COURSE OVERVIEW DE0922
Petroleum Risk and Decision Analysis

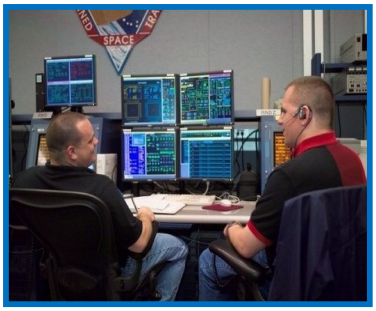
Course Title
Petroleum Risk and Decision Analysis

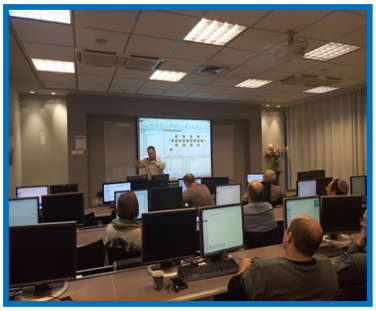
Course Date/Venue
Session 1: February 23-27, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: August 25-29, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
DE0922

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description





This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using the Monte Carlo simulation.

One of the most characteristic features of the oil and gas industry is the dramatic risk/reward relationship associated with exploration. Industry professionals must understand these dynamics and understand the language of risk analysis. 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. 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.

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. Probability distributions express professional judgments about risks and uncertainties and are carried through calculations. Decision tree and influence diagrams provide clear communications and the basis for valuing each alternative. Monte Carlo simulation is discussed and experienced in detail in a hand-calculation exercise. Project modeling fundamentals and basic probability concepts provide the foundation for the calculations. Emphasis is on practical techniques for immediate application.

This course provides participants a practical, hands-on approach to modern techniques in petroleum risk and decision analysis. The techniques presented are applicable to all aspects of oil and gas exploration and production - prospect evaluation, resource allocation, diversification, risk sharing, and corporate planning.

The course helps participants develop problem solving, leadership, and functional skills necessary to manage the modern oil and gas enterprise. Participants will find the concepts and techniques stimulating and beneficial - enabling them to apply risk and decision making concepts to their jobs immediately.

Participants learn how to design and solve decision trees and payoff tables, popular decision modeling techniques. These methods provide clear communications and the basis for valuing each alternative. Judgments about risks and uncertainties are expressed as probability distributions. Monte Carlo simulation, another powerful technique, is also presented. Four basic probability concepts provide the foundation for the calculations. The mathematics is straightforward and mostly involves only common algebra.

Course Objectives

Upon successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on decision and risk analysis and management
- Discuss the basics of decision analysis covering the review of economics, statistics, probability theory, decision trees introduction and risk tolerance
- Carryout decision tree analysis using calculation procedures, craft and solve decision models and flexibility and control, evaluate investment and design alternatives with decision tree analysis
- Illustrate Monte Carlo simulation that includes sampling techniques, solution accuracy and stopping rules, hypercube sampling, correlation and considerations for portfolio problems and optimization and its advantages and limitations
- Solve for expected values with decision trees, payoff tables and Monte Carlo simulation (hand calculations)
- Recognize the decision criteria and policy comprising of value measures, decision rules, decision with multiple objectives, the advantages of the decision analysis approach and dealing with capital constraint, risk aversion and portfolios
- Model the decision and the investment opportunity through the ten step decision precision problem-solving process, real options analysis, operations, earnings and cash-flow model structures, sensitivity analysis and scenario analysis
- Discuss the basic probability and statistics including the four fundamental probability rules, types and uses of distributions applicable to the petroleum industry and the alternate ways to represent correlation between variables
- Employ probabilistic risk analysis, risk analysis strategies and optimization by representing discrete risk events in Venn diagrams, probability trees and joint probability tables

- Recognize the expected value concept that covers the foundation for decision policy, features, quantitative estimation of risk and uncertainty, capture of expert judgements and recognition and avoidance of biases and errors
- Analyze the methods in the petroleum industry consisting of the characterization risks of exploration, field development, EOR, transport and plant investments and risk mitigation methods
- Implement decision analysis by framing the problem/following guidelines for good analysis practice, considering team analysis, using computer tools, interpreting decision analysis results from a management perspective and establishing credibility in the analysis
- Describe the elements of the decision analysis process and the respective roles of management and the analysis team
- Express and interpret judgements about risks and uncertainties, probability distributions and popular statistics
- Develop and solve decision trees for value of information (VOI) problems

