Optimization of the oil and gas industry decision-making process by incorporating Artificial intelligence, process automation, and edge technologies

Course Description

This course provides novel concepts, methodologies, and workflows to better understand the oil and gas industry's decision-making process. The decision-making process starts from the reservoir discovery and ends with the asset abandonment and decommissioning.

This course will cover how we design the FDP and make decisions, from the type of wells and completion we choose to drain the reservoir to the technologies we select for asset monitoring and real-time decision-making. The core of the training is the use of Artificial Intelligence (AI), intelligent well completions, edge technologies, process automation, and other technologies to support the decision-making process.

Generally, investors select projects for capital investment based on the organization's ability to design and accomplish trustworthy and reliable field development plans (FDP). Then, oil and gas companies have the challenge of designing the proper road map to implement FDP from its discoveries to abandonment in the most efficient way. This course would focus on how to leverage cutting-edge technologies like Artificial Intelligence, the Internet of Things (IoT), sensors, edge computing, machine learning, and advanced data analytics to make informed decisions within oil and gas projects, particularly at the operational level where data is generated in real-time, allowing for rapid response and optimization strategies.

The Front-End Loading (FEL) methodology, as well as decision scenario optimization, are the core areas of this training. The FEL methodology demonstrates the importance of effective early planning decisions in delivering successful development projects.

At the end of the training, the attendee will be able to understand the importance of incorporating Artificial Intelligence, the Internet of Things (IoT), sensors, edge computing, machine learning, and advanced data analytics to optimize the decision-making process.

Who Should Attend?

The program provides engineering and management professional knowledge needed to enhance the oil and gas decision-making process during project design and implementation phases. This course is designed for professionals with a background in engineering, geology, sciences, economy, and project management.

1. Attendants should be familiar with reservoir engineering, geology, project management, leadership, and economy.

2. Preferably, attendants should have some basic knowledge of drilling and completion, production, reservoir characterization, and project management.

What You Will Gain:

1. Learn how Artificial Intelligence (AI), process automation, and edge technologies can help us to improve the oil and gas decision-making process
2. Understand the concepts and workflows related to Front-End-Loading (FEL), decision scenario optimization (DSO), and Integrated Asset Modeling (IAM).
3. Learn about the fundamentals of project economics and key economic indicators used to measure business success
4. Understand the importance of Digital transformation on the decision-making process

Training Methodology

The training course will combine lectures (30%) with workshop/work presentations (30%), interactive practical exercises and case studies (20%), supported by video material, software and general discussions (20%)

Course Content

Day 1. Introduction of oil and gas decision-making process

- Review of key aspects of the decision-making process in the oil and gas industry
  - Data Collection and Analysis
    - Geological and Geophysical Data
    - Risk assessment
    - Financial Modeling
  - Strategic Planning
    - Defining Goals and Objectives
    - Developing Strategies
  - Project Evaluation and Decision-making
  - Types of decision-making models, Challenges in the decision-making process

- **Introduction — Unlocking the Power of Digitalization**
  - Digital Transformation in Oil and Gas Upstream: review of concepts of AI, Automation, and data analytics
  - Main digital technologies
  - Benefits of digital skills, Digital and AI achievements
  - Data utilization and value creation, Generative AI
  - Challenges related to the use of Digital Technologies
  - Digital Technologies Applications

Day 2. Digital transformation Case studies
- **Case studies in subsurface geoscience and visualization**
  - Petrophysics
  - Project management
  - Field development plan optimization
  - Reservoir management, continuous production optimization
  - What if scenario analysis

Day 3. Introduction to Field Development Planning and Production Optimization
- Review of the Field Development Planning (FDP) process
  - Field development processes, uncertainties, and decisions
  - Type of decisions and deliverables of a Field Development Plan.
- Field Development Optimization
  - Optimization objective. Maximization of profit, NPV, recovery factor, production plateau duration; minimization of number of producer and injector wells, drilling cost, OPEX.
  - Case studies

Day 4. Introduction to Upstream Decision-Making and Risk Analysis

- Risk sources
- Risk Management and Project Decision Making
- Descriptive statistics and Inferential statistics
- Probability density function overview
- Uncertainty quantification by stochastic simulation (Monte Carlo)
- Sensitivity diagrams, Tornado plot
- Exercises
- Case studies discussion

Day 5. Intelligent well completions, and real-time monitoring

- Intelligent and smart well concepts, Intelligent well completions
- Comparison of Conventional vs. Intelligent Wells
- Horizontal wells vs. vertical wells
- Role of Intelligent wells in the context of the Digital Oil field –DOF

- AFE Analysis, intelligent well cost optimization analysis
- Impact of new drilling and completion technologies in NPV
- Importance of real-time monitoring
- Introduction of Digital Oil Field (DOF)
- Case studies

Day 6. Front-End-Loading for Field Development
- FEL (Front-End-Loading) methodology
- Decision Scenario Optimization (DSO)
- Uncertainty and decision-making evaluation from integrated profit models
- Case studies discussion

Day 7. Overview of Economic Evaluations
- Introduction to oil and gas economics
  - Time value of money, present value formula
  - Inflation, escalation, real and nominal cash flow
  - Types of cash flow, Capital Expenditure (CAPEX)
  - Operating expenditures (OPEX)
  - Depreciation Methods
- Overview of main economic indicators
- Modern portfolio theory
  - Efficiency Frontier concept
- Practical session exercise using Excel for building an economic model

Day 8. Risk Management
- Risk management in FDP
  - Uncertainty versus risk analysis
  - Risk management process
  - Decision Tree Analysis
  - Risk Matrix
  - Uncertainty processes impacting decision-making (multidisciplinary approach
  - Edge technologies and risk reduction

Day 9. Digital strategic Vision
- Challenges, Digital Road map
- Edge technologies, Process automation
- Importance of high-performance teams
- Leading a digital transformation

Day 10. Importance of leadership in the Digital transformation
- Leadership Challenges and emerging trends in digital technologies
- AI trends for 2024
- Exploring leadership practices for the digital age
- Sharing best practices and lessons learned
- Course wrap-up