: **101186024** – Project duration: **Nov. 2024 - Oct. 2027**

COOPERATION MODEL HVET – UNIVERSITY – COMPANY ● COOPERATION INSIDE HUCO ECOSYSTEM

1. Design and alignment	2. Learning delivery	3. Monitoring & support	4. Cooperation inside HUCO
ESJO & University: - Define Learning Outcomes (LOs) aligned with EQF 6; - Map technical tasks to the TRIComp framework; - Ensure academic validation of the work plan. ***Company:*** - Provide detailed Job Descriptions; - Identify specific industrial challenges; - Assign a dedicated **Company Mentor.**	***Company:*** - Host the student; - Provide access to industrial tools; - Integrate the student into R&D or Production teams. ***ESJO & University:*** - Provide a university and academic tutor for continuous scientific technical support; - Deliver "just-in-time theoretical modules if specific technical gaps emerge.	***ESJO:*** - Tripartite evaluation: student performance, company satisfaction, academic coherence. - Review of skills acquired vs. intended learning outcomes. - Update the partnership and internship model based on feedback for the next cycle.	The HUCO Ecosystem provides the digital infrastructure and the network of trust (MoUs) necessary to validate hours and competencies acquired abroad, ensuring that a project developed in a German or Spanish company is fully recognized within the French licence SIEE curriculum. ***Evaluate the Final exam; Certify the achievement of professional skills***

As part of the HUCO LABS program, a four-week study abroad program is planned for French students. The general idea is to complete 140 hours of internship/apprenticeship within a foreign company as part of the 350 hours overall.
Depending on the host companies, a skills program directly related to the profession and the application of research and development will be defined.
Overall, students will be able to validate the direct practical application of the skills expected by the HUCO LABS program.
The host countries that were identified in advance are Germany and Spain.

PROFESSIONNAL EXPERIENCE IN BRIEF

Who: UPV and DHBW CMQe MSI (Saint Joseph-La Salle Group)
When: From 01/02/2027 to 26/02/2027
Students concerned: students (2 + 2) in Spain and 4 students (2 + 2) in Germany
Where: This internship will take place in Spain (2 companies) and in Germany (2 companies)
Duration: 4 weeks

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

DHBW Duale Hochschule Baden-Württemberg Karlsruhe

5. Teaching Methodologies

- ☐ Lectures
- ☐ Technical Laboratory
- ☐ Inquired-Based Learning
- ☐ Project-Based Learning
- ☐ Case-Based Learning
- ☒ Experiential Learning
- ☐ Teaching from / in practice
- ☐ Study / Workshop
- ☐ Study visit / mobility experiences abroad
- ☐ Other (specify)

6. Description of Practical / Work-Based Learning Phases (if applicable)

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Practical Context	Student tasks and activities (concrete and observable examples)	Skills developed in practice Mapped onto TRIComp
Internship/ apprenticeship	**Mechanical productor system design** - Perform functional analysis of a mechanical product or system - Develop all or part of the specifications for a mechanical product or system - Research technical solutions that meet functional requirements - Design a technical solution for a mechanical product or system using CAD software Establish a progress schedule for a mechanical product or system design project - Conduct all or part of a quality assurance study, taking into account the environmental profile of the mechanical product or system - Draft all or part of a set of specifications Coordinate the various internal and external stakeholders according to a schedule defined by management - Study and design industrial products using appropriate IT tools - Master mechanical engineering technologies Select and implement appropriate techniques (automation, numerical control, robotics, etc.) for system automation - Define parts and assemblies in 3D, extract manufacturing plans and programmes for numerical control manufacturing - Define load cases and stresses applied to mechanical components - Use theoretical and computer tools for calculating and dimensioning components. - Work in different IT environments. - Verify the suitability of the chosen technologies/costs. - Provide all the information needed to set prices and participate in the process. - Take into account industrialisation methods that are compatible with the means of production. - Participate in the creation and updating of manufacturing files.	CREATIVE PROBLEM-SOLVING COMMUNICATION INTERDISCIPLINARY COLLABORATION DIGITAL MODELLING & SIMULATION BENCHMARK & STANDARDS QUALITY & PROCESS MANAGMENT SELF & TIME MANAGEMENT SUSTAINABILITY THINKING SYSTEMS THINKING DIGITAL FUNDAMENTALS DATA LITERACY
Internship/ apprenticeship	**Mechatronics and automation design** - Participate in the development of functional specifications for product definition. - Participate in the selection of mechanical, electronic and IT technologies, materials and manufacturing processes in order to achieve the best compromise with the specifications. - Participate in the design of products that can integrate mechanical, electronic and IT functions. Design a plan, diagram or software program, simulate it, optimise it and validate it using IT tools.	CREATIVE PROBLEM-SOLVING COMMUNICATION INTERDISCIPLINARY COLLABORATION DIGITAL MODELLING & SIMULATION BENCHMARK & STANDARDS

Internship/ apprenticeship	- Participate in the selection of components, assembly processes and integration techniques. Define the appropriate means and methods of measurement. - Use quality management tools (functional analysis, FMEA, etc.). - Provide technical support to production: prototyping, series start-up, modifications, procurement, etc. - Participate in the development of control specifications and production files Participate in the drafting of technical and - commercial documents and technical manuals Provide technical assistance to the after-sales service - Participate in technology monitoring and industrial property protection. - Provide technical training to sales staff and product users. - Communicate and report. - Analyse the operation of a machine cycle. Deal with operational problems related to the machine cycle. - Teach users best practices for operating the equipment. - Make adjustments and synchronise the machine. Diagnose malfunctions related to the automated system - Perform a standard exchange of a functional sub- assembly of the installation - Identify possible areas for improvement and propose solutions - Communicate information related to your activity to the various stakeholders	**QUALITY & PROCESS MANAGEMENT** **SELF & TIME MANAGEMENT** **SUSTAINABILITY THINKING** **SYSTEMS THINKING** **DIGITAL FUNDAMENTALS** **DATA LITERACY**

7. Evaluation and assessment methods

Type of activity	Weight (%)	Evaluators		Supervision	
Theoretical test	**0%**	ESJO Teacher Company University	☐ ☐ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☐ ☐ ☐
Project / practical work	**0%**	ESJO Teacher Company University	☐ ☐ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☐ ☐ ☐
Report / documentation	**80%**	ESJO Teacher Company University	☒ ☐ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☒ ☒ ☒
Presentation / discussion	**20%**	ESJO Teacher Company University	☒ ☐ ☐	Alignment with Learning Outcomes (LO) Technical and practical quality Documentation and reflection skills	☒ ☐ ☒

