



PETROLEUM RISKS AND DECISION ANALYSIS (PRD)

COURSE LEVEL: Foundation

PETROSKILLS

DESIGNED FOR

Geologists, geophysicists, engineers, planning analysts, and managers

ABOUT THE COURSE

Good technical and business decisions are based on superior analysis of project costs, benefits, and risks. Attendees learn a practical, systematic process for analyzing decisions under conditions of risk and uncertainty. Participants design and solve decision models. Probability distributions express professional judgments about risks and uncertainties. Decision tree and influence diagrams provide clear communications and the basis for valuing each alternative. The complementary Monte Carlo simulation technique is also presented and experienced in detail in a hand-calculation exercise. Economic evaluation fundamentals and basic probability concepts provide the foundation for the calculations. The mathematics is straightforward and mostly involve only common algebra. The emphasis is on practical techniques for immediate application.

This course is recommended for persons having strong English listening skills.

COURSE CONTENT

Decision Tree Analysis: decision models • low probability, high-consequence events • valuing additional information and control • project threats and opportunities • advantages and limitations • **Monte Carlo Simulation:** Latin hypercube sampling • solution convergence • portfolio problems • optimization • decision criteria and policy: value measures • multiple objectives • capital constraint and risk aversion • **Modeling the Investment:** influence diagrams • deal structures • sensitivity • real options analysis basics • **Basic Probability and Statistics:** four fundamental rules, including Bayes' theorem • choosing distribution types • "gambler's ruin" • common misconceptions about probability • expected value concept: avoiding biases in estimation • **Analysis Methods:** guidelines for good analysis practice • implementing decision analysis: team analyses • computer tools • mitigating risks • evaluating a multi-pay prospect (team exercise)

*A semi-custom variant of this course, **Economic Evaluation of Prospects and Producing Properties**, is available for in-house presentation.*

2009-2010 SCHEDULE (partial)

Monday, November 9 to Friday, November 13	
Buenos Aires	Tim
Monday, December 7 to Friday, December 11	
Houston	Tim
Monday, February 8 to Friday, February 12	
Houston	Tim
Monday, March 1 to Friday, March 5	
Couva, Trinidad & Tobago	Tim
Monday, March 22 to Friday, March 26	
Calgary	Tim
Monday, April 19 to Friday, April 23	
London	John
Monday, June 14 to Friday, June 18	
Houston	Tim



ADVANCED DECISION ANALYSIS WITH PORTFOLIO AND PROJECT MODELING (ADA)

COURSE LEVEL: Specialized

PETROSKILLS

DESIGNED FOR

Planners, analysts, economists, and evaluation team members

ABOUT THE COURSE

Quality forecasts and evaluations depend upon well-designed decision policy and project models in addition to professional judgments. Participants learn the methods and practice of building good evaluation models.

Practical analysis concepts are experienced by developing models with hands-on use of Monte Carlo simulation, influence diagrams, and decision tree software.

This course is intended for professionals involved with constructing project evaluation and other forecasting and assessment models. The familiar Excel spreadsheet is used for developing project and risk assessment models. Add-in software provides Monte Carlo and decision tree capabilities. The emphasis is on the evaluation concepts and techniques rather than on particular software programs. Approximately 50% of the class time is devoted to hands-on computer modeling. Enrollment is limited to approximately 16 participants.

Participants are expected to know the concepts in the Petroleum Risks and Decision Analysis course or have similar substantial background. In addition, basic Excel competence in an MS Windows environment is a requirement. This course is recommended for persons having strong English listening skills.

Visit <http://www.maxvalue.com/prereq.htm> for a list of expected pre-course competencies.

One personal computer is supplied, at added cost, for every two participants.

