



# D2.2 DigitalResilience Curriculum

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## Content

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# 1. DigitalResilience Curriculum

## Course Title: Digital Twins for Climate Resilience

**Course Objective:** The Digital Twins for Climate Resilience course aims to introduce digital twin (DT) technology to future and young professionals (F/YP) in the construction and engineering (C&E) sectors, equipping them with the necessary knowledge and skills. At the end of the course, participants will gain a deep understanding of digital twin technology and its climate-specific applications in the construction and engineering sectors.

**Learning Outcomes:**
**LO1:** Define the concept, scope, advantages, and limitations of digital twin (DT) technology.
**LO2:** Identify the significance of DT technologies in the construction and engineering (C&E) sectors.
**LO3:** Describe data collection methods and tools, and address related ethical, legal, and integration challenges.
**LO4:** Explain the use of DTs in wind and thermal impact analysis.
**LO5:** Evaluate the integration of DT technologies into higher education institutions (HEIs) and vocational education and training (VET) environments.

**Course Target Group:** Students in higher education (HE) and vocational education and training (VET), and early-career professionals in the field of civil engineering, along with educational institutions, project leads and managers in the construction field aiming to integrate digital twins into their curricula and practices.

**Prerequisites:** Basic software & internet literacy, introductory-level construction/engineering vocabulary

**Learning Profiles & Approach:** This curriculum serves two learner profiles: (i) HE/VET students and (ii) active professionals. Although the learning content is the same, the approach will differ depending on the type of learner:
**Students (HE/VET):** Modules are structured with weekly time indications and a suggested sequence. ***End-of-module assessment:*** Knowledge checks such as quizzes, matching, and similar activities.
**Professionals:** Fully self-paced, non-sequential; can pick the topics needed. ***End-of-module assessment:*** Consists solely of self-reflective questions.

# 2. Learning Pathways

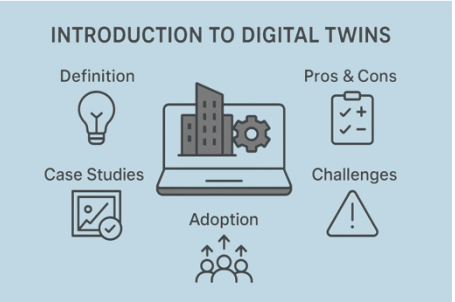
## 2.1 Pathway 1- Introduction To Digital Twinning

*This pathway introduces the fundamental concepts of digital twinning including what Digital Twins are, how they work, and how they are applied. It aims to build an understanding with identification of data, tools, and organizational readiness.*

### Module 1- Introduction to Digital Twins (1 week, 3 hours*)

**Content:**

- What is a Digital Twin? Scope and Definitions.
- Advantages and challenges
- Examples of successful implementations.
- Introduction to Scenario Development and Modelling
- *End of module assessment.*




### Module 2 - Data Collection (1 Week, 3 Hours*)

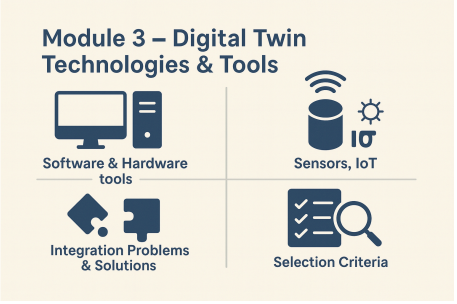
**Content:**

- Identify data sources & tools
- How to collect data (practical methods, formats, instruments)
- Using data within the legal framework (GDPR etc.)
- *End of module assessment.*


