

# Digital Twins and Simulation for Renewable Energy Systems

## COURSE OVERVIEW

This course explores the application of digital twin technology and simulation in renewable energy systems. It covers the creation of virtual replicas of solar, wind, hydro, and hybrid energy assets for real-time monitoring, predictive maintenance, and performance optimization. The course also highlights how digital twins enable proactive fault detection, resource management, and cost reduction, driving sustainability and maximizing energy yield. Participants will learn how digital twins support design optimization, operational efficiency, and grid integration by simulating various scenarios and environmental factors.

## WHO SHOULD ATTEND?

The course is ideal for engineers, system operators, energy project developers, researchers, policymakers, and decision makers who seek to leverage digitalization and simulation tools to improve system reliability, reduce operational risks, and accelerate the transition to sustainable energy solutions. It is also relevant to technology providers and consultants supporting renewable energy projects.

## COURSE OUTCOMES

Delegates will gain the skills and knowledge to:

- Understand the core concepts and architecture of digital twin technology in renewable energy systems.
- Develop and implement virtual models to simulate the performance of solar, wind, hydro, and hybrid energy assets.
- Utilize real-time data for monitoring, predictive maintenance, and performance optimization.
- Analyze various environmental conditions and operational scenarios to improve system reliability and efficiency.
- Integrate digital twins with IoT devices and AI-driven analytics for enhanced decision-making.
- Assess the economic and sustainability impacts of digital twins in renewable energy projects.
- Design simulations to support grid integration, resource management, and expansion planning.

## KEY COURSE HIGHLIGHTS

At the end of the course, you will understand:

- The fundamental principles and architecture of digital twin technology in renewable energy systems.
- How digital twins support real-time monitoring, predictive maintenance, and fault detection.
- Simulation techniques to optimize renewable energy production and operational efficiency.
- Integration of digital twins with IoT and AI for enhanced analytics and decision-making.
- The economic and sustainability benefits of digital twins in energy projects.
- Strategies for improving grid resilience and renewable energy integration using digital twins.
- Best practices and challenges in deploying digital twin technology in the renewable energy sector.

All our courses are dual-certificate courses. At the end of the training, the delegates will receive two certificates.

1. A GTC end-of-course certificate
2. Continuing Professional Development (CPD) Certificate of completion with earned credits awarded