MERCURY

Digital Twin & Emerging Tech in Operations

23 – 27 May 2027
Manama (Bahrain)



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Ref: 16431_1020393 **Date:** 23 – 27 May 2027 **Location:** Manama (Bahrain) **Fees:** 5500 Euro

Introduction:

The Digital Twin and Emerging Technologies in Operations course provides an in-depth exploration of integrating virtual replicas of physical systems with advanced technological frameworks. Participants will delve into the transformative impact of digital twins, artificial intelligence, and the Internet of Things on modern operational strategies. The curriculum provides a comprehensive understanding of how these technologies converge to optimize performance, enhance decision-making, and drive innovation across various industries.

Through theoretical learning, learners will examine real-world applications and case studies, gaining insights into the practical implementation of these technologies. The Digital Twin and Emerging Technologies in Operations program emphasizes the development of critical thinking and analytical skills necessary for navigating the complexities of digital transformation in operations. Participants will lead and manage initiatives that leverage digital twin technologies and emerging tech to achieve operational excellence.

Targeted Groups:

This Digital Twin and Emerging Technologies in Operations training targets professionals seeking specialized knowledge and skills:

- Operations Managers aiming to enhance efficiency through digital solutions.
- IT Professionals interested in the application of emerging technologies.
- Data Analysts focus on real-time data integration and analysis.
- Engineers involved in system modeling and simulation.
- Project Managers overseeing technology-driven initiatives.
- Business Strategists exploring innovation through digital transformation.

Course Objectives:

Participants will achieve the following objectives by completing the Digital Twin and Emerging Technologies in Operations course:

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- Understand the foundational concepts of digital twin technologies and their role in operations.
- Explore the integration of IoT, AI, and machine learning in operational systems.
- Analyze the impact of digital twins on decision-making processes.
- Examine case studies of digital twin applications across various industries.
- Develop strategies for implementing digital twin solutions in organizational contexts.
- Assess the challenges and opportunities associated with digital transformation in operations.
- Enhance skills in data visualization and real-time monitoring systems.
- Cultivate an understanding of the ethical considerations in deploying emerging technologies.
- Foster innovation and continuous improvement through digital integration.
- Prepare for leadership roles in technology-driven operational environments.

Targeted Competencies:

Participants will gain the following competencies during the Digital Twin and Emerging Technologies in Operations program:

- Proficiency in conceptualizing and implementing digital twin models.
- Ability to integrate IoT devices for real-time data acquisition.
- Skill in applying AI algorithms for predictive analytics.
- Competence in utilizing simulation tools for operational optimization.
- Expertise in developing strategies for digital transformation in operations.
- Capacity to lead cross-functional teams in technology adoption.
- Adeptness in evaluating the ROI of digital twin implementations.
- Understanding of cybersecurity measures in digital operations.
- Knowledge of regulatory compliance related to digital technologies.
- Capability to drive continuous improvement through technological innovation.

Studying Scenarios:

In this Digital Twin and Emerging Technologies in Operations training, participants will develop their skills through the analysis of the following scenarios:

- Implementing a digital twin in a manufacturing plant to monitor equipment health and predict maintenance needs.
- Utilizing AI-driven analytics to optimize supply chain operations in a retail environment.
- Designing an IoT-enabled system for real-time monitoring of energy consumption in a smart building.
- Developing a digital twin model for a transportation network to improve traffic flow and reduce congestion.
- Applying machine learning algorithms to forecast demand and adjust production schedules accordingly.
- Integrating augmented reality interfaces with digital twins for enhanced user interaction and training.
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Assessing the environmental impact of operations through digital simulations and predictive modeling.
- Managing data governance and privacy concerns in the deployment of digital twin technologies.

Course Content:

Unit 1: Introduction to Digital Twin Technologies:

- Definition and evolution of digital twins.
- Key components include physical assets, digital models, data, and connectivity.
- Types of digital twins: descriptive, diagnostic, predictive, and prescriptive.
- Role of digital twins in Industry 4.0.
- Benefits of Implementing Digital Twins in Operations.
- Challenges and limitations in digital twin adoption.
- Future trends and developments in digital twin technologies.

Unit 2: Integration of Emerging Technologies:

- Overview of Internet of Things IoT and its role in digital twins.
- Artificial Intelligence AI and Machine Learning ML applications in operations.
- Big Data analytics for processing and analyzing large datasets.
- Cloud computing and edge computing in digital twin ecosystems.
- Cyber-Physical Systems CPS and their interaction with digital twins.
- Blockchain technology for data integrity and security.
- Augmented Reality AR and Virtual Reality VR for immersive simulations.

Unit 3: Applications Across Industries:

- Manufacturing: predictive maintenance and process optimization.
- Energy: smart grid management and renewable energy integration.
- Healthcare: patient monitoring and personalized medicine.
- Transportation: Traffic Management and Autonomous Vehicles.
- Urban Planning: smart cities and infrastructure management.
- Agriculture: precision farming and resource management.
- Retail: inventory management and customer experience enhancement.

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Unit 4: Implementation Strategies:

- Steps for Developing a Digital Twin Strategy
- Selecting appropriate technologies and platforms.
- Data collection and integration methodologies.
- Modeling and simulation techniques.
- Deployment and scaling considerations.
- Monitoring and maintenance of digital twin systems.
- Evaluating performance and ROI.

Unit 5: Ethical, Legal, and Future Perspectives:

- Ethical implications of digital twin technologies.
- Data privacy and security concerns.
- Regulatory frameworks and compliance requirements.
- Impact on workforce and skill development.
- Sustainability and environmental considerations.
- Innovations on the horizon: quantum computing and beyond.
- Preparing for the future: continuous learning and adaptation.

Final Insights & Key Takeaways:

The integration of digital twin technologies with emerging tech is revolutionizing operations across industries. Mastering these concepts equips professionals to lead in the era of digital transformation.