Summary
This course considers in detail the technical and commercial influences on Field Development Planning within the global oil and gas industry. It takes into account the need for the understanding of field development choices, on resource size, on facility choices, size and cost. By defining a set of key learning objectives, the course is tailored to those wishing to deepen their understanding of Field Development Planning’s purpose within the oil and gas industry. This course is orientated to building understanding of the multi-discipline skills required for Field Development Planning.

Learning Outcomes
Participants will learn to:

1. Have a detailed understanding of the purpose of Field Development Planning.
2. Critically analyse the principal technical and commercial features of oil and gas properties.
3. Deepen the understanding of the role of risk and uncertainty when making field development planning decisions.
4. Understanding all aspects that appertain to Field Development Planning, including resource size, resource location and reservoir production support mechanism.
5. Be able to assess the impact of field development choices on facility selection, sizing and costing.
6. Resolve the technical aspects into holistic understanding of the commercial worth of assets.
7. Develop a set of key tools to make optimum decisions based upon available information and uncertainties.
8. Develop a comprehensive understanding of how a field development project is managed through key stage gates.
9. Manage the risk of the Field Development cost, schedule and operability throughout field life.

Duration and Training Method
Five-day, classroom based course, with worked examples, exercises and discussion.

Who Should Attend
This course is designed for reservoir/petroleum/production/facility/drilling engineers, geoscientists, team leaders and managers.

Prerequisites and Linking Courses
Whilst there are no formal prerequisites for this class, participants are expected to have a basic understanding of statistics and able to use excel to complete individual exercises.

Course Content
The course relies heavily on interactive learning modules and team and individual exercises and is structured as follows:

DAY 1: Estimating Resources

- Session 1: Field Development Planning Quiz 1. A short, team based quiz and gives participants an
opportunity to assess their current understanding

- Session 2: Core issues in Field Development Planning. Review of the principles of Field Development Planning and main aspects of the industry that will be covered during the course.
- Session 3: The concept of Value. Analysis of the tools required to evaluate the worth of a business opportunity
- Session 4: Geological Issues. A review of key features of how hydrocarbons are formed, migrate and trapped in sedimentary bodies; the essential identification of reservoir and the tools that provide the data for analysis
- Session 5: Hydrocarbon issues - “The Fluids”. Review of key features of the chemistry, composition, properties, phase-behaviour of hydrocarbon fluids. Understanding PVT plots, how fluids are sampled identified and how hydrocarbon correlations used and interpreted.
- Session 6: Petro-physical Properties. Log Interpretation – estimating the expected porosity, permeability, water saturation and temperature gradient.
- Session 7: Reservoir Mechanisms. The nature and expected recovery factor of common mechanisms for highly under-saturated, solution gas drive, gas-cap drive, displacement drive, gravity drainage reservoirs.
- Session 8: Risk and Uncertainty. The statistical treatment of uncertainty with emphasis on a practical appreciation with typical data sets and some of the tools available for use
- Session 9: Resource Uncertainty. Estimating the distribution of resource size using provided software and interpreting the software results.
- Session 10: Exercise Reservoir “DELTA”. Class example to be worked on as syndicate teams

DAY 2: Estimating Costs

- Session 1: Review. A chance to review the course content covered in day 1 and to clear up any questions before moving onto the today’s material.
- Session 2: Field Development Planning Quiz 2. Designed to give the participants an opportunity to assess how much more knowledge they have developed since starting the course.
- Session 3: Field Development Definition. How to incorporate environmental factors, that determines the nature of the field development, for example, onshore/offshore, water depth, nearest export route, etc.
- Session 4: Well Productivity. Estimating the initial well productivity, inflow performance, tubing performance and minimum wellhead flowing pressures along with the outflow well curves
- Session 5: Oil/Gas/Water Profiles. How to build production profiles using and individual well performance decline curves and reservoir models. How to estimate the concomitant water and gas production profiles.
- Session 6: Secondary Recovery. Well injection capacity for water injection schemes, pressure maintenance and water flood operation. Artificial lift with down hole pumps and gas lift techniques
- Session 7: Additional production Issues. Sand production, deviated holes, high temperature and high pressure, extremely viscous crudes, subsea completions
- Session 8: Facility Selection. Select the appropriate facility, depending on reservoir size and type, the environment and the market for sale of the production.
- Session 9: Facility Costs. How to estimate facility costs from cost curves
- Session 10: Exercise Reservoir “DELTA”. Class example to be worked on as syndicate teams
DAY 3: Estimating Value

- Session 1: Review. A chance to review the course content covered in day 2 and to clear up any questions before moving onto the today’s material.
- Session 2: Field Development Planning Quiz 3. Designed to give the participants an opportunity to assess how much more knowledge they have developed since starting the course.
- Session 3: Transportation costs. How to estimate transportation costs from cost curves
- Session 4: Gas and Gas Condensate fields. What changes when we are dealing with a gas or gas condensate field
- Session 5: Reprise of the Gas Value Chain. Brief overview of Gas Value Chain course
- Session 6: Commercial Evaluation/Fiscal Regulations. The implication of fiscal arrangements, common tax regimes and the implications to the phasing of the development plan
- Session 7: Onshore Oil Field Development Example. Tutorial based on an actual field development – used to illustrate the choices and limitations of the development plan
- Session 8: Offshore and Deepwater Oil Field Development Examples. Tutorial based on an actual field developments – used to illustrate the choices and limitations of development plans in these cases
- Session 9: Gas Field Development Example. Tutorial based on an actual field development – used to illustrate the choices and limitations of the development plan in this case
- Session 10: Exercise Reservoir “DELTA”. Class example to be worked on as syndicate teams

DAY 4: Making Decisions

- Session 1: Review. A chance to review the course content covered in day 3 and to clear up any questions before moving onto the today’s material.
- Session 2: Field Development Planning Quiz 4. Designed to give the participants an opportunity to assess how much more knowledge they have developed since starting the course.
- Session 3: Making Decisions. Who makes decisions, how to optimise them and how uncertainty is incorporated. Decision trees to help make and exemplify decisions
- Session 4: Bayesian Revision - Value of additional data. Review of risk and uncertainty definition and the evaluating the value of additional data
- Session 6: Correlations and dependent variables – How best to incorporate them
- Session 7: The value of Information. Value of Study, cost of delay, opportunity cost
- Session 8: The value of intervention. Intervention Planning and Flexibility
- Session 9: Production Forecasting. Tools for forecasting production and ultimately the value of the development
- Session 10: Exercise Reservoir “DELTA”. Class example to be worked on as syndicate teams

DAY 5: Project and Risk Planning

- Session 1: Review. A chance to review the course content covered on day 4 and to clear up any questions before moving onto the today’s material.
- Session 2: Field Development Planning Quiz 5. Designed to give the participants an opportunity to assess how much more knowledge they have developed since starting the course.
Session 3-5: Field Development Project Planning. Project Planning, Project Life Cycle, Benefits of a Project Planning Methodology, Common Processes for each phase of the project cycle. The Triple Constraint - Scope, Schedule & Cost, Project Control and Closeout

Session 6-8: Field Development Risk Planning. Risks to Delivery, Effective Communication to all stakeholders, Risk planning processes

Session 9: DELTA Field Development Example. Tutorial based on the syndicates’ field development plans

Session 10: Review of the course – last questions and close-out