TRIComp Competence	Assessment Methods	Evaluation Criteria / Evidence: The expected TRIComp levels are considered achieved when the student demonstrates the ability to:	Expected Application Level (EQF 6)
CREATIVE PROBLEM-SOLVING	Technical Report & Case Study	Demonstrates the ability to propose at least two viable technical alternatives to a design bottleneck and justifies the final choice based on functional constraints.	Advanced
DIGITAL MODELLING & SIMULATION	CAD Portfolio & Simulation Data	Produces 3D models and simulation reports (FEA/CFD) that accurately predict component behavior under real-world stress conditions.	Advanced
SYSTEM DESIGN	Project Documentation	Successfully identifies the interdependencies between mechanical, electronic, and software sub-systems within an automated installation.	Intermediate
COMMUNICATION	Final Presentation & Tech Manuals	Delivers a clear, professional technical defense and drafts manuals that allow non-expert users to operate the developed equipment.	Advanced
SUSTAINABILITY THINKING	Environmental Impact Study	Integrates Life Cycle Assessment (LCA) data into the design phase, selecting materials or processes that minimize the carbon footprint of the product.	Intermediate
QUALITY & PROCESS MANAGEMENT	FMEA / Quality Audit Files	Applies quality management tools (like Failure Mode and Effects Analysis) to identify risks and suggest preventive measures in the production cycle.	Intermediate
INTERDISCIPLINARY COLLABORATION	Peer/Mentor Evaluation & Report	Provides documented evidence of effective coordination with different industrial departments (e.g., R&D, Maintenance, and Sales).	Advanced
SELF & TIME MANAGEMENT	Progress Schedule & Logbook	Maintains a detailed project timeline and meets all industrial milestones autonomously, adjusting the plan when technical delays occur.	Advanced
SYSTEMS THINKING	Project Documentation	Diagnose malfunctions related to the automated system and perform a standard exchange of a functional subset of the installation.	Intermediate
DIGITAL FUNDAMENTALS	Peer/Mentor Evaluation & Report	Use reference digital tools and computer security rules to acquire, process, produce and disseminate information as well as to collaborate internally and externally.	Advanced
DATA LITERACY	Analytics Report / Monitoring Data	Collects, interprets, and utilizes sensor or production data to optimize machine cycles or improve mechanical performance.	Intermediate
BENCHMARK & STANDARDS	Technical Specification Review	Ensures all designs comply with EU/International safety standards (ISO/CE) and performs a cost-benefit analysis against market competitors.	Intermediate

8. Workload Structure and Hour Distribution

Type of Activity	Hours	Location	Supervision
Work-Based Learning (WBL)	**310**	Company	ESJO / Company
Study Mobility Abroad	**140**	Company	ESJO / University / Company
–		–	
Self-Study	**24**	Autonomous	
Assessment / Exams	**1**	ESJO	ESJO
Total Hours x ECTS calculation:	**375**		
ECTS Credits Awarded:	**15**		

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SUMMARY MATRIX - 6TH LEVEL EQF PATHWAY

INNOVATION COMPETENCES	25	26	27	28	29	30	31
INNOVATION COMPETENCES							
CREATIVE PROBLEM-SOLVING	X	X	X	X	X		X
APPLIED INNOVATION RESEARCH			X	X	X		
RESPONSIBLE RESEARCH	X		X				
COMMUNICATION			X	X			X
INTERDISCIPLINARY COLLABORATION			X	X			X
DIGITAL MODELLING & SIMULATION		X		X	X		X
BENCHMARK G STANDARDS					X		X
INNOVATION MANAGEMENT				X			
MANAGEMENT COMPETENCES							
PROJECT LEADERSHIP				X			
RESEARCH-DRIVEN							
QUALITY G PROCESS MANAGEMENT					X		X
ENTREPRENEURIAL THINKING				X	X		
SELF G TIME MANAGEMENT					X		X
GREEN COMPETENCES							
SUSTAINABILITY THINKING	X	X			X		X
SYSTEMS THINKING	X						X
SUSTAINABLE SYSTEM DESIGN	X	X					
DIGITAL COMPETENCES							
DIGITAL FUNDAMENTALS						X	X
DATA LITERACY						X	X
CYBERSECURITY G PRIVACY					X		
AI-LITERACY G APPLICATION		X	X			X	
CLOUD-BASED MANUFACTURING		X					
DIGITAL APPLICATION DESIGN							

TRAINING MODULES: TITLES
TU25 - INTRODUCTION TO LIFE CYCLE ASSESSMENT AND ECO-DESIGN OF PRODUCTS
TU26 - COMPUTER AIDED DESIGN
TU27 - RESEARCH AND SCIENTIFIC COMMUNICATION
TU28 - INNOVATION SPRINT
TU2G – INDUSTRY DESIGN JAM
TU30 - DIGITIZATION OF THE DESIGN FUNCTION
TU31 - PROFESSIONNAL EXPERIENCE

The provided matrix offers a comprehensive overview of the integration of **TRIComp Future Skills** across the 7 Training Units (TU) of the **HUCO 6th-level EQF pathway**. This mapping serves as a strategic plan for the study programme, illustrating how cross-disciplinary and innovative skills are integrated into the technical curriculum. In order to comply with the Level 5–Level 6 continuum, the numbering of the training units begins at 25; the Italian Level 5 programme presents training units ranging from 1 to 24.

Key observations from the table include:

Integrated Competence Clusters: The framework is organized into four main pillars: **Innovation, Management, Green, and Digital Competences.** This structure confirms that the pathway is designed to train "Innovation Enablers" who possess a holistic set of skills ranging from technical digitalization to sustainable leadership.

Strategic Mapping (The "X" Marks): Rather than overwhelming every module with all skills, the table shows a targeted selection. Most Training Units are associated with a limited number of competencies (typically 3 to 4), ensuring that the training remains focused and that the active teaching methodologies can effectively "train" those specific skills alongside the technical content.

It should be noted that training units 28, 29, and 30 validate a significant number of Future Skills, as they were designed for this purpose.

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TRAINING SCHEDULE FOR THE 2026-2027 SCHOOL YEAR

le cnam
Bourgogne – Franche-Comté

HUCO LABS

CALENDRIER PREVISIONNEL D'ALTERNANCE 2026-2027

Licence 3 Sciences pour l'Ingénieur en Electromécanique Parcours Méca

525 h de formation - en contrat de professionnalisation ou en contrat d'apprentissage

