Petroleum Technology (PETC) 1103 Basic Drilling Surface Stack (1 Unit)  
[formerly Petroleum Technology 94X]

Prerequisite: None

Total Hours: 12 hours lecture; 16 hours lab (28 hours total)

Catalog Description: This course is designed to provide a working understanding of well control and the problems normally associated with pressure control as related to Basic Drilling Surface Stack. This course is offered on a Pass/No Pass basis only.

Type of Class/Course: Degree Credit


Additional Required Instructional Materials: None

Course Objectives:

By the end of the course, a successful student will be able to

1. perform hydrostatic pressure calculations,
2. discuss formation pressure and sources,
3. perform shut-in procedures,
4. correctly operate blowout prevention (BOP) equipment,
5. identify and mitigate potential circumstances,
6. control formation pressure, and
7. use a “kill sheet.”

Course Scope and Content:

Unit I Minerals Management Services Regulations – Subpart O  
A. Recordkeeping requirements  
B. Certification requirements

Unit II Basic Well Control Pressures  
A. Hydrostatic pressures  
B. Pressure gradient  
C. Formation pressures

Unit III Blowout Prevention Equipment, Design, and Use  
A. Basic stack design criteria  
B. Types of BOP equipment  
C. Chokes  
D. Safety valves
Unit IV  Kick and Blowout Definitions
A.  Kick definition
B.  Conditions necessary for a kick
C.  Causes of kick while drilling and tripping
D.  Blowout definition – Reasons for occurrence

Unit V  Shut-in Procedures
A.  Diverters
B.  Shut-in procedures while drilling and tripping
C.  Shut-in drill pipe pressures
D.  Shut-in casing pressure

Unit VI  Simulator Exercise: Orientation and Shut-in Procedures
A.  Each team plans and executes a shut-in procedure

Unit VII  Minerals Management Services Regulations – Subpart D
A.  30 CFR, Part 250, Subpart D – Oil and Gas Drilling Operations
B.  Field rules and how they may modify other requirements

Unit VIII  Volume Calculations
A.  Single string capacity
B.  Pipe between pipe
C.  Displacement
D.  Tripping pipe for the loss of hydrostatic pressure

Unit IX  Fracture Gradient
A.  Definition
B.  Methods of determination – Before and while drilling

Unit X  Drilling and Completion
A.  Functions of drilling fluids
B.  Functions of completion fluids
C.  Fluid type

Unit XI  Kill Procedures
A.  Kick definition
B.  Conditions necessary for a kick
C.  Causes of kick while drilling

Unit XII  Kill Sheets
A.  Explanation and examples
B.  Practice problems

Unit XIII  Simulator Exercise: Kill Procedures
A.  Student participation in two practice kill operations

Unit XIV  Workbook Session: Calculations
A.  Workbook exercises for covered subjects

Unit XV  Minerals Management Services Regulations – Subparts C, E, G, H, & O
A.  Pollution
B.  Completion
C.  Abandonment
D.  Safety systems
Unit XVI  BOP Testing Procedures
   A.   BOP control

Unit XVII Abnormal Pressure
   A.   Causes
   B.   Detection methods – Rig hands
   C.   Detection methods – Mud loggers

Unit XVIII Well Completion and Well Control Problems
   A.   Multiple completions
   B.   Running a drill string test
   C.   Other completion operations

Unit XIX Special Problems
   A.   Excessive casing pressure
   B.   Out-of-hole well kick
   C.   Plugged bit
   D.   Drill string washout

Unit XX Simulator Exercise: Work Through Multiple Well and Pressure Problems
   A.   Execute resolution of multiple problems on the simulator

Lab Content:
1.   Practices evaluating well conditions using simulator
2.   Kill wells using simulator
3.   Simulated kill sheet calculations using simulator

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 2 hours per week outside of the regular class
time doing the following:

1.   Identifying regulations and procedures

Methods of Instruction:
1.   Lecture/discussion
2.   Exercises
3.   Demonstration on WESTEC Drilling Rig Computer Simulator
4.   Application on WESTEC Drilling Rig Computer Simulator

Methods of Evaluation:
1.   Written exam
2.   Performance observation of student operation