PETROLEUM RISKS AND DECISION ANALYSIS

PRE011

COURSE OVERVIEW

Good technical and business decisions are based on competent analysis of project costs, benefits and risks. Participants learn the decision analysis process and foundation concepts so they can actively participate in multi-discipline evaluation teams. The focus is on designing and solving decision models. About half the problems relate to exploration. The methods apply to R&D, risk management, and all capital investment decisions. Probability distributions express professional judgments about risks and uncertainties and are carried through the calculations. Decision tree and influence diagrams provide clear communications and the basis for valuing each alternative. Monte Carlo simulation is experienced in detail in a hand-calculation exercise. Project modelling fundamentals and basic probability concepts provide the foundation for the calculations. The mathematics is straightforward and mostly involves only common algebra. The emphasis is on practical techniques for immediate application.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Understand and apply the decision analysis process.
- Express and interpret risks using probability distributions.
- Use decision trees and Monte Carlo simulation for analysis.
- Evaluate investments and design alternatives.
- Assess value of information (VOI) and project flexibility.
- Apply decision criteria and policy.
- Model decisions using influence diagrams and analyze correlations.
- Understand basic probability and statistics concepts.
- Implement decision analysis techniques in practice.
- Mitigate risks and evaluate prospects effectively.

WHO SHOULD ATTEND

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

COURSE DURATION

5 Working Days

COURSE OUTLINES

Day 1

- Pre course evaluation.
- Learn how to describe the elements of the decision analysis process
- How to demonstrate respective roles of management and the analysis team
- Express and interpret judgments about risks and uncertainties as probability distributions and popular statistics
- Represent discrete risk events in
    - Venn diagrams
    - Probability trees
    - Joint probability tables

Day 2

- Solve for expected values with decision trees
- Payoff tables
- Monte Carlo simulation (hand calculations)
- Craft and solve decision models
- Evaluate investment
- Design alternatives with decision tree analysis
- Develop and solve decision trees for value of information (VOI) problems

Day 3

- Decision Tree Analysis:
    - Decision models
    - Value of information (a key problem type emphasized in the course)
    - Flexibility and control
    - Project threats and opportunities
- Monte Carlo Simulation:
    - Latin hypercube sampling
    - Portfolio problems
    - Optimization
    - Advantages
    - Limitations

Day 4

- Decision Criteria and Policy:
  - Value measures
  - Multiple objectives
  - HSE
  - Capital constraint
  - Risk aversion
- Modeling the Decision
  - Influence diagrams
  - Sensitivity analysis
  - Modeling correlations
- Basic Probability and Statistics
  - Four fundamental rules including Bayes' rule (the easy way)
  - Calibration and eliciting judgments
  - Choosing distribution types
  - Common misconceptions about probability

Day 5

- Expected Value Concept:
  - Foundation for decision policy
  - Features
  - Pitfalls to avoid
- Implementing Decision Analysis:
  - Problem framing
  - Guidelines for good analysis practice
  - Team analyses
  - Computer tools (discussion and demonstrations)
  - Mitigating risks
- Evaluating a multi-pay prospect (team exercise)
- Post course evaluation.