Duration: 3 Days
Format: Live or Virtual

This intensive course is for participants who are eager to learn as much as they can about the industry. The course covers upstream and midstream in greater depth (including offshore operations and international forms of minerals contracts) plus oil and gas marketing, crude oil refining and liquefied natural gas. The content can be adjusted to best fit your needs.

Course Content

1) <u>Structure of the Industry</u>

- Production Components:
  - Gases (types of gases, characteristics, market uses, wet/dry gas, condensate, contaminants, gas gathering/processing and NGL)
  - Crude Oil (composition, API gravity, sulfur and value) (examination of crude oil specimen in live courses)
  - Oil and gas measurement units
- Sectors of the industry (upstream, midstream and downstream and key activities in each)
- Industry participants (public and private O&G companies, integrated vs. independent, national oil companies, midstream operators and contractors/suppliers)
- Varying operational capabilities of national oil companies and how they limit global opportunities
- Crude oil exporters, importers and OPEC
- Global crude oil market dynamics
- US unconventional activities (synopsis of changes brought by unconventional development)
- Current focus of U.S. drilling activities

2) <u>Petroleum Geology and Exploration</u>

- Organic source of oil and gas
- Explanation of clastic, mineral and biological sedimentary rocks important to oil and gas
- Lithification and how sedimentary basins are formed (examine rock samples with magnifiers in live courses)
- Oil and gas formation, migration and traps
- Examples of conventional exploration trap types and how formed
- Differences between conventional vs. unconventional (shale and tight rock) targets
- Porosity, permeability, and why unconventional development requires horizontal drilling and hydraulic fracturing
- How the earth changes over geological time and why it is important to oil and gas
- The “total petroleum system” (brings it all together and distinguishes tight rock from shale)
- Video overview of exploration methods and tools
- More on seismic (how acquired and 2D vs. 3D)
- Offshore seismic techniques
- Exploration economic considerations

3) **Mineral Rights and Leasing**

- Mineral estate ownership in the U.S. vs. other nations
- The US rectangular survey system and metes and bounds method
- US mineral estate distribution (private, state and federal ownership)
- Severance of the mineral estate from the surface estate and rights of the mineral estate owner
- Joint mineral estate ownership (multiple owners in the same estate)
- Rule of capture (rights of a mineral estate with respect to oil and gas)
- State regulation of oil and gas activities (including a Texas horizontal well spacing example)
- Why leasing is common and key terms of a lease (bonus, royalty, primary term, etc.)
- Overview of other types of mineral interests (overriding royalty, non-participating royalty, net profits, and farmouts)
- Pooling and unitization (why critical with horizontal drilling)
- Federal leasing procedures
- Title opinions and division orders
- Overview of international forms of minerals contracts (licenses/concessions, production sharing agreements, and risk-service contracts)

4) **Drilling and Completion**

- We produced the industry's most-comprehensive drilling video and use several segments that show rig-floor activities as well as animations of downhole activities. Topics covered include:
  - Well planning, design elements, site preparation, and rig mobilization
  - Drill string components and spudding
  - Rig structure and functions (hoisting, rotating and circulating)
  - Rig crew and company man
  - Casing and cementing
  - Drilling fluids (mud), mud logging and logging while drilling
  - Directional drilling in the curve and lateral sections
  - Well stimulation, flowback and completion (tubing, packer and Christmas tree)
  - Batch drilling and simul-frac techniques
- Example of a drilling permit
- Overview of well costs and tangible vs. intangible
- Offshore rigs and overview of deepwater drilling techniques

5) **Development and Production Operations**

- Example of a discounted cash flow analysis used in a development decision
- Overview of potential well-evaluation techniques (logging, coring and drill stem tests)
- Example of reservoir behavior and natural reservoir drives
- Overview of artificial lift (may be needed to bring fluid to the surface)
- Processing facilities and animated tour of a modern production site
- Enhanced oil recovery techniques
- Offshore production platform types and subsea completions
- Oil and gas reserves

6) **Joint Operations**

- Reasons for joint operations
- Model-form joint operating agreements (JOA)
- Review of key provisions in the AAPL model form JOA
- Operator duties, partner approvals and AFEs
- JOA accounting procedure
- Direct costs, operator overheads and joint interest bills (JIBs)
- JV auditing process
- Unitization for conventional projects (such as a waterflood)

7) **Gas Gathering and Processing**

- Gas composition
- Gas gathering arrangements
- Pipeline quality standards and why processing may be required
- Gas processing (animated tour of a gas processing plant)
- Gas processing contracts and examination of a plant statement
- Fractionation

8) **Measurement and Transportation**

- Oil measurement
  - Standard volume conditions
  - Gravity and gravity adjustment to standard temperature
  - Tank sale method using strapping table
  - Tank sale procedures (live course demo using thief, thermometer, plumb bob and tape)
  - Sample gravity using thermohydrometer and BS&W analysis
  - Run ticket and volume calculation
  - LACT meter sale method and meter ticket
- Gas measurement
  - Standard volume conditions
  - Information needed for gas measurement
  - Orifice meters
  - Gas sampling, chromatography, and Btu value
- Transportation
  - Oil and gas transportation methods
  - Pipelines
    - Video showing stages of pipeline construction
    - Pipeline operation and SCADA
    - Pipeline transportation arrangements
    - North American crude oil pipeline network and hubs
    - U.S. gas pipeline network and hubs
    - Offshore pipeline construction
    - Gulf of Mexico offshore pipeline network
  - Crude oil tankers
  - Crude by rail

9) **Oil and Gas Marketing**

- Oil Marketing
  - Market participants
  - World crude oil sources and characteristics
  - Spot markets, posted prices and futures markets
  - Use of pricing benchmarks and differentials
  - Brief discussion of hedging and speculation
- Gas marketing
  - Market participants
  - Spot and futures markets
  - Bid week and transaction terms

10) **Crude Oil Refining and Distribution**

- Major world crude oil sources
- Crude oil assays
- Major refining locations
- Refinery process overview and resulting refined products
  - Crude distillation (sorting molecules into cuts/ranges)
  - Cracking and coking (breaking large molecules into higher-value smaller molecules)
  - Reforming and isomerization (improving gasoline components)
  - Alkylation (combining gases into liquids)
  - Treating (sulfur removal)
  - Gasoline blending
- Ethanol blending
- Refined product distribution and marketing

11) **Liquefied Natural Gas**

- Purpose of liquefaction
- Key thermodynamic principles (video example of gas liquefying)
- Types of liquefaction technology in use
- Processing stages in a mixed refrigerant facility
  - Pretreatment
  - Liquefaction
- LNG carrier types
- Regasification facilities
- Major LNG flows (exporting and importing nations)