

Introduction to Big Data for Industry 4.0

COURSE OUTLINE

Catalogue Number	88-3301-0013
Category	Industry 4.0
Duration	15 Hours
Prerequisite Courses	Introduction to Industry 4.0
Recommended Prerequisite	Introduction to IoT and Connectivity for Industry 4.0

Activity 1: Introduction to Big Data

- What is Big Data?
- Examples of Big Data
- The Multi-V Model
- Concepts in Big Data

Activity 2: Characteristics of Big Data and Dimensions of Scalability

- Big Data Volume
- Big Data Velocity
- Big Data Variety
- Big Data Veracity
- Aspects of Scalability

Activity 3: Intelligent Decision Making and Getting Value Out of Big Data

- Big Data and Informed Decision Making
- Planning and Operations
- The Impact of Big Data
- Predictive Analytics and Use Cases

Activity 4: Data Collection and Management

- Defining Data Science
- Data Science Life Cycle
- Collecting Data
- Data Management
- Data Cleansing

Activity 5: Algorithms, Computing, and Descriptive Statistics

- Statistical Computing
- Algorithms for Data Science
- Process Monitoring and Evaluation
- Process Capability
- Analytics Maturity

Activity 6: Data Analysis

- Analysis Types and Tests
- Chi-Square Test
- T-test
- ANOVA Test
- Pearson and Spearman Correlations
- Regression Analysis
- Statistical Design of Experiments

Activity 7: Visualization of Data

- Communicating Data
- Types of Data Visualization
- Data Dashboards
- Real World Applications

Activity 8: Predictive Analytics and Modeling

- Defining Predictive Analytics
- Statistical Process Control
- Models
- Control Charts
- Predictive Maintenance

Activity 9: Machine Learning

- Defining Machine Learning
- Training Models
- Facilitating Machine Learning
- Categories of Machine Learning
- Machine Learning Applications
- Machine Learning and Manufacturing

Activity 10: Introduction to KPIs

- Defining KPIs
- Types of Indicators
- KPIs as Organizational Performance Measurements
- Big Data Analytics and KPIs

Activity 11: Improving KPIs with Big Data

- The Link Between Big Data and KPIs
- Challenges for Big Data
- KPI Dashboard
- Case Study

Activity 12: Database Fundamentals

- Data Management Functionality
- File Processing Systems
- Database Management Systems
- Modern Relational Database Management Systems
- Introduction to Structured Query Language

Activity 13: Data Warehousing

- Data Warehousing: Definition and Objectives
- Data Warehouses Vs Databases
- Decision Support Systems
- Physical and Virtual Data Warehousing

Activity 14: Data Mining

- Defining Data Mining
- Mining with Big Data
- Machine Learning and Data Mining
- Supervised and Unsupervised Learning

Activity 15: Cloud Computing for Big Data

- Defining Cloud Computing
- Cloud Services
- Cloud Computing and Big Data
- Benefits and Risks of Cloud Computing
- Cloud Computing and Manufacturing

Big Data Analytics on the Cloud

Activity 16: Data-Driven Innovation

Data-Driven Improvements and Innovations

Examples: IIoT, Digital Twinning, and Lot Size One