Politecnico di Torino

PH.D. IN AEROSPACE ENGINEERING
COURSE III LEVEL

DIGITAL TWINS FOR ENGINEERING STRUCTURES

SPEAKER

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8 - 10 January 2025

DIMEAS
Politecnico di Torino

PROGRAM

CONTENT

Introduce the overview of Digital Twin Technology (DTT) in the context of engineering design of structures. Describe the steps in setting up digital twins for engineering structures, including system models, sensor data collection, real-time integrations, and visualisation of virtual models.

- Understand the theory and operating principles of commonly used structural modelling and simulation tools for multi physics analysis of components and their integration for system analysis. Describe current and emerging applications of digital twins for the design and analysis of engineering structures, including lightweight composite and additively manufactured structures,
- Describe the transformative approach to managing engineering composite structures throughout their lifecycle, improving their design, performance, and sustainability that combines real-time data, advanced simulations, and predictive analytics. Demonstrate awareness of the relationship between digital twins and recent technologicaldevelopments in aerospace, transport, automotive and marine industries.

COURSE PLAN

DAY 1 - 8 JANUARY 2025

- Lecture 1 (10:00 – 12:00 - Sala DIMEAS P.T.)
- Module 1: Introduction to Digital Twins in Engineering
- Lecture 2 (14:00 – 16:00 - Sala Ferrari - 2nd floor)
- Module 2: Fundamentals of Engineering Structural Design, Composite Structures and Damage Tolerance Analysis

Day 2 - 9 January 2025

- Lecture 1 (10:00 – 12:00 - Sala Ferrari)
- Module 3: Building a Digital Twin forStructural Systems
- Lecture 2 (14:00 – 16:00 - Sala Ferrari)
- Module 4: Simulation and Modeling for Digital Twins

Day 3 - 10 January 2025

- Lecture 1 (10:00 – 12:00 - Sala Ferrari)
- Module 5: Artificial Intelligence, Machine Learning, and Digital Twins
- Lecture 2 (14:00 – 16:00 - Sala Ferrari)
- Module 6: Applications and Industry Case Studies

Final Assessments

- Two quizzes on key concepts and technical tools.
- Creation of a basic digital twin model and its analysis