août-26	n°	sept-26	n°	oct-26	n°	nov-26	n°	déc-26	n°	janv-27	n°	févr-27	n°	mars-27	n°	avr-27	n°	mai-27	n°	juin-27	n°	juil-27	n°	août-27	n°
samedi 1	31	mardi 1		jeudi 1		dimanche 1		mardi 1		vendredi 1		lundi 1		lundi 1		jeudi 1		samedi 1	17	mardi 1		jeudi 1		dimanche 1	
dimanche 2		mercredi 2		vendredi 2	40	lundi 2		mercredi 2		samedi 2	53	mardi 2		mardi 2		vendredi 2	13	dimanche 2		mercredi 2		vendredi 2	26	lundi 2	
lundi 3		jeudi 3	36	samedi 3		mardi 3		jeudi 3	49	dimanche 3		mercredi 3		mercredi 3		samedi 3		lundi 3		jeudi 3	22	samedi 3		mardi 3	
mardi 4		vendredi 4		dimanche 4		mercredi 4		vendredi 4		lundi 4		jeudi 4	5	jeudi 4	9	dimanche 4		mardi 4		vendredi 4		dimanche 4		mercredi 4	
mercredi 5		samedi 5		lundi 5		jeudi 5	45	samedi 5		mardi 5		vendredi 5		vendredi 5		lundi 5		mercredi 5		samedi 5		lundi 5		jeudi 5	31
jeudi 6	32	dimanche 6		mardi 6		vendredi 6		dimanche 6		mercredi 6		samedi 6		samedi 6		mardi 6		jeudi 6	18	dimanche 6		mardi 6		vendredi 6	
vendredi 7		lundi 7		mercredi 7		samedi 7		lundi 7		jeudi 7	1	dimanche 7		dimanche 7		mercredi 7		vendredi 7		lundi 7		mercredi 7		samedi 7	
samedi 8		mardi 8		jeudi 8	41	dimanche 8		mardi 8		vendredi 8		lundi 8		lundi 8		jeudi 8	14	samedi 8		mardi 8		jeudi 8	27	dimanche 8	
dimanche 9		mercredi 9		vendredi 9		lundi 9		mercredi 9		samedi 9		mardi 9		mardi 9		vendredi 9		dimanche 9		mercredi 9		vendredi 9		lundi 9	
lundi 10		jeudi 10	37	samedi 10		mardi 10		jeudi 10	50	dimanche 10		mercredi 10		mercredi 10		samedi 10		lundi 10		jeudi 10	23	samedi 10		mardi 10	
mardi 11		vendredi 11		dimanche 11		mercredi 11		vendredi 11		lundi 11		jeudi 11	6	jeudi 11	10	dimanche 11		mardi 11		vendredi 11		dimanche 11		mercredi 11	
mercredi 12		samedi 12		lundi 12		jeudi 12	46	samedi 12		mardi 12		vendredi 12		vendredi 12		lundi 12		mercredi 12		samedi 12		lundi 12		jeudi 12	32
jeudi 13	33	dimanche 13		mardi 13		vendredi 13		dimanche 13		mercredi 13		samedi 13		samedi 13		mardi 13		jeudi 13	19	dimanche 13		mardi 13		vendredi 13	
vendredi 14		lundi 14		mercredi 14		samedi 14		lundi 14		jeudi 14	2	dimanche 14		dimanche 14		mercredi 14		vendredi 14		lundi 14		mercredi 14		samedi 14	
samedi 15		mardi 15		jeudi 15	42	dimanche 15		mardi 15		vendredi 15		lundi 15		lundi 15		jeudi 15	15	samedi 15		mardi 15		jeudi 15	28	dimanche 15	
dimanche 16		mercredi 16		vendredi 16		lundi 16		mercredi 16		samedi 16		mardi 16		mardi 16		vendredi 16		dimanche 16		mercredi 16		vendredi 16		lundi 16	
lundi 17		jeudi 17	38	samedi 17		mardi 17		jeudi 17	51	dimanche 17		mercredi 17		mercredi 17		samedi 17		lundi 17		jeudi 17	24	samedi 17		mardi 17	
mardi 18		vendredi 18		dimanche 18		mercredi 18		vendredi 18		lundi 18		jeudi 18	7	jeudi 18	11	dimanche 18		mardi 18		vendredi 18		dimanche 18		mercredi 18	
mercredi 19		samedi 19		lundi 19		jeudi 19	47	samedi 19		mardi 19		vendredi 19		vendredi 19		lundi 19		mercredi 19		samedi 19		lundi 19		jeudi 19	33
jeudi 20	34	dimanche 20		mardi 20		vendredi 20		dimanche 20		mercredi 20		samedi 20		samedi 20		mardi 20		jeudi 20	20	dimanche 20		mardi 20		vendredi 20	
vendredi 21		lundi 21		mercredi 21		samedi 21		lundi 21		jeudi 21	3	dimanche 21		dimanche 21		mercredi 21		vendredi 21		lundi 21		mercredi 21		samedi 21	
samedi 22		mardi 22		jeudi 22	43	dimanche 22		mardi 22		vendredi 22		lundi 22		lundi 22		jeudi 22	16	samedi 22		mardi 22		jeudi 22	29	dimanche 22	
dimanche 23		mercredi 23		vendredi 23		lundi 23		mercredi 23		samedi 23		mardi 23		mardi 23		vendredi 23		dimanche 23		mercredi 23		vendredi 23		lundi 23	
lundi 24		jeudi 24	39	samedi 24		mardi 24		jeudi 24	52	dimanche 24		mercredi 24		mercredi 24		samedi 24		lundi 24		jeudi 24	25	samedi 24		mardi 24	
mardi 25		vendredi 25		dimanche 25		mercredi 25		vendredi 25		lundi 25		jeudi 25	8	jeudi 25	12	dimanche 25		mardi 25		vendredi 25		dimanche 25		mercredi 25	
mercredi 26		samedi 26		lundi 26		jeudi 26	48	samedi 26		mardi 26		vendredi 26		vendredi 26		lundi 26		mercredi 26		samedi 26		lundi 26		jeudi 26	34
jeudi 27	35	dimanche 27		mardi 27		vendredi 27		dimanche 27		mercredi 27		samedi 27		samedi 27		mardi 27		jeudi 27	21	dimanche 27		mardi 27		vendredi 27	
vendredi 28		lundi 28		mercredi 28	44	samedi 28		lundi 28		jeudi 28	4	dimanche 28		dimanche 28		mercredi 28	17	vendredi 28		lundi 28		mercredi 28	30	samedi 28	
samedi 29		mardi 29	40	jeudi 29		dimanche 29		mardi 29	53	vendredi 29				lundi 29		jeudi 29		samedi 29		mardi 29	26	jeudi 29		dimanche 29	
dimanche 30		mercredi 30		vendredi 30		lundi 30		mercredi 30		samedi 30				mardi 30	13	vendredi 30		dimanche 30		mercredi 30		vendredi 30		lundi 30	
lundi 31				samedi 31				jeudi 31		dimanche 31				mercredi 31				lundi 31				samedi 31		mardi 31	

Signature + Tampon Entreprise

Signature alternant
Nom Prénom

Légende

- INNOVATION SPRINT COMAU TURIN
- SCHOOL ATTENDANCE
- HOLIDAYS
- APPRENTICESHIP IN COMPANIES
- SCHOOL CLOSURE
- INTERNSHIP GERMANY SPAIN
- DIGITIZATION DESIGN KARLSRUHE
- INDUSTRIAL JAM

MAJ le 04/03/2026 DBO

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Annex A – Recognition Procedure Flowchart