### Module 3 - Digital Twin Technologies and Tools (1 week, 3 hours*)

**Content:**

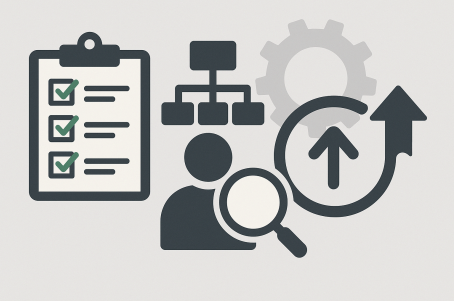
- Digital twin software and hardware tools.
- Sensors, IoT and integration
- Overview of DT tool categories, reliability and selection criteria (usability, cost, support).
- *End of module assessment.*



### Module 4 - Preparation of the Organization (1 week, 2 hours*)

**Content:**

- Assessing organizational readiness and needs.
- How to adapt to new digital technologies
- *End of module assessment.*



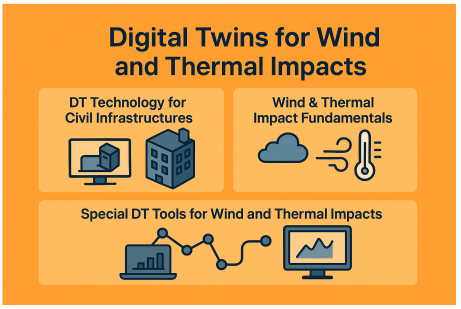
## 2.2 Pathway 2- Specialization Training: Wind/Thermal Impact Analysis

*This pathway explores the application of DT technologies for wind and thermal impacts. The combination theory and practice to model, interpret, and improve climate resilient infrastructures by investigating the case studies.*

### Module 5 – Preparing Digital Twins for Wind/Thermal Impacts (1 week, 3 hours*)

**Content:**

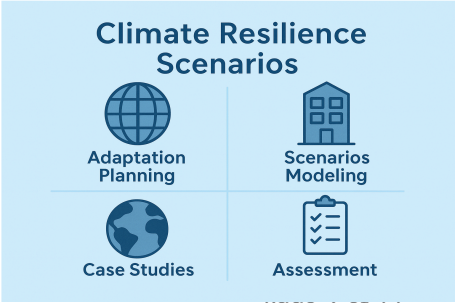
- DT tools and technology for Wind/Thermal analysis.
- Wind & Thermal Impact Fundamentals.
- Specific data sources and sensors input.
- *End of module assessment.*




### Module 6 – DT Modelling for Climate Resilience (1 week, 3 hours*)

**Content:**

- Scenario definition for Wind/Thermal Impact's analysis.
- Wind/Thermal Digital Twins modelling.
- Digital Twin Calibration
- Case Studies of Climate-Resilient Infrastructure for Wind/Thermal effects.
- *End of module assessment.*



### Module 7 – Improving towards Climate Resilience (1 week, 2 hours*)

**Content**

- Interpreting results for Wind/Thermal analysis
- Defining and testing new solutions for Wind/Thermal analysis to enhance results.
- Assessing Institutional Readiness for digital twin.
- Integrating Digital Twins into Education and Institutional Practices.
- *End of module assessment.*


### Module 8 – Best Practices/experiences (1 week, 3 hours*)

**Content**

- Real-world examples of successful DT cases for Wind/Thermal analysis.
- Explore experience sharing, sector-based case studies.
- *End of module assessment.*

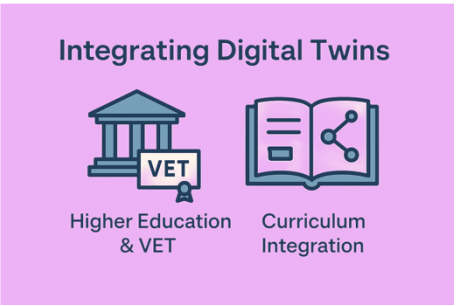

## 2.3 Pathway 3 - Guides for HEI and VETs Integration

*This pathway is intended for educators and institutions aiming to integrate Digital Twin methodologies into higher education (HE) & vocational training systems (VET) and related institutional contexts.*