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of petroleum decision and risk analysis and management for multi-discipline audiences including geologists, petroleum engineers, geophysicists, managers, planning analysts, senior planners and planners.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 8,000 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Konstantin Zorbalas, MSc, BSc, is a **Senior Petroleum Engineer & Well Completions Specialist** with over **25 years** of **offshore** and **onshore** experience in the **Oil** & **Gas**, **Refinery** & **Petrochemical** industries. His wide expertise includes **Workovers & Completions**, **Petroleum Risk & Decision Analysis**, **Acidizing Application** in **Sandstone** & **Carbonate**, **Well Testing Analysis**, **Stimulation Operations**, **Reserves Evaluation**, **Reservoir Fluid Properties**, **Reservoir Engineering & Simulation Studies**, **Reservoir Monitoring**, **Artificial Lift Design**, **Gas Operations**, **Workover/Remedial Operations** & **Heavy Oil Technology**, **Applied Water Technology**, **Oil & Gas Production**, **X-mas Tree** & **Wellhead Operations** & **Testing**, **Artificial Lift Systems** (**Gas Lift**, **ESP**, and **Rod Pumping**), **Well Cementing**, **Production Optimization**, **Well Completion Design**, **Sand Control**, **PLT Correlation**, **Slickline Operations**, **Acid Stimulation**, **Well testing**, **Production Logging**, **Project Evaluation** & **Economic Analysis**. Further, he is actively involved in **Project Management** with special emphasis in production technology and field optimization, performing conceptual studies, economic analysis with risk assessment and field development planning. He is currently the **Senior Petroleum Engineer & Consultant** of **National Oil Company** wherein he is involved in the mega-mature fields in the Arabian Gulf, predominantly carbonate reservoirs; designing the acid stimulation treatments with post-drilling rigless operations; utilizing CT with tractors and DTS systems; and he is responsible for gas production and preparing for reservoir engineering and simulation studies, well testing activities, field and reservoir monitoring, production logging and optimization and well completion design.

During his career life, Mr. Zorbalas worked as a **Senior Production Engineer**, **Well Completion Specialist**, **Production Manager**, **Project Manager**, **Technical Manager**, **Technical Supervisor** & **Contracts Manager**, **Production Engineer**, **Production Supervisor**, **Production Technologist**, **Technical Specialist**, **Business Development Analyst**, **Field Production Engineer** and **Field Engineer**. He worked for many **world-class oil/gas companies** such as **ZADCO**, **ADMA-OPCO**, **Oilfield International Ltd**, **Burlington Resources** (later acquired by **Conoco Phillips**), **MOBIL E&P**, **Saudi Aramco**, **Pluspetrol E&P SA**, **Wintershall**, **Taylor Energy**, **Schlumberger**, **Rowan Drilling** and **Yukos EP** where he was in-charge of the **design and technical analysis** of a gas plant with capacity **1.8 billion m3/yr gas**. His achievements include **boosting oil production 17.2% per year** since 1999 using **ESP** and **Gas Lift systems**.

Mr. Zorbalas has **Master** and **Bachelor** degrees in **Petroleum Engineering** from the **Mississippi State University**, **USA**. Further, he is an **SPE Certified Petroleum Engineer**, **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), an active member of the Society of Petroleum Engineers (**SPE**) and has numerous scientific and technical publications and delivered innumerable training courses, seminars and workshops worldwide.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 - 0800	*Registration & Coffee*
0800 - 0815	*Welcome & Introduction*
0815 - 0830	***PRE-TEST***
0830 – 0930	***Decision Analysis Basics*** *Review of Economics • Statistics (Using Excel) • Probability Theory • Decision Trees Introduction • Risk Tolerance*
0930 – 0945	*Break*
0945 – 1100	***Decision Tree Analysis*** *Calculation Procedures • Decision Models • Value of Information • Flexibility & Control • Project Threats & Opportunities • Advantages and Limitations Contrasted with Monte Carlo Simulation*
1100 – 1215	***Monte Carlo Simulation*** *Sampling Techniques • Solution Accuracy and Stopping Rules • Latin Hypercube Sampling • Correlation*
1215 – 1230	*Break*
1230 – 1420	***Monte Carlo Simulation (cont'd)*** *Considerations for Portfolio Problems and Optimization • Advantages and Limitations*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Decision Criteria & Policy*** *Value Measures • Decision Rules • Decisions with Multiple Objectives • Discrediting Intuition • HSE • Advantages of the Decision Analysis Approach • Dealing with Capital Constraint and Risk Aversion • Portfolios*
0930 – 0945	*Break*
0945 – 1100	***Modeling the Decision*** *Influence Diagrams • Sensitivity Analysis • Modeling*
1100 – 1215	***Modeling the Investment Opportunity*** *The Ten-Step Decision Precision Problem-Solving Process • Real Options Analysis • Operations, Earnings and Cash-Flow Model Structures*
1215 – 1230	*Break*
1230 - 1420	***Modeling the Investment Opportunity (cont'd)*** *Modeling Tools, Including Influence Diagrams (Briefly) • Deal Structures • Sensitivity Analysis • Scenario Analysis*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Basic Probability and Statistics*** *Four Fundamental Probability Rules, Including Bayes' Theorem • Calibration & Eliciting Judgements • Choosing Distribution Types • Types and Uses of Distributions Applicable to the Petroleum Industry, Especially Exploration*
0930 – 0945	*Break*
0945 – 1100	***Basic Probability and Statistics (cont'd)*** *"Gambler's Ruin" Concept • Alternate Ways to Represent Correlation Between Variables • Common Misconceptions about Probabilities*
1100 – 1215	***Probabilistic Risk Analysis*** *Sampling Techniques • Building Simple Models and Interpreting Results • Correlation between Inputs and Output • Solution Accuracy and Stopping Rules • Latin Hypercube Sampling • Correlation • Considerations for Portfolio Problems and Optimization • Advantages and Limitations • Using Excel and Monte Carlo Software to Analyze Data Volumetric Products for Resources and Reserves • Aggregation Models and the Central Limit Theorem*
1215 – 1230	*Break*
1230 – 1420	***Probabilistic Risk Analysis (cont'd)*** *Changing Distribution Type – Testing Sensitivity • Correlation: Recognising and Incorporating Dependency, Cross Plots, Effects of Correlation • Modeling Unusual (Rare) Events by Assigning Probability and outcome • Simple Production Forecasts and Cashflow*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