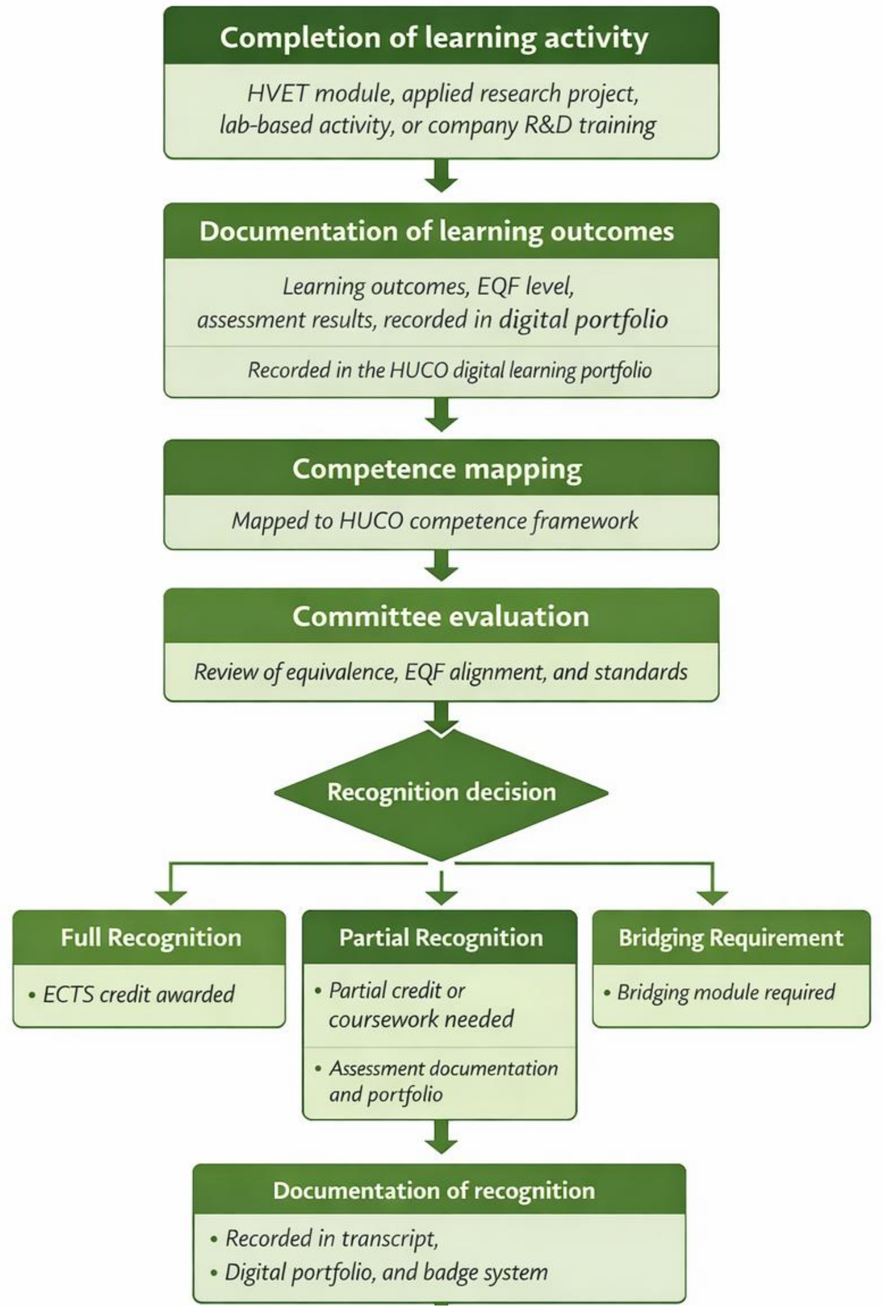

Figure 1. Recognition procedure for learning outcomes between HVET and higher education within the HUCO Labs framework.

Recognition Procedure for Learning Outcomes between HVET and Higher Education

In order to ensure transparency and consistency in the recognition of learning outcomes between Higher Vocational Education and Training (HVET) and higher education institutions, the HUCO Labs project establishes a structured recognition procedure.

The procedure follows the principles of the **Bologna Process, the Lisbon Recognition Convention, and the ECTS Users' Guide**, emphasising learning outcomes rather than institutional differences.

The recognition process consists of the following stages.

Step 1 – Completion of Learning Activity

Students complete a learning activity within the HUCO training pathways.
This may include:

- a formal HVET training module
- applied research project
- laboratory-based innovation activities
- company-based R&D training.

The learning activity is assessed according to the standards of the sending institution.

Step 2 – Documentation of Learning Outcomes

The achieved learning outcomes are documented in a **standardised learning outcome description format**.

The documentation includes:

- module title
- learning outcomes
- EQF level
- assessment results
- evidence of competence achievement.

This information is recorded within the **HUCO digital learning portfolio**.

Step 3 – Competence Mapping

The documented learning outcomes are mapped to the **HUCO competence framework developed in Deliverable D2.1**.

Each learning outcome receives:

- a competence identifier
- an associated competence area
- a reference EQF level.

This mapping ensures comparability across partner institutions.

Step 4 – Recognition Request

The student submits a recognition request to the receiving institution.

The request includes:

- module description
- learning outcomes
- assessment documentation
- evidence from the digital portfolio.

Step 5 – Evaluation by Recognition Committee

The receiving institution evaluates the recognition request through a **Recognition Committee** composed of:

- academic programme representatives
- faculty members responsible for relevant modules
- representatives of the HUCO consortium (where appropriate).

The committee evaluates the request based on:

- equivalence of learning outcomes
- EQF level alignment
- assessment standards
- relevance for the receiving programme.

Step 6 – Recognition Decision

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Three types of recognition decisions are possible.

Table 5- Recognition Types

Decision Type	Description
Full recognition	Learning outcomes are considered fully equivalent and recognised with ECTS credit.
Partial recognition	Some learning outcomes correspond; additional coursework may be required.
Bridging requirement	Additional bridging modules are required to achieve full equivalence.

Step 7 – Documentation of Recognition

The recognition decision is formally documented in:

- the student transcript
- the HUCO digital competence portfolio
- the digital badge system (where applicable).

This ensures transparency and portability of learning achievements.

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Annex B – Learning Outcome Mapping Matrix

B.1 Module Alignment between the Italian HVET Pathway and French Higher Education Programmes

The HUCO Labs consortium conducted a mapping exercise to identify correspondences between training modules delivered within the **Italian HVET pathway (EQF Level 5)** and modules delivered by **French higher education partners (EQF Level 6)**.

The mapping focuses on **learning outcome equivalence rather than structural similarity of programmes**.

The following criteria were used for the mapping:

- competence area
- learning outcome descriptors
- EQF level
- assessment methods
- relevance to programme objectives.

B.2 Complete working mapping table

The matrix below presents a complete working mapping derived from the module catalogues of the Italian Level 5 and French Level 6 HUCO pathways. It is intended to support pilot recognition decisions and should be institutionally validated during implementation by the receiving higher education partner(s).

