integral analytics™

DATA AS SIMPLE AS BLACK AND WHITE

DA101: Data Analytics - Basic

You Will Learn

- A brief history of machine learning and advanced pattern recognition (APR)
- Regression, statistics, and first principles techniques for prediction
- Single-In Single-Out (SISO), Multi-In Single-Out (MISO), and Multi-in Multi-Out (MIMO) modeling definitions and techniques
- Scatter Plots, Time Series diagrams, and Histograms and how each are utilized
- The differences between dependent and independent variables and how each are used
- How to train, validate, and test data sets for optimal performance
- Avoidance cost, direct savings, and how to manage and report each
- How to create ”actionable limits” to avoid nuisance alerts
- How to use a bell curve to determine if a residual is zero-centered and balanced
- An introduction to program metrics, cost-benefit analysis, and alert philosophy

The objective of any Asset Monitoring & Diagnostics (M&D) program include minimizing the opportunity for catastrophic failure, maximizing machine and cycle efficiency, and eliminating time-based preventive maintenance tasks. The ability to benefit from each of these three objectives relies on the ability to understand the principles behind applications found in M&D programs as well as develop their own applications to meet specific M&D program needs.

Data Analytics - Basic will help you understand the analytics tools you use beyond the user manual. You will learn how to be more effective and efficient with your daily tasks, as well as learn new concepts and techniques, boosting your M&D program value. We’ll examine the basics, from an introduction to data analytics techniques to alert fundamentals. To help you develop retention and long-term recall of the course material, over 25% of class time is spent on hands-on exercises, using visual association tools to break down complex topics. This course prepares you to identify and execute proper analytical techniques and will boost your career by helping you develop these in-demand skills.

DA101 Section Descriptions

DA101.1: Analytics Toolbox Orientation
In this section, attendees learn the need for the "Analytics Toolbox" rather than simply relying on Advanced Pattern Recognition (APR) for their M&D program. Topics include the history of machine learning and APR, regression techniques, statistical techniques, and first principles techniques.

DA101.2: Explore Data Analysis Part 1
In this section, attendees learn how to analyze different variable relationships using time-series, x-y scatter, correlation analysis, and 3D scatter plots, including dependent-independent variables as well as "influence" and "predicted" variables. Topic include analytics capabilities, the need for specific sensors to detect failure modes, and avoided costs versus direct savings. Exercises include scatter plot analysis, time-series analysis, and histogram analysis.

DA101.3: Explore Data Analysis Part 2
In this section, attendees continue learning how to analyze different variable relationships using more complex modeling techniques combined with data requirements and data fidelity. Topics include data set types and purposes, data historian considerations, and model and data relationships. Exercises include exploratory data analysis and advanced scatter plot analysis.

DA101.4: Analytics Algorithm Basics
In this section, attendees learn how supervised learning compares to unsupervised learning and more advanced techniques for regression, clustering, and vector-based analysis. Attendees also learn when a model is overfit and when one spills over into another model negatively affecting the output. Topics include regression analysis, clustering analysis, vector-based analysis, and supervised and unsupervised learning.

DA101.5: Analytics Model Development - Basic
In this section, attendees learn how to scope assets for criticality and available data, model design criteria, and how to tell if program capabilities are being oversold. Additionally, attendees also learn proper model documentation and workflow. Topics include model scoping, model coverage, model deployment consideration, data selection, and model documentation. Exercises include regression model analysis and APR model - regression model comparison.

DA101.6: Alert Setting Fundamentals Part 1
In this section, attendees learn the importance of and how to set actionable limits, minimize nuisance alerts and increase the effectiveness of their M&D program. Topics include alert settings, alert definitions, actionable alerts, and the iterative refinement process. Exercises include actionable alert setting.

DA101.7: Alert Setting Fundamentals Part 2
In this section, attendees learn how to start an Alert Philosophy, to analyze residual quality using statistics, statistical analysis, and trend analysis, and how to automate value tracking, moving from lengthy manual processes to automated processes. Topics include alert philosophy, metrics vs. measures, and residual analysis.

Who Should Attend

- Data Analysts
- Asset Monitoring & Diagnostics Program Managers
- Directors or VPs of Data Analytics for manufacturing and utilities
- Information Technology professionals
- Systems Administrators who are responsible for M&D program implementation