COURSE CONTENT

Project Modeling: influence diagrams, correlation, control and feedback concepts, good modeling practices • **Monte Carlo simulation:** cashflow models, prospect risking, play analysis and discovery process models, choosing distribution types, calculating probabilities and distributions with simulation, modeling and optimizing portfolios, competitive bidding and other optimization, winner's and optimizer's curses, valuing added control, traditional and Latin hypercube sampling, methods for modeling correlation • **Decision Tree Analysis:** value of information, options • **Decision Policy:** overview of finance theory related to PV discount rate and risk (CAPM and portfolio theory), real options analysis, multi-criteria decisions, risk policy as a utility function, insurance and hedging, optimizing working interest, shareholder value model, modeling and optimizing portfolios • **Risk and Decision Analysis in Projects:** project activity networks (CPM, PERT and PDM), project risk management • **Implementation:** presentation formats; team processes; alternative and emerging evaluation technologies, including fuzzy logic, neural networks, expert systems, simulated annealing, and genetic algorithms

2009-2010 SCHEDULE (partial)

Monday, December 14 to Friday, December 18	
Houston	Tim
Monday, March 8 to Friday, March 12	
Couva, Trinidad & Tobago	Tim
Monday, April 26 to Friday, April 30	
London	John



ECONOMIC EVALUATION OF PROSPECTS AND PRODUCING PROPERTIES (EPP)

OGCI

*Offered only as an in-house course.
EPP has 85% of the same concepts and
65% of the same notebook contents as PRD.*

COURSE LEVEL: Intermediate

DESIGNED FOR

Geologists, engineers, geophysicists, managers, and persons new to analysis and evaluation responsibilities

ABOUT THE COURSE

Property sales and acquisitions, lending, and joint ventures abound in the petroleum industry. The central information for decision making is the value of the subject asset. The evaluation model is the focal point for communicating among the project team members, managers, and partners. The course emphasis is optimizing monetary value, and ways are discussed to bring in HSSE (health, safety, security and the environment) and other considerations into the analysis.

Appraisal methods for upstream properties and related projects are discussed and experienced in this hands-on workshop. The learning objective is a process for delivering a credible and well-documented evaluation of reserves and economic worth. Participants learn the tools and techniques of good evaluation practice. While not normally used in the course, personal computer spreadsheets and other software are discussed in detail. (Participants are welcome to bring a notebook computer to class, though this provides only slight advantage in several exercises.)

Geologic and engineering information provide inputs to the production forecast model. Judgments about a variety of risks and uncertainties must be considered and incorporated into the analysis. Product pricing, various costs and taxes, inflation, and deal structure are added. The forecasting model translates the physical asset description into resource/reserves, production and cashflow forecasts, and various decision criteria. Participants learn how many real-world problems can be solved with a scientific or business hand calculator (which they bring to the course), three reference textbooks, and a 500+ page course notebook. The emphasis is on practical technique for immediate application.

This course is recommended for persons having strong English listening skills.

COURSE CONTENT

Physical Estimation: overview of geologic and engineering aspects in estimating the volume of recoverable hydrocarbons and in forecasting production • **Risk and Decision Analysis** (course emphasis): using probabilities (e.g., chance of hydrocarbons, political scenarios) and probability distributions (e.g., recovery production decline, prices); principles and application of decision trees and Monte Carlo simulation; three fundamental probability rules and basic statistics; probabilistic reserves, aggregation, and issues in reserve classifications; multiple pay zones; statistics of field data • **Economic Evaluation Concepts:** project and cashflow modeling; influence and flow diagrams; projecting recovery and production rates; popular decision criteria; decision policy, including multi-criteria decisions; overview of real options analysis; taxes, inflation and financing; auditing evaluations; optimizing decisions for project design and deal transaction structures; working with cross-discipline teams; presenting the analysis.



TECHNICAL PUBLICATIONS

DECISION ANALYSIS FOR PETROL. EXPLORATION, 2nd Edition—Paul Newendorp and John Schuyler

This is an updated edition of the best-selling standard text and reference in the field. First published in 1975, this book introduces ways to apply decision analysis concepts to the analysis of decisions under uncertainty. The problem-solving techniques are general and apply to decisions of all types. The focus, however, is on petroleum exploration investment decisions. Topics covered represent practices used throughout the world for analyzing prospects. Several ideas and concepts were first published in the first edition, and it continues as an oft-cited reference.

