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Semester effective:

Petroleum Technology (PETC) 1104 Basic Drilling and Workover Sub-sea (1.5 Units)
[formerly Petroleum Technology 94Y]

Prerequisite: None

Hours and Unit Calculations:

Total Contact Hours: 16 hours lecture (32 Outside of class hours); 24 hours lab (72 Total Student Learning Hours) 1.5 Units

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 and workover sub-sea operations. This course is offered on a pass/no pass basis with an option of challenging a proctored online knowledge assessment for an International Association of Drilling Contractors (IADC) certificate of completion with a score of 70% or better.

Type of Class/Course: Degree Credit

Textbook: WESTEC *Well Control Workbook*

Additional Required Materials: Provided by WESTEC

Course Objectives:

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

1. Perform hydrostatic calculations
2. Discuss formation pressures and why they occur
3. Perform shut-in procedures, reading and recording shut-in values
4. Correctly operate blowout prevention (BOP) equipment
5. Identify and mitigate potential down hole problems associated with well control
6. Control formation pressure
7. Understand and use a kill sheet to bring the well back to balance
8. Recognize and discuss sub-sea equipment use

Course Scope and Content:

- Unit I Bureau of Safety and Environmental Enforcement (BSEE) – Subpart O
- a. Recordkeeping requirements
 - b. Training requirements

- Unit II Basic Well Control Pressures
 - a. Hydrostatic pressure
 - b. Formation pressure
 - c. Pressure gradient

- Unit III Blowout Prevention Equipment (BOP) 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 to occur
 - c. Causes of kicks while drilling and tripping
 - d. Blowout definition and reason 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 pressures

- Unit VI Simulator Exercise: Orientation and Shut-in Procedures
 - a. How to recognize a kick
 - b. Plan and execute a shut-in procedure

- Unit VII Bureau of Safety and Environmental Enforcement (BSEE) – 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 and the loss of hydrostatic pressure due to pulling pipe

- Unit IX Fracture Gradient
 - a. Definition
 - b. Method of determination – before and while drilling

- Unit X Drilling, Completion, Workover and Packer Fluids
 - a. Functions of drilling fluids

- b. Functions of completion and workover fluids
- c. Fluid types
- Unit XI Kill Procedures
 - a. Methods
 - i. Wait and weight
 - ii. Drillers
 - iii. Concurrent
- Unit XII Kill Sheets
 - a. Explanation and examples
 - b. Practice problems
- Unit XIII Simulator Exercise: Kill Procedures
 - a. Practice two methods of kill operations
 - i. Drillers
 - ii. Wait and weight
- Unit XIV Workbook Session: Calculations
 - a. Workbook exercises for covered subjects
- Unit XV Bureau of Safety and Environmental Enforcement (BSEE) Drilling – Subparts C, E, G, and H
 - a. Pollution
 - b. Completion
 - c. Abandonment
 - d. Safety Systems
- Unit XVI Blow Out Prevention Equipment (BOP) Testing Procedures
 - a. BOP control
 - b. Accumulator
- Unit XVII Abnormal Pressure
 - a. Causes
 - b. Detection method – rig hands
 - c. Detection method – mud loggers
 - d. Kick tolerance
- Unit XVIII Well Completion and Well Control Problems
 - a. Multiple completions (dual string)
 - b. Running a drill string test
 - c. Other completion operations
- Unit XIX Special Problems
 - a. Excessive casing pressure
 - b. Out-of-hole when the well kicks
 - c. Plugged bit
 - d. Drill string washout

- e. Volumetric method
 - f. Lubricate and bleed
- 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 Bureau of Safety and Environmental Enforcement (BSEE) – Subpart F
- a. Workover
 - 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 in more than one reservoir
- Unit XXV Live Well Operations
- a. Killing a producing well
 - b. Volumetric kill
 - c. Lubricate and bleed
- Unit XXVI Small Tubing Operations
- a. Applications
 - b. Equipment descriptions
 - c. Blowout prevention equipment
 - d. Flow string system
- Unit XXVII Well Equipment
- a. Surface equipment
 - b. Downhole tools and tubulars
 - c. Packers
- Unit XXVIII Bureau of Safety and Environmental Enforcement (BSEE) Workover/Completion – Subpart C, D, and E
- a. Pollution
 - b. Drilling
 - c. Completion
 - d. Workover
- Unit XXIX Sub-Sea Equipment
- a. Design Criteria
 - b. Risers
 - c. Sub-sea stack arrangement

- d. Choke and kill lines

Unit XXX Sub-Sea Well Control Considerations

- a. Kick detection
- b. Riser collapse
- c. Lower friction gradients
- d. Choke line fracture pressure

Unit XXXI Sub-Sea Shut-in Procedures

- a. Sub-sea stack while drilling
- b. Sub-sea stack while tripping

Unit XXXII Sub-Sea Kill Procedure Considerations

- a. Wait and Weight Method
- b. Drillers' method

Lab Content:

1. Practice evaluating well conditions using simulator
2. Simulated kill sheet calculations (skills assessment)
3. Simulator kill well exercises (skills assessment)

Learning Activities Required Outside of Class: None

Methods of Instruction:

1. Lecture/Discussion
2. Exercises
3. Demonstration on drilling rig computer simulator
4. Application on drilling rig computer simulator

Methods of Evaluation:

1. Performance observation of student operation (skills assessment)
2. Written exam for credit
3. Proctored online knowledge assessment for IADC Certificate of Completion
 - a. 70% or better to pass assessment
 - b. 50%-69% one re-try within 45 days
 - c. 0%-49% must re-take course

Supplemental Data:

TOP Code:	095430: Petroleum Technology
SAM Priority Code:	C: Clearly Occupational

Distance Education:	Not Applicable
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	2: Stand-alone
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	NO
Eligible for Pass/No Pass:	C: Pass/No Pass
Taft College General Education:	NONE
Discipline:	Mining and Metallurgy