Short Course

Introduction to Petroleum Exploration & Production
Available to EGI Corporate Associate Members

OVERVIEW
Based on the model for the Oilfield Life Cycle, this course covers each of the following phases:

- Reconnaissance
- Prospect Generation
- Discovery
- Reservoir Delineation
- Facilities
- Primary Production
- Enhanced Recovery
- Acquire/Divest

Target Audience
This course is suitable for a newly hired scientists and engineers, finance professionals, managers coming from non-petroleum industry backgrounds, and support staff including geo-techs, engineering techs, data management staff, and administrative support.

Instructor:
EGI Research Staff and Affiliate Scientists

Course Structure
Lectures, presentation materials, workbook
(Optional ½-day workshop)

Participants
12-24 persons

Duration
1 day
Optional ½ day workshop or evening activity

Location
EGI’s Salt Lake offices or your location.

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SESSION 1:

1. Structure and operations of the oil and gas industry:
   a) Upstream – Exploration and Production
      » Downstream – Transportation, Storage, Refining, Marketing, Petrochemicals
      » “Midstream” – Governance, Accounting, Regulatory compliance, IT, R&D, Services
   b) Types of companies:
      » Majors: revenue from upstream & downstream
      » IOCs: majors that operate around the globe
      » Independents: ‘mostly’ upstream
      » NOCs: arm of national government
      » Oilfield service companies, consultants, data and software vendors, field operations
   c) Partnership between oil companies and the oilfield services sector; “where is the R&D?”
   d) Core versus non-core functions

2. The nature of petroleum and other reservoir fluids:
   a) Groundwater, “formation water”, chemistry and salinity
   b) Crude oil, oil gravity, pour point
   c) Natural gas, other gases, condensate

3. Reservoir rocks (primarily sedimentary):
   a) Clastic rocks: sandstones and shales
   b) Carbonate rocks: limestones and dolomites
   c) Porosity and permeability, burial and compaction, diagenesis

4. Source rocks:
   a) Shales, mudstones, and carbonates
   b) Organic carbon, kerogen, generation, thermal maturity
   c) Expulsion, pressure and overpressure, reservoir seals
   d) Migration, timing

5. Unconventional reservoirs and energy resources

6. Structure and petroleum traps:
   a) Anticlines and domes
   b) Fault traps and salt domes
   c) Unconformities and pinch-outs
   d) Hydrodynamic traps
   e) “Basin-centered” accumulations
7. Acquiring exploration rights:
   a) National versus private ownership
   b) Leasing, licenses, and concessions
   c) Mineral rights versus surface rights

8. Petroleum exploration:
   a) Geology: surface mapping, subsurface interpretation, knowing the rocks
   b) Geophysics: seismic acquisition and interpretation, potential fields methods
   c) Scale and scope: reconnaissance, basin modeling, prospect generation, limitations of data and methods, 2D versus 3D

**SESSION 2:**

9. Drilling for oil and gas:
   a) The drilling rig: components, terminology
   b) Drilling operations
   c) Horizontal drilling
   d) Hazards and risks

10. Evaluation:
    a) Mud logging: rate of penetration, drill cuttings lithology interpretation, gas detection, shows
    b) Wireline logging, types of well logs, what they measure
    c) Coring and core analysis
    d) Well testing, drillstem tests, wireline formation testing

11. Well completion:
    a) Casing and cementing
    b) Perforating
    c) Acidizing, well cleanup
    d) Other completions
    e) Workovers

12. Appraisal and delineation:
    a) Well stepouts and infill
    b) Well spacing
13. Reservoir characterization and field development
14. Design, construct and commission facilities:
   a) Wellheads, gathering systems
   b) Separators, heater treaters
   c) Tank batteries, pipelines
15. Production operations
16. Stimulate wells, improve recovery:
   a) Fracturing (hydraulic “fracking”)
   b) Pressure maintenance
   c) Tertiary EOR methods
17. Development of offshore operations:
   a) Seismic acquisition
   b) Mobile offshore drilling units
   c) Offshore platforms
18. Dispose, decommission, or divest asset
19. The asset team:
   a) Geologists and geophysicists
   b) Engineers: drilling, facilities, reservoir, production
   c) “Landmen”
   d) Economics: risk assessment and reserves
   e) Extended team: paleontologists, petrophysicists, research and technical services
20. Environmental issues:
   a) Geophysical acquisition
   b) Drilling – surface and subsurface
   c) Stimulation – “fracking”
   d) Water supply
   e) Production and subsidence
   f) Fluid disposal
   g) Induced seismicity
21. The future of petroleum

**OPTIONAL SESSION**

Hands-on simulation (game)