Italian HVET module (EQF 5)	**French HE module (EQF 6)**	**Working recognition mode**	**Rationale**
TU3 – Technical English	TU27 – Research and Scientific Communication	Partial recognition + bridging	Strong overlap in technical communication, but the French module has a more explicit academic/scientific communication orientation.
TU5 – Creativity, AI and Proactive Mindset	TU28 – Innovation Sprint	Partial recognition	Shared focus on creativity, innovation, AI-supported ideation, and proactive innovation work.

TU6 – Technical Drawing & CAD Modelling	TU26 – Computer Aided Design	Full recognition	This is one of the clearest correspondences: both modules centre on CAD-based design and digital modelling.
TU7 – Product Development and Advanced Design	TU26 – Computer Aided Design / TU25 – Introduction to Life Cycle Analysis and Eco-Design of Products	Partial recognition	Strong design overlap; partial progression to eco-design and higher-level systems integration at EQF 6.
TU8 – Materials and Production Technologies – MRP	TU25 – Introduction to Life Cycle Analysis and Eco-Design of Products	Partial recognition	Overlap in materials and production logic, but TU25 adds explicit life-cycle and eco-design orientation.
TU12 – Applied R&D – Applied Research Methodologies	TU27 – Research and Scientific Communication	Bridging required	This is the clearest candidate for bridging: the Italian module addresses applied research methods, while the French module introduces more formal research communication and academic/scientific framing. This corresponds to the example already used in your draft annex.
TU13 – Prototyping, 3D Printing and Testing	TU30 – Digitization of the Design Function	Partial recognition	Strong overlap in prototyping, digital design workflows, scanning, and digital tools, but TU30 is positioned at EQF 6 and framed in a Fab Lab / digital twin logic.
TU14 – Design for Manufacturing & Concurrent Engineering	TU26 – Computer Aided Design / TU29 – Industrial Design Jam	Partial recognition	Links both to higher-level design formalisation and to implementation-oriented project design.

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TU15 – Virtual Simulation and Digital Validation	TU26 – Computer Aided Design / TU30 – Digitization of the Design Function	Full or partial recognition, case-dependent	Strong overlap in digital modelling/simulation; full recognition may be possible where evidence shows equivalent practical achievement.
TU16 – Ergonomic Simulation and Human-Centered Design	TU25 – Introduction to Life Cycle Analysis and Eco-Design of Products	Partial recognition	Conceptual overlap through user-oriented and sustainability-aware design, but the French module is more explicitly framed through eco-design.
TU17 – Statistical Methods and Process Optimization	TU29 – Industrial Design Jam / TU31 – Professional Experience	Partial recognition	Process optimisation and project monitoring can support recognition, but equivalence depends on evidence and assessed complexity.
TU18 – Metrology and Quality Control	TU31 – Professional Experience	Partial recognition	Can contribute to recognition where the internship / professional experience evidences applied quality assurance in real settings.
TU19 – PLM and Technical Documentation	TU27 – Research and Scientific Communication / TU31 – Professional Experience	Partial recognition	Strong overlap in documentation practices, but academic/scientific writing usually requires bridging.
TU20 – Project Management (Waterfall and Agile)	TU29 – Industrial Design Jam / TU28 – Innovation Sprint	Full or partial recognition	This is a strong correspondence: TU20 covers project management, teamwork, milestones, and structured delivery; TU29 explicitly includes project planning, specification, implementation phases, and company validation, while TU28 covers innovation project conception and pitching.
TU21 – Lean Manufacturing and Process Sustainability	TU29 – Industrial Design Jam	Partial recognition	TU29 explicitly uses Kaizen / continuous improvement logic and project implementation in company settings, which makes it the strongest French correspondence.

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TU22 – Green Technologies and Circular Economy	TU25 – Introduction to Life Cycle Analysis and Eco-Design of Products	Full or partial recognition	One of the strongest green correspondences: both are directly connected to ecological transition and sustainable design logic.
TU23 – Industrial Economics and Sustainable Innovation	TU28 – Innovation Sprint / TU29 – Industrial Design Jam	Partial recognition	Overlap in value creation, innovation planning, and business-oriented innovation processes.
Inquiry-Based Practical Laboratory 1	TU28 – Innovation Sprint / TU29 – Industrial Design Jam	Partial recognition	Shared project-based, challenge-based, and innovation-oriented practical learning logic.
Inquiry-Based Practical Laboratory 2	TU28 – Innovation Sprint / TU29 – Industrial Design Jam / TU30 – Digitization of the Design Function	Partial recognition	Strong overlap in applied, interdisciplinary and experimental learning activities.
TU24 – Curricular Internship	TU31 – Professional Experience	Full or partial recognition	This is the clearest work-based learning correspondence: both pathways include substantial professional experience in company settings. The French TU31 is 15 ECTS and explicitly validated through company and supervising teacher assessment.

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Interpretation of the Mapping Results

The mapping exercise demonstrates that **significant competence overlap exists between HVET training programmes and higher education engineering programmes**.

However, differences may arise in:

- theoretical depth
- methodological complexity
- academic research orientation.

Where such differences occur, the HUCO recognition framework introduces **bridging modules** enabling students to acquire additional competences required for higher education programmes.

Bridging Modules

Bridging modules may include topics such as:

- advanced research methodology, which supports learners in strengthening their understanding of research design, analytical procedures, and the more formal methodological requirements expected in higher education contexts;
- academic writing and documentation, which enables learners to develop the conventions of higher education communication, including structured reporting, technical documentation, and the presentation of research findings in an academically appropriate form;
- quantitative analysis methods, which help learners build the analytical competences required to interpret data, apply more advanced evaluation techniques, and engage with evidence-based problem-solving at a higher level of complexity;
- interdisciplinary innovation management, which supports learners in working across disciplinary boundaries, coordinating innovation processes, and understanding the organisational and strategic dimensions of applied research and development.

Within the current HUCO pilot architecture, such bridging functions are reflected particularly in the French Level 6 modules TU27 – Research and Scientific Communication, TU28 – Innovation Sprint, TU29 – Industrial Design Jam, and, depending on the case, TU30 – Digitization of the Design Function, as these modules extend the competence profile developed in the Italian Level 5 pathway towards the more advanced requirements of EQF Level 6. These modules ensure that learners transitioning from HVET programmes can successfully integrate into higher education learning environments by complementing prior vocationally acquired competences with the academic, methodological, and interdisciplinary capacities required for progression and recognition.

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Annex C – Institutional Recognition Agreement - Agreement on the Recognition of Learning Outcomes within the HUCO Labs Project

Recognition of Learning Outcomes between Higher Vocational Education and Training, Higher Education, and Work-Based Learning Contexts

C.1 Preamble

This Institutional Recognition Agreement is concluded by the participating institutions of the **HUCO Labs consortium** in order to establish a common understanding and a shared procedural basis for the recognition of learning outcomes achieved across the project's integrated learning pathways.

