Training Course on AI and Machine Learning for Upstream Data Analytics

Professional Development Training Course Outline

Category	Oil and Gas	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The energy sector is undergoing a transformative shift, with Artificial Intelligence (AI) and Machine Learning (ML) redefining how upstream operations extract, process, and analyze data. Training Course on AI & Machine Learning for Upstream Data Analytics course empowers engineers, analysts, and decision-makers with the latest AI technologies to optimize exploration, drilling, and production strategies. Through real-time data ingestion, predictive maintenance, reservoir modeling, and intelligent automation, professionals will gain an edge in operational efficiency and risk management.

This course leverages cutting-edge tools such as Python, TensorFlow, and cloud-based ML platforms tailored to upstream workflows. Trainees will learn how to deploy AI-driven solutions to reduce downtime, enhance asset integrity, and optimize recovery. The curriculum integrates practical labs, case studies from top oil & gas companies, and project-based learning to ensure mastery of core concepts and their industrial applications. Participants will graduate with industry-relevant skills and strategic insights into digital transformation in upstream operations.

Programme Curriculum

Training Course on AI & Machine Learning for Upstream Data Analytics

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Course Objectives

1. Understand the fundamentals of AI and ML in upstream oil & gas workflows
2. Leverage predictive analytics for drilling optimization
3. Apply machine learning algorithms for seismic data interpretation
4. Use natural language processing (NLP) for report automation
5. Implement real-time data analytics using AI-driven sensors
6. Optimize production forecasting with time series modeling
7. Apply computer vision in equipment inspection and safety monitoring
8. Explore deep learning models for reservoir characterization
9. Utilize edge computing and IoT for data collection in remote sites
10. Analyze unstructured data using data lakes and cloud platforms
11. Design and deploy AI-based predictive maintenance systems
12. Integrate AI-powered decision-making in drilling and well planning
13. Evaluate AI ethics and data governance in upstream analytics

Target Audiences

1. Petroleum Engineers
2. Data Scientists in Oil & Gas
3. Exploration & Production Managers
4. Geophysicists & Geologists
5. AI/ML Enthusiasts in Energy Sector
6. Drilling Engineers
7. Oilfield Service Providers
8. Project Managers in Energy Analytics

Course Duration: 10 days

Course Modules

Module 1: Introduction to AI & ML in Upstream

- Basics of AI, ML, Deep Learning
- Use cases in upstream oil & gas
- AI technology stack in exploration
- Key challenges in adoption
- Tools: Python, Scikit-learn, TensorFlow
- **Case Study**: BP’s use of AI for seismic imaging

Module 2: Seismic Data Interpretation using Machine Learning

- Data preprocessing and labeling
- ML models: CNNs for image data
- Fault detection with supervised learning
- Transfer learning for seismic analysis
- Visualization tools: Petrel, GeoTeric
- **Case Study**: Shell’s deep learning models for seismic fault mapping

Module 3: Predictive Maintenance in Oil Rigs

- Introduction to predictive maintenance
- Sensor data integration via IoT
- Anomaly detection techniques
- ML models for failure prediction
- Dashboard visualization
- **Case Study**: Chevron's AI implementation to reduce non-productive time (NPT)

Module 4: Real-Time Drilling Analytics

- Introduction to WITSML data
- Time-series modeling with LSTM
- Predictive modeling for stuck pipe
- Real-time alert systems
- Feature engineering in sensor data
- **Case Study**: Halliburton's real-time drilling optimization AI

Module 5: Production Optimization with AI

- Production data modeling techniques
- Regression and classification models
- Data fusion from multiple sensors
- Intelligent well performance tracking
- Using AI to predict decline curves
- **Case Study**: Saudi Aramco's ML-based oil production forecasting

Module 6: Reservoir Characterization with Deep Learning

- Data from well logs, core samples
- DL models: autoencoders, CNNs
- Feature extraction from petrophysical data
- Formation classification
- Lithofacies prediction
- **Case Study**: Schlumberger's AI-assisted reservoir mapping

Module 7: Natural Language Processing in Upstream Reports

- Text mining and data extraction
- NLP models: BERT, GPT-based models
- Summarizing technical reports
- Named entity recognition for asset names
- Automation in regulatory reporting
- **Case Study**: TotalEnergies' use of NLP for document intelligence

Module 8: Edge Computing for Remote Field Analytics

- Introduction to edge AI
- Hardware platforms for edge analytics
- Reducing latency in remote operations
- Data syncing with cloud
- Use cases in remote sensor networks
- **Case Study**: ExxonMobil's edge AI in offshore operations

Module 9: Computer Vision in Safety and Inspection

- Object detection (YOLO, Faster R-CNN)

- Camera-based monitoring systems
- Identifying PPE compliance
- Crack/damage detection on pipes
- Use of drones and robots
- **Case Study**: ConocoPhillips' AI for pipeline corrosion detection

Module 10: Forecasting and Time-Series Analytics

- Time-series forecasting models
- ARIMA, Prophet, LSTM techniques
- Forecasting production & pressure trends
- Rolling window evaluation
- Visual dashboards (Power BI, Tableau)
- **Case Study**: Apache Corp's pressure prediction for well control

Module 11: Ethics, Bias & Governance in AI

- AI model bias in upstream datasets
- Data privacy and regulatory standards
- Explainability and transparency in ML
- Secure data pipelines
- Ethical AI frameworks in energy
- **Case Study**: Oxy's AI governance protocol for exploration data

Module 12: AI in Reservoir Simulation

- Generative models for synthetic data
- History matching with ML
- Dynamic simulation optimization
- Hybrid physics-ML models
- Model validation and error analysis
- **Case Study**: Equinor's hybrid modeling for field planning

Module 13: AI for Environmental Impact Analysis

- Monitoring emissions with ML
- AI in flare detection
- Satellite and drone data usage
- Compliance prediction models
- Sustainability dashboards
- **Case Study**: Repsol's AI model for methane emissions tracking

Module 14: Cloud AI in Upstream Analytics

- Using AWS, Azure for ML pipelines
- AutoML in upstream workflows
- Cloud data lakes and security
- Deploying scalable models
- Cost-efficiency with cloud processing
- **Case Study**: ENI's cloud-first strategy for AI deployments

Module 15: Final Capstone Project

- Real-world upstream data project
- Model design, development, testing
- Documentation and reporting

- Peer and instructor feedback
- Presentation and deployment plan
- **Case Study**: Group project simulating AI for drilling optimization

Training Methodology

- Interactive instructor-led sessions
- Hands-on coding labs with industry datasets
- Group discussions and peer reviews
- Case study analysis and group projects
- Capstone project presentation
- Online learning materials and lifetime access to recordings

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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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