Consulting and Training | Reach New Heights

Course Name

Predictive Maintenance with Data Science Tools and Big Data Analytics

Sector Name

Maintenance & Reliability Management

Document Type

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Predictive Maintenance with Data Science Tools and Big Data Analytics

Course Introduction

This advanced course provides hands-on training in using data science tools and big data analytics to drive predictive maintenance strategies.

Participants will learn how to collect, process, and analyze large-scale equipment and sensor data, build machine learning models to forecast equipment failures, and optimize maintenance planning. Designed for data scientists, maintenance engineers, and analytics professionals, the course equips attendees with the knowledge and technical skills to shift from reactive to proactive maintenance using modern data-driven methodologies.

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Target Audience

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Predictive Maintenance with Data Science Tools and Big Data Analytics

Learning Objectives

- ✓ Understand the principles of predictive and proactive maintenance.
- ✓ Work with large-scale equipment and sensor datasets for analysis.
- ✓ Apply data science workflows to real-world maintenance problems.
- ✓ Use tools such as Python, Jupyter, Pandas, and Scikit-learn for model development.
- ✓ Build, validate, and deploy machine learning models for failure prediction.
- ✓ Apply big data concepts (e.g., Spark, time-series databases) in scalable environments.
- ✓ Translate predictive insights into actionable maintenance strategies.

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Predictive Maintenance with Data Science Tools and Big Data Analytics

Course Outline

✓ DAY 01

Module 1: Foundations of Predictive Maintenance and Data Handling

Introduction to Predictive and Proactive Maintenance

- ✓ Maintenance strategies: reactive, preventive, condition-based, predictive
- ✓ The business value of predictive maintenance
- ✓ Data-driven maintenance decision-making

Data Collection and Management

- ✓ Overview of data sources: SCADA, sensors, logs, CMMS
- ✓ Data acquisition techniques (e.g., MQTT, OPC-UA, APIs)
- ✓ Cleaning and preprocessing maintenance datasets
- ✓ Time-series data fundamentals and challenges

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Course Outline

✓ Day 02

Module 2: Foundations of Predictive Maintenance and Data Handling

Tools & Platforms Overview

- ✓ Data science stack: Python, Pandas, Numpy, Scikit-learn
- ✓ Big data platforms: Hadoop, Apache Spark, Kafka (intro level)
- ✓ Industrial data platforms (OSIsoft PI, Azure IoT, AWS IoT, etc.)

Module 3: Predictive Modeling and Feature Engineering

Feature Engineering for Maintenance

- ✓ Creating features from time-series data
- ✓ Statistical summaries, rolling windows, and lag features
- ✓ Domain-specific feature extraction (vibration, temperature, cycles)

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Course Outline

✓ Day 03

Machine Learning for Failure Prediction

- ✓ Classification models: Decision Trees, Random Forest, Gradient Boosting
- ✓ Regression models for Remaining Useful Life (RUL)
- ✓ Model evaluation: confusion matrix, ROC, precision/recall

Anomaly Detection and Advanced Models

- ✓ Unsupervised learning for anomaly detection (K-Means, Isolation Forest)
- ✓ Predictive maintenance using Deep Learning (e.g., LSTM basics)
- ✓ Intro to survival analysis and reliability modeling

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Course Outline

✓ Day 04

Module 4: Strategy, Deployment, and Optimization

Scalable Architecture and Data Pipelines

- ✓ Real-time vs. batch processing
- ✓ Building a data pipeline for streaming equipment data
- ✓ Integration with CMMS and ERP systems

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Course Outline

✓ Day 05

Module 5: Strategy, Deployment, and Optimization

From Model to Maintenance Action

- ✓ Interpreting model results for operational decisions
- ✓ Setting thresholds, alerts, and maintenance triggers
- ✓ Building dashboards (Power BI, Grafana, Kibana overview)

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Nov. 16, 2026	Nov. 20, 2026	5 days	2150.00 $	Virtual , Online
April 5, 2027	April 9, 2027	5 days	4950.00 $	Spain , Madrid
Aug. 22, 2027	Aug. 26, 2027	5 days	4250.00 $	KSA , Riyadh
June 14, 2027	June 18, 2027	5 days	4250.00 $	UAE , Dubai

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