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COURSE BROCHURE

AI and IoT for Electrical Engineers Training Course

28 February – 4 March 2027
Muscat

AI and IoT for Electrical Engineers Training Course

Ref: 58_1479 **Date:** 28 February – 4 March 2027 **Location:** Muscat **Fees:** 6500 GBP

AI and IoT for Electrical Engineers is a 1-week training course for power systems, instrumentation and maintenance engineers, in which participants design a smart electrical monitoring architecture for one critical asset fleet. Transformers, motors and switchgear now carry cheap sensors, and the engineers who turn their signals into fault warnings decide how much unplanned downtime an organisation absorbs. The course is delivered by Jupiter Prime Training.

Why AI and IoT for Electrical Engineers Matters Now

Three pressures meet on the electrical side of every plant and building. Ageing transformers and motors run closer to their thermal limits as loads grow with electrification and data centres; low-cost wireless sensors and edge gateways make continuous measurement affordable; and asset owners expect maintenance budgets to follow condition rather than the calendar. Engineers who read these signals well extend asset life and avoid trips. Those who read them badly drown in alarms or miss the slow insulation failure that ends in an outage. Model oversight follows ISO/IEC 42001 AI management systems and the NIST AI Risk Management Framework NIST AI RMF.

Who Gains Most from AI and IoT for Electrical Engineers

- Engineers who specify protection, metering and sensing on substations and distribution boards
- Engineers responsible for transformer, motor and switchgear reliability
- Engineers who configure instrumentation, SCADA points and edge gateways
- Engineers who forecast feeder and plant loads for capacity choices
- Engineers who plan maintenance windows and spare parts for electrical assets

A site gains most when its electrical, instrumentation and maintenance engineers attend together, because sensor choice, data flow and work orders must be designed as one chain.

AI and IoT for Electrical Engineers Capabilities

Participants leave able to move from a single sensor reading to a defensible maintenance or loading decision on a live electrical asset.

- Specify sensor types, sampling rates and placement for transformers, motors and switchgear — asset reliability engineers
- Design an edge-to-cloud data path with secure gateways and protocols — instrumentation and OT security leads
- Apply anomaly detection to vibration, thermal and partial discharge signals — maintenance planners
- Calculate remaining useful life estimates from condition trends — capital replacement decisions
- Build short-term load forecasts from smart meter and feeder data — capacity and energy managers
- Assess alarm thresholds against false-trip and missed-fault costs — operations supervisors

Key AI and IoT for Electrical Engineers Terms

- Partial discharge — small electrical sparks inside insulation that signal early degradation in cables, transformers and switchgear.
- Dissolved gas analysis — testing gases in transformer oil to identify overheating, arcing or insulation breakdown before failure.
- Edge computing — processing sensor data on a gateway near the asset so that alarms do not wait for a central server.
- Motor current signature analysis — reading the current waveform of a motor to detect rotor, bearing or load faults without stopping it.
- Remaining useful life — an estimate of how long an asset can run before it reaches a failure threshold.
- Digital twin — a live model of an asset that mirrors its measured condition to test loading and maintenance options.

AI and IoT for Electrical Engineers Day by Day

Day 1: Connected Electrical Assets and Their Signals

- Electrical Asset Criticality Ranking — Where Sensing Pays Back First
- Sensor Families for Thermal, Vibration and Partial Discharge — Measurement Choices
- Smart Meters and Power Quality Analysers — Load and Harmonic Visibility
- Failure Modes of Transformers, Motors and Switchgear — Signal Selection
- Electrification and Data Centre Load Growth — Asset Stress Outlook

Day 2: Edge Devices and Data Pipelines

- Edge Gateway Architecture — Local Processing Versus Central Historian
- Industrial Protocols and SCADA Integration — Interoperability and Point Naming
- Wireless Sensor Networks in Substations — Range, Power and Interference Limits
- OT Cybersecurity for Connected Sensors — Segmentation and Device Hardening
- Time-Series Data Quality Checks — Gaps, Drift and Calibration Errors

Day 3: Machine Learning for Fault Detection

- Anomaly Detection on Vibration and Thermal Trends — Early Warning Thresholds
- Dissolved Gas Analysis Classification — Transformer Fault Type Diagnosis
- Motor Current Signature Analysis With Classifiers — Bearing and Rotor Faults
- Partial Discharge Pattern Recognition — Cable and Switchgear Insulation Health
- Thermal Imaging With Computer Vision — Hot Joint and Connection Detection

Day 4: Forecasting, Maintenance and Model Oversight

- Short-Term Load Forecasting Models — Feeder Loading and Peak Shaving
- Remaining Useful Life Estimation — Replace, Refurbish or Run Decisions
- Condition-Based Maintenance Scheduling — Outage Windows and Spare Parts
- Transformer Digital Twin — Dynamic Rating and Overload Tolerance
- ISO/IEC 42001 and NIST AI RMF — Model Validation for Safety-Related Alarms

Day 5: Practising the Smart Electrical Monitoring Architecture

- Sensor and Gateway Bill of Materials — Coverage for a Chosen Asset Fleet
- Fault Detection Model Selection — Matching Algorithms to Failure Modes
- Alarm Rationalisation Matrix — False Trips Versus Missed Faults
- Business Case for Condition Monitoring — Avoided Outages and Extended Asset Life
- Smart Electrical Monitoring Architecture — Layers, Owners and Rollout Stages

Applying AI and IoT for Electrical Engineers After the Course

- Fit temporary vibration and thermal sensors on the two most critical motors or transformers and compare an anomaly model's warnings with the existing maintenance log.
- Run an alarm rationalisation review of one substation's SCADA points, retiring nuisance alarms and adding condition-based thresholds for insulation health.

AI and IoT for Electrical Engineers Questions FAQ

What is AI and IoT for electrical engineers, and why does it matter now?

It is the use of connected sensors, edge devices and machine learning to watch electrical assets continuously. It matters now because loads are rising, assets are ageing and sensors have become cheap enough to fit across whole fleets.

Which roles gain most from AI and IoT for electrical engineers?

Power systems, instrumentation, reliability and maintenance engineers gain most. You learn to connect sensor specification, data pipelines and fault models so that a warning reaches the right planner in time to act.

How does AI and IoT for electrical engineers differ from a utility network operations course?

It stays at the level of the individual asset. Instead of grid balancing or customer billing, you work on transformer oil gases, motor current signatures, partial discharge and thermal images, and on the sensors and models that read them.

What do you bring back from AI and IoT for electrical engineers?

You bring back a monitoring design for one asset fleet. It lists sensors and gateways, matches fault models to failure modes, sets alarm thresholds and states the business case for condition-based maintenance.

AI and IoT for Electrical Engineers: The Way Forward

The smart electrical monitoring architecture first informs which asset fleet receives permanent sensors and edge gateways. Reliability, instrumentation and maintenance engineers use it to agree data paths, model choices and alarm owners. After the first months of live data, revisit the alarm thresholds and remaining useful life estimates, because real fault history will show which signals deserve more weight.