HUCO Labs promotes collaborative learning environments connecting **Higher Vocational Education and Training (HVET)**, **higher education institutions**, and **company-based research and innovation settings**. As these learning environments are organised across different national and institutional systems, transparent and reliable recognition arrangements are essential to support learner progression, mobility, and permeability.

Within the current pilot architecture of HUCO Labs, a central objective is the recognition of learning outcomes achieved in the **Italian HVET pathway** by the **French higher education partner institution(s)**. This Agreement therefore establishes the institutional basis on which modules and documented learning outcomes successfully completed within the Italian pathway are to be evaluated for recognition within the corresponding French higher education pathway.

This Agreement sets out the principles, scope, and implementation conditions under which learning outcomes achieved within the HUCO Labs framework may be assessed and recognised by participating institutions.

C.2 Purpose of the Agreement

The purpose of this Agreement is to establish a shared institutional framework for the recognition of learning outcomes acquired within HUCO Labs learning activities, in particular where such learning outcomes are achieved in one educational or professional context and are to be recognised in another.

More specifically, the Agreement aims to:

- support permeability between vocational education, higher education, and applied research environments;
- facilitate learner mobility across partner institutions and countries;

- enable transparent recognition of learning outcomes achieved in **EQF Level 5 HVET pathways** within **EQF Level 6 higher education programmes**, where appropriate;
- establish a clear basis for the recognition by the **French higher education partner institution(s)** of modules successfully completed within the **Italian HVET pathway**;
- strengthen trust, comparability, and cooperation among participating institutions;
- provide a consistent basis for recognition decisions while respecting institutional autonomy and national regulations.

Within the current pilot context of HUCO Labs, this Agreement applies in particular to the recognition of learning outcomes achieved in the Italian HVET pathway delivered by **ITS Cuccovillo Foundation**, which are to be assessed by the relevant French higher education partner institution(s) for possible recognition within their own Level 6 programmes.

C.3 Legal and Policy Reference Framework

The institutions signing this Agreement acknowledge that recognition procedures developed within HUCO Labs are informed by and aligned with relevant European principles and reference instruments, including in particular:

- the **Bologna Process** and its emphasis on learning-outcome-based higher education;
- the **European Credit Transfer and Accumulation System (ECTS)**;
- the **European Qualifications Framework (EQF)**;
- the **Lisbon Recognition Convention (1997)**;
- the **European approach to micro-credentials for lifelong learning and employability**;
- relevant European policy initiatives supporting permeability, learner mobility, recognition of prior learning, and lifelong learning.

In line with these frameworks, recognition decisions should focus primarily on the **level, quality, scope, and relevance of demonstrated learning outcomes**, rather than on institutional form alone.

C.4 Shared Recognition Principles

The participating institutions agree that recognition under this Agreement shall be guided by the following principles:

1. Learning-Outcome Orientation: Recognition decisions shall be based primarily on the comparability of achieved learning outcomes, including knowledge, skills, and responsibility/autonomy, and not solely on differences in institutional setting, programme title, or delivery format.

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2. Substantial Equivalence: Recognition may be granted where substantial equivalence of learning outcomes can be demonstrated, even where programmes differ in structure, duration, or pedagogical organisation.

3. EQF Referencing: Learning outcomes referenced to EQF Level 5 and achieved within the Italian HVET pathway shall be considered for recognition within EQF Level 6 pathways of the French higher education partner institution(s), where the receiving institution determines that the achieved outcomes are sufficiently relevant and equivalent for the intended purpose.

4. Evidence-Based Decision-Making: Recognition decisions shall be grounded in documented and verifiable evidence, such as module descriptions, learning outcomes, assessment records, project outputs, portfolios, micro-credentials, or validated workplace-based evidence.

5. Transparency and Fairness: Recognition procedures shall be transparent, documented, and communicated in a way that is understandable and accessible to learners and partner institutions.

6. Quality and Academic Integrity: Recognition shall be based on credible assessment evidence and shall uphold the academic and professional standards of the receiving institution.

7. Respect for Institutional Autonomy: Final decisions on recognition, credit allocation, progression, and certification remain the responsibility of the receiving or awarding institution, in accordance with its own regulations and applicable national law.

At the same time, the French higher education partner institution(s) commit to examining recognition requests relating to successfully completed Italian HVET modules within the HUCO Labs framework in a structured, transparent, and supportive manner.

C.5 Scope of Recognition

This Agreement applies to learning outcomes achieved within the HUCO Labs framework, including learning outcomes acquired through:

- formal HVET modules and training units;
- higher education modules and course components;
- applied research and development projects;
- laboratory-based innovation activities;
- project-based collaborative learning formats;
- supervised workplace-based learning in company environments;
- digitally documented competence development evidenced through portfolios, badges, or micro-credentials.

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Within the pilot implementation of HUCO Labs, the primary scope of this Agreement concerns modules completed in the **Italian HVET pathway** that are mapped against corresponding modules or competence requirements in the **French higher education pathway**.

Recognition under this Agreement may lead to one or more of the following outcomes:

- **full recognition** of a module or component of study;
- **partial recognition**, including the allocation of partial credit where appropriate;
- recognition subject to completion of **bridging or complementary learning requirements**;
- formal acknowledgement of competence achievement within a digital portfolio or micro-credential framework;
- consideration of recognised learning outcomes for progression, admission, or exemption purposes, subject to institutional rules.

C.6 Operationalisation within the HUCO Labs Project

The institutions agree that recognition procedures under this Agreement shall be operationalised through the instruments and processes developed within the HUCO Labs project, in particular:

- the **Learning Outcome Recognition Framework (LORF)**;
- the **Joint Implementation Framework (JIF)**;
- the **TRIComp / HUCO competence framework**;
- the **module mapping matrix** developed for Level 5 and Level 6 pathways;
- agreed documentation and assessment procedures;
- the **digital competence portfolio** and, where applicable, the project's **micro-credential and digital badge system**.

For the purposes of the pilot phase, these instruments shall be used in particular to support the recognition by the **French higher education partner institution(s)** of learning outcomes and modules completed within the **Italian HVET pathway**, on the basis of agreed mapping, documented evidence, and institutional evaluation.

C.7 Recognition Procedure

The participating institutions agree to support a recognition process that, as a minimum, includes the following elements:

1. **Documentation of achieved learning outcomes** by the Italian sending institution or relevant learning context;

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2. **Submission of evidence** concerning the completed Italian HVET module(s) to the French receiving higher education institution;
3. **Mapping and comparison** of the documented learning outcomes against the relevant French module, competence, or programme requirements;
4. **Evaluation of equivalence and relevance** by the French receiving institution or its designated academic body;
5. **Formal recognition decision** by the French receiving institution, including full recognition, partial recognition, or bridging requirements;
6. **Documentation of the decision** in the relevant institutional and, where applicable, HUCO project records.

The detailed workflow may be further specified through internal procedures of the participating institutions, provided these remain consistent with the principles of this Agreement.

