Petroleum Technology (PETC) 1102 Basic Drilling and Workover Surface (1.25 Units)
[formerly Petroleum Technology 94Z]

Prerequisite: None

Total Hours: 16 hours lecture; 16 hours lab (32 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 Surface Drilling and Workover
Surface. This course is offered on a Pass/No Pass basis only.

Type of Class/Course: Degree Credit

Textbook: WESTEC. Well Control Workbook. WESTEC Energy Publications.

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 BOP 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, Completion, Workover and Packer Fluids
   A. Functions of drilling fluids
   B. Functions of completion and work over fluids
   C. Fluid type

Unit XI Kill Procedures - Workover Surface
   A. Kick definition
   B. Conditions necessary for a kick
   C. Causes of kick while drilling
   D. Causes of kick while tripping

Unit XII Kill Sheets - Workover Surface
   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

Unit XXI Workbook Review Session
   A.   Review workbooks

Unit XXII Training for Drilling
   A.   Testing on material covered

Unit XXIII Minerals Management Services Regulations – Subpart F
   A.   Work over
   B.   Field rules and how they may modify other requirements

Unit XXIV Reasons for Workover Operations
   A.   Repair mechanical failure
   B.   Stimulation to increase production
   C.   Completing into more than one reservoir

Unit XXV Live Well Operations
   A.   Killing a producing well
   B.   Volumetric kill
   C.   Top kill

Unit XXVI Small Tubing Operations
   A.   Applications
   B.   Equipment descriptions
   C.   BOP equipment
   D.   Flow string systems

Unit XXVII Well Equipment – Workover Surface
   A.   Surface equipment
   B.   Downhole tools and tubulars
   C.   Packers

Lab Content:

1.   Practical hands-on exercises including assessment of well conditions using simulator
2.   Kill wells practical hands-on exercises using simulator
Learning Activities Required Outside of Class: None

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

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