This book is about quantitative analysis methods useful for capital investments, especially exploration decisions. The book will be of special interest to professionals involved in the evaluation of exploration prospects: petroleum geologists, engineers, geophysicists, and management decision makers. A mathematical or statistical background is not required to follow the practical, applications-oriented discussions.

CONTENTS: Decision Analysis—Why Bother?; Measures of Profitability; Expected Value Concept; Decision Tree Analysis; Utility (Risk Preference) Theory Concepts; Basic Principles of Probability and Statistics; Petroleum Exploration Risk Analysis Methods; Risk Analysis Using Monte Carlo Simulation; Implementing Risk Analysis Methods; Decisions to Purchase Imperfect Information; Special Problems and Open Issues; Epilogue; Glossary; Bibliography
Price \$64.95 — 606 pages
2000, Planning Press ISBN 978-0-9664401-1-9

RISK AND DECISION ANALYSIS IN PROJECTS, 2nd Edition—John Schuyler

Most of the world's assets are built or developed as projects. With so much money and resources devoted, it is alarming that so many projects are failures or only marginally successful. One reason for the failures is inattention to project planning and risk management. This book shows how risk and decision analysis is applied to project decisions, from feasibility analysis -to- project execution -to- end of life.

Probability is the language of uncertainty. A few basic concepts in probability and statistics go a long way toward making better decisions. The evaluation calculations are straightforward, and many everyday analyses can be solved with a hand calculator. A key benefit of the process is improved accuracy in evaluation. A decision analysis result is often substantially different than the answer obtained with single-point estimates in traditional models. Decisions can be made faster and with more confidence.

CONTENTS: Risk and Decision Analysis; Decision Analysis Process; Decision Policy; Utility and Multi-Criteria Decisions; Decision Trees; Value of Information; Monte Carlo Simulation; Project Risk Management—by the Numbers; Modeling Techniques; Probability Distribution Types; Judgments and Biases; Relating Risks; Stochastic Variance; Exploiting the Best of Critical Chain and Monte Carlo Simulation; Optimizing Project Plan Decisions; Probability Rules; Expert Systems in Project Management; Appendices: Summary of Methods; Decision Analysis Software; Glossary
Price \$34.95 — 256 pages
2001, Project Management Institute ISBN 1-880410-28-1

TRAINING IN RISK AND ECONOMIC DECISION ANALYSIS

**Capital Investment Decisions
Optimizing Engineering Design
Appraisal • Project /Asset Modeling
Portfolio Optimization
Project Planning and Risk Management**

Quality decisions are more important than ever in these days of volatile oil prices and increasing competition. Where should your company apply its capital, people, and other resources—where they can best create shareholder value? Most decisions involve many factors. For most of us, intuition is inadequate for even modestly complex situations. Fortunately, new techniques and tools are available to help.

Decision analysis is the discipline that helps decision makers choose wisely under conditions of uncertainty. Decision analysis won't eliminate risk, though it does provide assurance of the best choice given the information available at the time. The most popular calculation techniques are **decision tree analysis** and **Monte Carlo simulation**. These methods are straightforward and often involve only common algebra. Personal computer programs are now widely available for large problems or those requiring repetitive calculations. Most people quickly become comfortable with decision analysis techniques after only a modest investment in training and practice.

John Schuyler and Tim Nieman present three courses in these techniques, described on the following panels:

- **Petroleum Risks and Decision Analysis** (PRD), which includes value of imperfect information, especially suited to explorationists.
- **Applied Decision Analysis with Portfolio and Project Modeling** (ADA), a sequel to PRD (preferred) or EPP, for analysts and persons wanting additional training.
- **Economic Evaluation of Prospects and Producing Properties** (EPP), a broad course about the evaluation process and techniques, including probabilistic reserves.