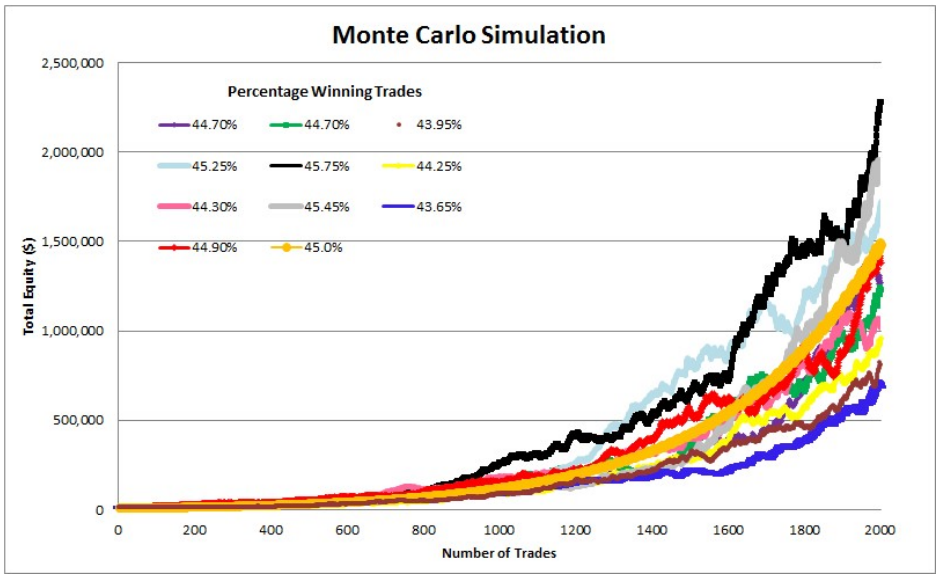
0730 – 0930	***Risk Analysis Strategies & Optimisation*** *Layered Systems • Faulted Reservoir Considerations • Production Models Pseudo-Cases*
0930 – 0945	*Break*
0945 – 1100	***Risk Analysis Strategies & Optimisation (cont'd)*** *Determining Well Sequence • Class Problem Using Monte Carlo Simulation*
1100 - 1215	***Expected Value Concept*** *Foundation for Decision Policy • Features • Quantitative Estimates of Risk and Uncertainty • Capturing Expert Judgments • Recognizing and Avoiding Biases and Errors*
1215 - 1230	*Break*
1230 - 1420	***Analysis Methods in the Petroleum Industry*** *Characteristic Risks of Exploration, Field Development, EOR, Transport and Plant Investments • Risk Mitigation Methods*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Implementing Decision Analysis*** *Problem Framing • Guidelines for Good Analysis Practice • Team Analyses • Computer Tools (Discussion and Demonstrations) • Interpreting Decision Analysis Results from a Management Perspective*
0930 – 0945	*Break*
0945 – 1100	***Implementing Decision Analysis (cont'd)*** *Facilitating Team Analyses • Low-Cost Computer Tools • Establishing Credibility in the Analysis*
1100 – 1215	***Team Workshop*** *Evaluate a Multi-Pay Prospect Using Trees and the Probability Concepts Learned in the Course*
1215 – 1230	*Break*
1230 – 1345	***Team Workshop (cont'd)*** *Solving again using Monte Carlo Simulation*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Session

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator "Monte Carlo".



Monte Carlo Simulation

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org