C.8 Roles and Responsibilities

Italian Sending Institution: The Italian partner institution, in particular ITS Cuccovillo Foundation, commits to:

- provide clear and sufficiently detailed documentation of completed modules, learning outcomes, workload, assessment methods, and achieved results;
- map the relevant HVET modules to the HUCO competence framework and agreed module matrix;
- support learners in preparing recognition requests within the HUCO framework;
- cooperate with the French partner institution(s) in clarifying evidence and equivalence questions where required.

French Receiving Higher Education Institution(s): The French partner institution(s) commit to:

- examine the modules and learning outcomes successfully completed within the Italian HVET pathway for possible recognition within their own programmes;
- evaluate recognition requests on the basis of documented learning outcomes, EQF alignment, assessment evidence, and the agreed mapping instruments of the project;
- issue recognition decisions in a transparent and timely manner, in accordance with their institutional and national regulations;
- specify, where full recognition cannot be granted, whether partial recognition or bridging requirements apply.

HUCO Consortium Structures: Where relevant, project governance structures such as the **Recognition Coordination Group** or equivalent academic coordination bodies may support consistency, dialogue, and mutual understanding across institutions, without prejudice to institutional autonomy.

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C.9 Documentation and Evidence

Recognition decisions under this Agreement may be based on one or more of the following forms of evidence:

- official module or course descriptions;
- documented learning outcomes;
- transcripts or records of achievement;
- assessment reports and grading documentation;
- project reports, technical artefacts, or prototypes;
- supervisor statements from workplace or lab-based learning;
- digital portfolios;
- micro-credentials, badges, or other structured digital records.

The receiving institution may request additional documentation where necessary in order to reach a fair and evidence-based decision.

C.10 Quality Assurance and Review

The implementation of this Agreement shall be subject to periodic review within the HUCO Labs project in order to ensure that recognition practices remain transparent, workable, and aligned with project objectives.

The Agreement and its implementation may be reviewed and, where necessary, revised on the basis of:

- pilot implementation results;
- feedback from learners, teachers, institutions, and company partners;
- developments in European or national policy frameworks;
- lessons learned from the project's quality assurance and governance processes.

Any revision shall be made by mutual agreement of the participating institutions.

C.11 Duration

This Agreement enters into force on the date of signature by the participating institutions and remains valid for the duration of the **HUCO Labs project**, unless replaced, extended, or terminated by mutual written agreement of the signatories.

The institutions may decide to maintain or further develop the cooperation established through this Agreement beyond the project period, subject to separate arrangements where required.

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C.12 Participating Institutions

The following institutions participate in this Institutional Recognition Agreement within the HUCO Labs consortium:

- **DHBW Karlsruhe (Germany)** – Project Coordinator
- **ITS Cuccovillo Foundation (Italy)** – Sending HVET Partner
- **CMQ-MSI and associated higher education partner(s) (France)** – Receiving Higher Education Partner(s)
- **UPV (Spain)**
- **SSMTP (Lithuania)**
- **European Entrepreneurs CEA-PME (Belgium)**

Within this Agreement, the operational recognition relationship is centred in particular on the recognition by the **French higher education partner institution(s)** of learning outcomes and modules achieved within the **Italian HVET pathway**.

C.13 Statement of Commitment

By signing this Agreement, the participating institutions affirm their commitment to promoting transparent and trustworthy recognition of learning outcomes across vocational, higher education, and applied innovation contexts.

In particular, the signatory institutions confirm their shared intention that modules and learning outcomes successfully completed by learners in the **Italian HVET pathway** within the HUCO Labs framework shall be submitted to and considered by the **French higher education partner institution(s)** for recognition within the corresponding higher education pathway, in accordance with the procedures and principles set out in this Agreement.

They further affirm their shared intention to:

- strengthen permeability between educational sectors;
- support flexible and inclusive learner pathways;
- foster cross-border recognition of competences;
- contribute to a more integrated European learning, innovation, and skills ecosystem.

This Agreement expresses the partners' common commitment to cooperation within HUCO Labs and to the development of sustainable recognition practices that may serve as a model beyond the project itself.

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Annex D – HUCO Learning Architecture - Integrated Learning Pathway between HVET, HUCO Labs and Higher Education

D.1 Conceptual Overview

The HUCO Labs project establishes an integrated learning architecture that connects **Higher Vocational Education and Training (HVET), applied research environments, and higher education programmes**.

The objective of this architecture is to create **flexible learning pathways for mid-level technical professionals**, enabling them to progressively develop competences in applied research, innovation, and digital industrial technologies.

The architecture combines three complementary learning environments:

1. **HVET institutions** providing practice-oriented technical education
2. **HUCO Labs** serving as collaborative research and innovation environments
3. **Higher education institutions** offering academically oriented engineering and innovation programmes

Together, these environments form an **integrated competence development ecosystem**.

D.2 Structure of the HUCO Learning Pathway

The HUCO learning pathway can be described as a three-stage competence development model.

Learning Environment	Educational Level	Learning Focus
HVET Training Programmes	EQF Level 5	Applied technical competences and industrial practice
HUCO Labs Innovation Environment	EQF 5–6	Collaborative research and innovation projects
Higher Education Programmes	EQF Level 6	Advanced engineering knowledge and research methodology

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Students progressively move through these environments, developing both **technical expertise and innovation capabilities**.

D.3 Role of HUCO Labs

The HUCO Labs serve as **intermediate innovation environments linking vocational training and higher education**.

Within these labs, students participate in:

- applied research and development projects
- interdisciplinary innovation workshops
- industry-driven technology experiments
- collaborative engineering design activities.

The labs therefore function as **transitional learning spaces**, enabling students from vocational education backgrounds to engage with research-oriented learning processes.

D.4 Integration of Industry-Based Learning

Industry partners play a central role in the HUCO learning architecture.

Companies contribute by:

- defining innovation challenges
- providing laboratory infrastructure
- supervising applied research projects
- evaluating student project outcomes.

Through this integration, the HUCO learning pathway ensures that competence development remains **closely aligned with industrial innovation needs**.

D.5 Recognition and Mobility within the Architecture

Mobility between learning environments is enabled through the **Learning Outcome Recognition Framework (LORF)** described in this deliverable.

Recognition procedures ensure that:

- learning outcomes obtained within HVET programmes can be recognised within higher education programmes

- competences developed within HUCO Labs can contribute to academic credit recognition
- students can move flexibly between vocational and academic learning contexts.

This recognition framework enables the creation of **permeable learning pathways across educational sectors**.

D.6 Visual Representation of the HUCO Learning Architecture

The integrated learning pathway can be summarised in the following conceptual model:

Higher Education Institutions (EQF Level 6) - Advanced Engineering Education
↑
Recognition of Learning Outcomes
↑
HUCO Innovation Labs - Collaborative R&D Learning Environment
↑
Applied Innovation Projects
↑
HVET Institutions (Italy) - Technical Training (EQF Level 5)

This architecture illustrates how the HUCO project creates **structured progression pathways from vocational education into research-oriented higher education programmes**.

