Energy Data Science Applications Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Energy Data Science Applications Training Course provides professionals with practical skills to harness data science, artificial intelligence (AI), machine learning (ML), predictive analytics, big data, and advanced energy analytics for modern energy systems. The course explores how data-driven technologies are transforming oil & gas, renewable energy, power generation, transmission and distribution, energy trading, smart grids, energy efficiency, and sustainability. Participants learn how to convert complex energy datasets into actionable insights for forecasting, optimization, asset performance, risk management, predictive maintenance, and strategic decision-making.

Through hands-on exercises and industry-focused energy data science case studies, participants will develop the ability to apply Python, statistical modeling, machine learning, time-series forecasting, data visualization, anomaly detection, digital twins, IoT analytics, and AI-powered decision support to real-world energy challenges. The training emphasizes practical implementation, business value, and emerging EnergyTech applications, enabling organizations to improve operational efficiency, reduce costs and emissions, strengthen energy security, and accelerate the transition toward smart, resilient, low-carbon energy systems.

Programme Curriculum

Energy Data Science Applications Training Course

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Course Objectives

By the end of the course, participants will be able to:

1. Apply Data Science and AI techniques to energy-sector challenges.
2. Analyze and interpret complex energy datasets for business decisions.
3. Develop machine learning models for energy forecasting and optimization.
4. Perform time-series forecasting for electricity, demand, prices, and renewable generation.
5. Apply predictive maintenance to energy assets and infrastructure.
6. Use Python, statistical analytics, and data visualization for energy applications.
7. Implement anomaly detection for operational and equipment-performance monitoring.
8. Apply IoT, smart-meter, and sensor analytics to energy systems.
9. Use AI-powered optimization to improve energy efficiency and asset utilization.
10. Analyze renewable-energy data for solar and wind forecasting.
11. Apply energy trading analytics and market-price prediction techniques.
12. Evaluate carbon, emissions, and sustainability data using advanced analytics.
13. Design practical AI/ML energy solutions that support digital transformation and the energy transition.

Target Audience

1. Energy Data Scientists and Data Analysts
2. Energy Engineers and Petroleum Engineers
3. Power Generation and Grid Professionals
4. Renewable Energy and Sustainability Specialists
5. Oil & Gas and Energy Operations Professionals
6. Energy Traders, Economists, and Market Analysts
7. Digital Transformation, AI, and IT Professionals
8. Managers, Consultants, Researchers, and Energy Decision-Makers

Course Modules

Module 1: Energy Data Science Foundations

- Energy-sector **Big Data, AI, and Data Science** ecosystem
- Energy datasets, data sources, structures, and quality challenges
- **Data preprocessing, cleaning, integration, and feature engineering**
- Exploratory Data Analysis (**EDA**) for energy applications
- Energy Data Science workflows and business-value mapping

- **Case Study:** Analyzing historical electricity-demand data to identify consumption patterns and operational opportunities.

Module 2: Python and Statistical Analytics for Energy

- Python fundamentals for **energy analytics**
- NumPy, Pandas, and practical data manipulation
- Statistical analysis of energy consumption and production
- Correlation, regression, probability, and uncertainty analysis
- Data visualization and interactive **energy dashboards**
- **Case Study:** Using Python to analyze industrial energy consumption and identify major efficiency drivers.

Module 3: Machine Learning for Energy Applications

- **Supervised and unsupervised machine learning** techniques
- Regression and classification for energy-sector problems
- Clustering and segmentation of energy consumers/assets
- Feature engineering and model-performance evaluation
- Model interpretation and **AI-driven decision support**
- **Case Study:** Developing an ML model to predict equipment performance and identify early signs of failure.

Module 4: Energy Demand and Renewable Forecasting

- **Time-series analytics** and forecasting fundamentals
- Electricity-load and energy-demand forecasting
- Solar and wind-power generation forecasting
- Weather, IoT, and market-data integration
- Forecast accuracy, uncertainty, and model optimization
- **Case Study:** Forecasting solar-power generation using historical production and weather datasets.

Module 5: Predictive Maintenance and Asset Analytics

- **Predictive maintenance** strategies for energy assets
- Sensor, SCADA, IoT, and operational-data analytics
- Failure prediction and anomaly detection
- Remaining Useful Life (**RUL**) concepts
- Asset health scoring and reliability analytics
- **Case Study:** Detecting abnormal turbine operating conditions before a major equipment failure occurs.

Module 6: Smart Grids, Energy Optimization and Digital Twins

- **Smart-grid analytics** and intelligent energy management
- Demand-response and energy-consumption optimization
- Digital twins and real-time operational analytics
- Grid reliability, resilience, and distributed-energy resources
- AI-based optimization of energy assets and systems
- **Case Study:** Optimizing energy flows across a smart microgrid containing solar generation, battery storage, and variable demand.

Module 7: Energy Markets, Trading and Sustainability Analytics

- **Energy price forecasting** and market analytics
- Electricity-market and energy-trading datasets
- Risk analytics and scenario modeling
- Carbon emissions and **ESG data analytics**
- AI for energy transition and sustainability strategies
- **Case Study:** Building an analytics model to evaluate electricity-price movements and renewable-energy market exposure.

Module 8: Advanced AI and Energy Data Science Capstone

- **Generative AI, deep learning, and advanced analytics** in EnergyTech
- End-to-end energy data science project development
- Model deployment, monitoring, and responsible AI
- Data-driven energy efficiency and decarbonization strategies
- Building an organizational **AI and energy analytics roadmap**
- **Case Study:** Designing an AI-powered energy analytics solution that combines demand forecasting, renewable generation, predictive maintenance, and emissions optimization.

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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