The PetroSkills and OGCI class codes are in parentheses.

Over 100 Evaluation Tips about risk and decision analysis: Notes about articles, books, evaluation methods, and other topics are posted at <http://www.maxvalue.com>.

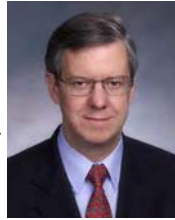
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Decision Precision® is a registered trademark of John Schuyler.*

INSTRUCTORS

JOHN SCHUYLER

John Schuyler, CAM, CCE, CMA, CMC, CPIM, PMP and PE, is a decision analyst, evaluation engineer, and investor. He founded his consulting practice, Decision Precision® in 1988. He has over 32 years of experience in analysis, consulting, and management, primarily in the energy industry. He has presented over 270 courses in 34 countries since 1990. His focus has been in feasibility analysis, appraisals, corporate planning, and evaluation software development. He was vice president and petroleum engineer with Security Pacific National Bank, planning and evaluation analyst and (later) manager of business systems for Cities Service Co., and senior management consultant with a national accounting firm. John is a member of eight professional organizations and is an author and speaker on modern analysis practices. He holds a BS and an MS in mineral-engineering physics from Colorado School of Mines, and an MBA from the University of Colorado. John is the revision author of *Decision Analysis for Petroleum Exploration, 2nd ed.*, author of *Risk and Decision Analysis in Projects, 2nd ed.*, and has written over 40 conference papers, articles, and handbook chapters.



Contact: 303-693-0067 or john@maxvalue.com

TIM NIEMAN

Tim Nieman is President of Decision Applications, Inc., a San Francisco area based decision analysis consulting firm. His firm performs decision and risk analysis for various organizations facing complex decision problems. His recent oil and gas consulting work includes risk analysis of deepwater pipeline routing; portfolio analysis for budgeting E&P R&D portfolios; and development of methods for assessing new basin entry opportunities. Other recent work includes development of remediation and reuse strategies for impaired properties, including former refineries, manufacturing facilities and pipelines; numerous projects for the Yucca Mountain proposed nuclear waste repository; work for the US Geological Survey on mountain top coal mining; and cancer causation modeling for national health organizations. He teaches various courses on decision analysis and quantitative modeling.



Mr. Nieman was formerly Senior Decision Analyst for Geomatrix Consultants, an Oakland based geological and environmental consulting firm. Prior to that, he was Director of Operations for Lumina Decision Systems, a decision analysis consulting and software firm. And prior to that, he spent 14 years with Amoco as a geophysicist, economist, and risk and portfolio analyst. He has a B.S. in geology and an M.S. in geophysics from Michigan State University, and an MBA from Rice University.

Contact: 408-234-9988 or
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Contact Information for PetroSkills

Registration: <http://www.petroskills.com>

In-House Courses:

PetroSkills Corporate Headquarters
2930 S. Yale Ave.
Tulsa, OK 74114
Telephone: 918-828-2500
Fax: 918-828-2580
E-mail: training@petroskills.com

About PetroSkills: <http://www.petroskills.com>
PetroSkills is a subsidiary of OGCI.

Additional DA Course Details

www.maxvalue.com/dp.htm or
www.petroskills.com

Examples

For any of these courses, participants are encouraged to bring examples from their work for discussion. Please contact PetroSkills or the instructor if you wish to submit a problem in advance.

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JOHN SCHUYLER and TIM NIEMAN

2009-2010
**PETROLEUM BUSINESS
MANAGEMENT**

Risk and Decision Analysis

**Petroleum Risks and
Decision Analysis**

**Advanced Decision
Analysis with Portfolio
and Project Modeling**

**Economic Evaluation of
Prospects and
Producing Properties**

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Decision Precision®

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