D.7 Strategic Contribution

The HUCO learning architecture contributes to broader European policy goals by:

- strengthening **permeability between vocational and higher education systems**
- promoting **innovation-oriented competence development**
- enabling **flexible learning pathways across institutional boundaries**
- supporting **industry–education collaboration in applied research and development**.

The model therefore represents a **transferable European approach for integrating vocational training, applied research, and higher education within technical professions**.

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Annex E – Governance Model for Joint Programme Implementation - Institutional Coordination and Decision-Making within the HUCO Labs Learning Framework

E.1 Purpose of the Governance Model

The implementation of joint training activities across multiple educational systems requires clear governance structures. The HUCO Labs governance model defines the institutional coordination mechanisms that support the **joint implementation of training modules, the recognition of learning outcomes, and the quality assurance of the integrated learning pathways**.

The governance model ensures that cooperation between Higher Vocational Education and Training (HVET) institutions, universities, and industry partners is organised in a transparent and efficient manner.

The governance structure supports:

- coordination of joint learning activities
- alignment of curricula and competence frameworks
- consistent recognition of learning outcomes
- monitoring of quality assurance processes.

E.2 Governance Principles

The governance model is based on five guiding principles:

1. Shared Responsibility
All partner institutions participate in the joint governance of the HUCO training framework.

2. Institutional Autonomy
Each participating institution retains full authority over its own academic regulations, certification processes, and credit allocation procedures.

3. Transparency
All recognition procedures and curriculum alignment decisions are documented and shared across the consortium.

4. Quality Assurance Alignment
The governance model aligns with the internal quality assurance systems of participating institutions and European quality standards.

5. Industry Integration
Industry partners participate in governance structures where relevant, particularly in relation to applied research training activities.

E.3 Governance Structure

The governance structure of the HUCO learning framework consists of three main coordination bodies.

Governance Body	Role
Project Steering Committee	Strategic coordination of the HUCO project
Academic Coordination Board	Alignment of curricula and training modules
Recognition Coordination Group	Implementation of recognition procedures

These bodies operate in coordination with the work packages defined in the HUCO project structure.

E.4 Project Steering Committee

The **Project Steering Committee** provides overall strategic oversight of the HUCO project.

Its responsibilities include:

- monitoring project implementation
- ensuring alignment with project objectives
- coordinating institutional cooperation across partner organisations
- supporting dissemination and sustainability activities.

The committee consists of representatives from all partner institutions.

E.5 Academic Coordination Board

The **Academic Coordination Board** is responsible for the alignment of training modules and learning outcomes across partner institutions.

Its main tasks include:

- coordination of joint curriculum development

- validation of module mapping between institutions
- supervision of joint teaching activities
- alignment of competence frameworks and learning outcomes.

Members of the Academic Coordination Board include:

- academic programme leaders
- faculty representatives from partner institutions
- project coordinators involved in Work Package 2.

E.6 Recognition Coordination Group

The **Recognition Coordination Group** is responsible for implementing the recognition procedures described in this deliverable.

The group ensures that recognition procedures are applied consistently across institutions.

Its responsibilities include:

- evaluating recognition requests
- maintaining the learning outcome mapping matrix
- updating recognition procedures based on pilot implementation results
- facilitating dialogue between HVET institutions and universities.

The group includes representatives from both vocational and higher education institutions participating in the project.

E.7 Industry Advisory Participation

Industry partners contribute to the governance model through participation in advisory activities related to applied research training.

Industry representatives may:

- provide feedback on competence requirements in industrial contexts
- support evaluation of innovation project outcomes
- contribute to the design of research-oriented training activities.

This ensures that the HUCO training model remains **aligned with evolving industrial innovation needs**.

E.8 Quality Assurance Integration

Quality assurance mechanisms within the HUCO governance model are aligned with:

- institutional quality assurance procedures of participating institutions
- European quality standards for higher education
- evaluation processes defined within the HUCO project quality assurance framework (Work Package 5).

Regular monitoring and evaluation activities will ensure continuous improvement of the joint training framework.

E.9 Sustainability of the Governance Model

The governance structure established within the HUCO project is designed to remain operational beyond the project duration.

The framework may serve as a **reference governance model for future transnational education initiatives linking vocational education, applied research environments, and higher education programmes**.

Through dissemination activities and collaboration with European education networks, the governance model can contribute to the wider development of **integrated European learning pathways in technical professions**.

Annex F – Risk and Mitigation Framework - Managing Risks in Joint Implementation and Recognition of Learning Outcomes

F.1 Purpose of the Risk Framework

The implementation of joint training activities across different national education systems involves a number of potential operational and institutional risks. These may arise from differences in regulatory environments, institutional procedures, or educational cultures.

The HUCO Labs consortium has therefore established a **risk management framework** that identifies potential risks associated with the joint implementation of training modules and the recognition of learning outcomes between Higher Vocational Education and Training (HVET) and higher education institutions.

The framework aims to ensure that the joint training architecture remains **robust, transparent, and adaptable** during the pilot implementation phase and beyond.

F.2 Key Risk Categories

The risk framework identifies five major categories of risks that may affect the implementation of joint training activities.

Risk Category	**Description**
Regulatory Differences	Differences in national regulations governing vocational and higher education systems
Recognition Procedures	Inconsistent interpretation of recognition criteria across institutions
Curriculum Alignment	Misalignment between module learning outcomes
Institutional Coordination	Communication challenges between partner institutions
Industry Engagement	Variability in company participation in applied research activities

These categories reflect common challenges encountered in transnational educational cooperation projects.

F.3 Risk Assessment and Mitigation Strategies

The HUCO consortium has developed mitigation strategies for each identified risk.

Risk	Potential Impact	Mitigation Strategy
Differences in national education regulations	Delays in recognition procedures	Use of EQF-based learning outcome framework
Variation in institutional recognition practices	Inconsistent credit recognition	Establishment of a Recognition Coordination Group
Misalignment of module learning outcomes	Difficulties in credit transfer	Development of module mapping matrix
Limited communication between partners	Operational inefficiencies	Regular coordination meetings
Limited industry participation	Reduced practical learning opportunities	Engagement of industry advisory partners

These mitigation measures ensure that potential challenges can be addressed in a structured and proactive manner.

F.4 Monitoring and Evaluation

Risk monitoring is integrated into the overall quality assurance framework of the HUCO project.

The **Recognition Coordination Group** and the **Academic Coordination Board** regularly review implementation experiences during the pilot phase.

Key monitoring activities include:

- evaluation of recognition decisions during pilot implementation
- monitoring of student mobility between institutions
- feedback collection from academic staff and industry partners.

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These activities support the continuous refinement of recognition procedures and governance mechanisms.

F.5 Contribution to Sustainable Cooperation

By systematically addressing potential risks associated with cross-border educational cooperation, the HUCO Labs consortium aims to create a **stable and transferable framework for joint training and recognition procedures**.

The risk management framework therefore contributes to the long-term sustainability of the integrated learning architecture developed within the project.

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