TETRA TECH RPS ENERGY | TRAINING

# N672: Applied Drilling Engineering

Instructor(s): Evren M. Ozbayoglu

**Format and Duration**
Classroom - 5 Days

## Summary

The course covers all aspects of drilling technology, emphasizing both theory and practical application. The course provides all required fundamentals and background to design, plan and drill a well whether it is shallow, vertical, directional, horizontal, high pressure - high temperature. Application of the information acquired from this course during design and execution process lead to significant drilling cost reduction as well as decrease the total time for drilling process yet end up with a safe and high-quality drilling job. Planning and general well design, casing, cementing, drill string selection, hydraulics are some of the essence to be covered in this course. Design calculations are part of the course, however, these are the similar calculations which must be handled while drilling and/or designing a well.

## Learning Outcomes

Participants will learn

1. Expose with major concepts of well design, planning and implementation for drilling
2. Accurately identify the drilling systems and drilling process for vertical, directional and horizontal wells.
3. Obtain integrating knowledge to mitigate and eliminate potential drilling problems.
4. Acquire the knowledge of how drilling systems interact, and how best to compromise solutions.
5. A means for optimizing drilling parameters and analyzing drilling performance.
6. Able to conduct a basic design hydraulics program, select most suitable drill string and casing for the task.
7. Evaluate and implement cementing programs
8. Incorporate directional drilling and deviation control

## Training Method

This is a 5 day classroom course comprising lectures illustrated by examples, videos, and case studies.

## Who Should Attend

Course designed for engineers, field personnel, managers, supervisors, contractors, and technical support personnel involved in the planning and implementation of drilling programs.

## Prerequisites and Linking Courses

Objective of this course is to aid the attendees in developing a working knowledge as well as building a firm foundation in rotary drilling systems, drilling fluids, drilling fluid hydraulics, drill bit hydraulics, cuttings transport, solids control, directional drilling tools and process, wellbore trajectory design, well survey, deviation control, formation pore pressure and fracture resistance predications, drill bit performance and wearing evaluation, drilling problems, drill string mechanics, drag and torque, overview of well drilling planning, casing and cementing design. Practical examples and interactive case studies will be implemented.

The key themes that are covered during this course include:

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## Well design process

1. Well planning
2. Basic cost analysis
3. Well design fundamentals
4. Rig selection process

## Circulation system

1. Overview on circulation system
2. Components of a circulation system
3. Mud pumps
4. Shale shakers
5. Hydrocyclones
6. Centrifuges
7. Degassers

## Drilling fluids

1. Functions of drilling fluids
2. Types of drilling fluids
3. Physical and chemical properties of drilling fluids
4. Rheology fundamentals
5. Field testing of fluids

## Drilling hydraulics

1. Pressure loss in pipes and annulus
2. Equivalent circulating density concept
3. Bit hydraulics
4. Cuttings transport fundamentals
5. Slip velocity
6. Hole cleaning in vertical wells
7. Hole cleaning in directional and horizontal wells

## Drill string design

1. Drill string components
2. Basic BHA design
3. Failure criteria for pipes
4. Proper drill pipe selection

## Casing design

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1. Functions of casings
2. Casing types and properties
3. Casing setting depth determination
4. Combination string design

### Cementing operations

1. Cement chemistry
2. Cement classes
3. Basic cement design

### Directional drilling basics

1. Surveying
2. Directional drilling tools
3. Direction control
4. Drag & torque concept

### Major drilling problems

1. Stuck pipe
2. Lost circulation
3. Kick
4. Mechanical and chemical wellbore stability
5. Buckling of drill string