TETRA TECH RPS ENERGY | TRAINING

N541: Petroleum Economics, Risk and Uncertainty

Instructor(s): Pete Smith

Format and Duration

Classroom - 3 Days
Virtual - 5 Sessions

Summary

The course focusses on the fundamentals of estimating risk and uncertainty to improve decision making and introduces both probabilistic and deterministic approaches. Included, is the examination of factors contributing to uncertainty throughout subsurface, drilling, facilities, production cost and economics. The underlying conjecture is that if a greater understanding of risks and uncertainty can be developed then unwanted surprises in delivering estimates of production, reserves and value can be lessened.

Business impact: Participants in this course will develop an understanding of **economic evaluation techniques** and their **related financial concepts** that are used in business to assist **decision making** in the face of **risk and uncertainty**. This will allow **volumes** to be converted to **value** and an **assessment** can be made of whether, for example, additional reservoir appraisal is worthwhile.

Learning Outcomes

Participants will learn to:

1. Illustrate what is critical to the business decision-making process.
2. Understand the basics principles of economic analysis such as the time value of money, discounting, and other project cash flow measures
3. Calculating the economic indicators Net Present Value and Rate of Return along with the Cost of Capital (Weighted Average Cost of Capital).
4. Understand risk ranking and bow-tie models to manage risks through project life
5. Assess the sources of the wide range of data which contribute to the understanding and development of hydrocarbon reservoirs, their use and associated uncertainty.
6. Develop decision trees to lay-out the logic and evaluate the robustness of the decision.
7. Recognize the various types of heuristics and biases and be able to distinguish between them.
8. Practice through exercises on range and probability estimation the need to keep ranges wide as possible.
9. Evaluate how to combine uncertainties for projects at different stages of the E&P lifecycle and select key variables in a probabilistic evaluation to manage uncertainty by acquiring additional data (appraisal) or design of interventions (contingency) within a Value of Information framework.
10. Appreciate Bayes theory and illustrate pertinence when evaluating risk mitigation cost.

Training Method

This is a classroom or virtual classroom course comprising a mixture of lectures, discussion, case studies, and practical exercises.

Who Should Attend

The course is designed for reservoir / petroleum / production / facility / drilling engineers, geoscientists,

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team leaders and managers.

Course Content

Part 1

- Heuristics Questionnaire
- Introduction
- Petroleum Economics
- Principles of cash flow analysis and discounted cash flow

Part 2

- Risk and Uncertainty
- Heuristics and Biases
- Exercise: Range Estimation
- Exercise: Probability Estimation

Part 3

- Decision trees
- Risk Management
- Bow-Tie Models
- Exploration Risking

Part 4

- Decisions with Uncertainty
- Probability distributions
- Basic Statistics
- Combining Uncertainties

Part 5

- Mitigation techniques
- Bayes Theory
- Value of Information
- Appraisal or Intervention?