### Module 9 - Integrating Digital Twins into Education and Professional Development (1 week, 2 hours*)

**Content**

- The role of Digital Twins in Higher Education and VET systems.
- Examples of curriculum integration.
- *End of module assessment.*




** Suggested duration only for higher education use.*

## 3. Curriculum Table (3 learning pathways)

*This section presents the structure of the curriculum. It shows how each module corresponds to the intended learning outcomes, main topics, and estimated duration throughout the three learning pathways.*

| Module | Related LO | Title | Content | Estimated Duration |
|---|---|---|---|---|
| M1 | LO1 | Introduction to Digital Twins | • What is a Digital Twin? Scope and Definitions.<br>• Advantages and challenges<br>• Examples of successful implementations.<br>• Introduction to Scenario Development and Modelling | 1 week |
| M2 | LO3 | Data Collection | • Identify data sources & tools.<br>• How to collect data (practical methods, formats, instruments)<br>• Using data within the legal framework (GDPR etc.) | 1 week |
| M3 | LO2 | Digital Twin Technologies and Tools | • Digital twin software and hardware tools.<br>• Sensors, IoT and integration<br>• Overview of DT tool categories and selection criteria (usability, cost, support). | 1 week |
| M4 | LO1, LO2, LO3 | Preparation of the Organization | • Assessing organizational readiness and needs.<br>• How to adapt to new digital technologies | 1 week |
| M5 | LO2, LO4 | Preparing Digital Twins for Wind/Thermal Impacts | • DT tools and technology for Wind/Thermal analysis.<br>• Wind & Thermal Impact Fundamentals.<br>• Specific data sources and sensors input. | 1 week |

| | | | | |
|---|---|---|---|---|
| M6 | LO2, LO4 | DT Modelling for Climate Resilience | • Scenario definition for Wind/Thermal Impact's analysis.<br>• Wind/Thermal Digital Twins modelling.<br>• Digital Twin Calibration<br>• Case Studies of Climate-Resilient Infrastructure for Wind/Thermal effects. | 1 week |
| M7 | LO5 | Improving towards Climate Resilience | • Interpreting results for Wind/Thermal analysis<br>• Defining and testing new solutions for Wind/Thermal analysis to enhance results.<br>• Assessing Institutional Readiness for digital twin.<br>• Integrating Digital Twins into Education and Institutional Practices. | 1 week |
| M8 | LO2, LO5 | Best Practices/experiences | • Real-world examples of successful DT applications.<br>• Explore experience sharing, sector-based case studies. | 1 week |
| M9 | LO5 | Integrating Digital Twins into Education and Professional Development | • The role of Digital Twins in Higher Education and VET systems<br>• Examples of curriculum integration | 1 week |

**Total Duration:** 9 weeks - 24 hours*

**Suggested duration for higher education use.*

## 4. Assessment Methodology

*In order to provide an adequate Assessment Methodology for the development of the Learning Platform (A3.4) in WP3, the following table* describes the assessment tools and approaches identified to evaluate the progress of the learners at the end of each module according to their learner profile (HE/VET students or professionals). This strategy will be adapted and implemented within WP3 according to the feedback from target agents specially in through piloting activities.

| Assessment Tool | Weight (%) | Description |
|---|---|---|
| Self-Assessment | 100% | **For students (HE/VET):** End-of-module assessments may include short quizzes (multiple choice, matching, multiple attempt) graded automatically via LMS.<br>**For professionals:** Assessments consist solely of self-reflective questions on how to apply the module content to their own practice. |

## 5. Pedagogical Approach

*This section shows the teaching and learning strategies applied in the course by indicating active, self-paced, and scenario-based learning supported by practical resources.*

100% asynchronous, online self-learning format.
Active methods include:
• Scenario-based prompts (choose/apply)
• Case study exploration (with guiding questions)
• Self-reflection tasks (short writing or checklist-based only for professionals)
Supplementary resources: downloadable checklists, templates, and case briefs.