



## Drilling Engineering Course-Basic Level

### Objective

This course will address the basic steps required by the well construction team (drillers, engineers, geoscientists) to develop a robust well plan from basic data available from seismic and offset wells. This course is focused on the fundamentals issues that must be addressed in the drilling plan and during well execution to insure safety and optimum performance. The course will deliver unmatched attention to early diagnostic trends of well problems and provide proactive preventive measures, a fundamental milestone to drilling optimization.

The participants will walk away from this course carrying a solid understanding of drilling planning, optimum execution strategies, and well informed on safety issues throughout the well construction process. In addition, the participant will appreciate the importance of team building and communication in the overall success of the drilling project. The course will include a healthy mix of fundamentals and contemporary state of the art drilling topics.

### Who should attend?

Anyone who is connected with well construction from the planning phase to post mortem including drillers, engineers, geologists, geophysicists, and environmental engineers.

### Course Materials

The course will be delivered using a mixture of power point presentation and heavy class participation (almost 70% hands on practical and discussions)

### Instructor:

Dr. Saad Saleh, Drill-Sense International (Vita Attached)

### Course Content:

1. **Day 1: Rig Selection and basic planning steps**
  - a. Types of wells
  - b. Types of rigs
  - c. Steps to drill oil or gas wells
  - d. The well construction team
  - e. Well costing
  - f. Communications and safety issues.
  
2. **Day 2: Basic pore pressure and fracture gradient estimation**
  - a. Units and terminology and basic definitions
  - b. Geopressure and well design consideration
  - c. Causes of overpressure

- d. Pore pressure theory
- e. Real time diagnostics of pore pressure
- f. Overburden gradient estimation
- g. Fracture gradient estimation
- h. LOT analysis
- i. Casing seat selection
- j. Uncertainty analysis.

**3. Day 3: Drilling Fluid and Hydraulics Design: Proactive Maintenance**

- a. Types and functions of drilling fluids
- b. Drilling fluid properties
- c. Review of basic drilling fluid systems and their applications
- d. Solids analysis
- e. Solids control economics
- f. Trends that indicate solids problems
- g. Overview of best practices to optimize solids removal
- h. Rig site assessment of solids removal system efficiency (rig audit)
- i. Basics of a hydraulic system design
- j. Hole cleaning in vertical wells
- k. Hole cleaning in deviated wells

**4. Day 4: Casings and Drill String Design**

- a. Casing functions, types, and connections
- b. Steel properties
- c. Casing strength properties
- d. Casing specification
- e. Casing design principals and design factors
- f. Drill string components
- g. Grades
- h. Tool joints
- i. Weight on bit
- j. Drill string washout
- k. Drill collars design
- l. Drill string design
- m. Drill string failure.

**5. Day 5: Hole Problems**

- a. Loss of circulation
- b. Shale problems
- c. Stuck pipe
- d. Final Exam

## The Instructor: Dr. Saad Saleh



Dr. Saleh holds a Ph.D. and MS degrees in Petroleum Engineering from the Colorado School of Mines. He has over 20 years of professional drilling experience in industry and 6 years in academia. Dr. Saleh is a specialist in real time geopressure, wellbore stability, and drilling analysis. Dr. Saleh is highly experienced in drilling technology frontiers (HPHT deepwater, sub salt drilling to name few) in many parts of the world including Latin America, Gulf Coast, North Sea, Canadian Shelf, and the Far East. Dr. Saleh has been involved in training and mentoring drilling engineers and drilling operation personnel on geopressures prediction, wellbore stability analysis, drilling fluid solids control, and drilling fluids optimization.

Currently, Dr. Saleh is the President of Drill-Sense International, a consulting firm which specializes in advancing real time drilling technologies, training in all aspects of Petroleum Engineering with emphasis on drilling training, as well as providing expert advice to the global drilling industry on drilling diagnostics, optimization, well planning, and real time drilling surveillance. Dr. Saleh is serving as a Global Advisor for Knowledge Systems in Houston as well as other service providers and operators. Dr. Saleh literally wrote the book for drilling best practices in the deepwater Gulf of Mexico subsalt wells, best practices for geopressure predictions in deepwater for many parts of the world including the Gulf of Mexico, Nile Delta, and others. At the present time, Dr. Saleh is heavily involved in

Recently, Dr. Saleh was a Senior Drilling Fluid Specialist with Saudi Aramco (from 2005 to 2007). Dr. Saleh championed the introduction of the Saudi Aramco's Real Time Drilling Operation Center (RTOC), drilling rate optimizations and other strategic projects.

Prior to Aramco, Dr. Saleh was the Principal Geopressure advisor/consultant for Knowledge Systems (6 years from 2000 to 2005) in Houston, Texas. With over 2000 wells analyzed world wide, Dr. Saleh has gained extensive experience in the field of geopressure and wellbore stability analysis which covered Latin America, U.S. Gulf Coast, East Canadian Shelf, North Sea, and the Mediterranean Nile Delta. During his tenure with Knowledge Systems, he has served as the Knowledge Systems' project manager, a wellsite geopressure/wellbore stability Consultant, a Trainer, and a specialist to audit internal drilling work processes with special focus on geopressure and geomechanics aspects.



Prior to joining Knowledge Systems, Dr. Saleh served as Drilling Advisor for PDVSA-Intevep (3.5 years from 1997 to 2000), Assistant Professor at the Colorado School of Mines (4 years from 1994 to 1997) and the University of Alaska (2 years from 1988 to 1990), and a Drilling Engineer for BP Exploration in Alaska (4 years from 1990 to 1994) and Northern Petroleum (2 years from 1977 to 1979).

In his career, Dr. Saleh has worked as a Drilling Engineer, Special Projects Engineer, Project Leader, Assistant Professor, Drilling Technology Advisor and Mentor. Dr. Saleh worked in drilling operations/rig supervision, well planning for deepwater HPHT wells, rig site and real-time advisor for drilling extremely difficult wells (subsalt), well productivity enhancement, and pioneered new technologies in bits for hard drilling, cementing in horizontal and highly deviated wells, drilling vibration minimization, foam diversion, foam application for production systems, and advanced enhanced oil recovery concepts. Dr. Saleh worked as an advisor to the United States Sandia National Laboratory to develop models for buckling of tubular, minimize water hammering effects, casing failure under salt loading, and other drilling problems. In addition, Dr. Saleh served as a Drilling Editor for the SPE Drilling Magazine. Dr. Saleh developed from scratch several state-of-the-art research laboratories for foam, formation damage, flow loop, and gas well testing simulator. Dr. Saleh has written several technical manuals for academic and industry teaching and published over 24 papers in drilling, formation damage, production, and reservoir engineering.