

PNGE 310 DRILLING ENGINEERING

Instructor: H. Ilkin Bilgesu
Office: MER 345C
Office Hours: Open door or by appointment

Course Format and Credit Hours: 4 hour lecture (4 credits)

Class Schedule: TBA

Prerequisites: GEOL 101 Physical Geology and MAE 331 Fluid Mechanics.

Course Objectives: To acquaint the students with the techniques, equipment, and engineering design calculations used in the oil and natural gas well drilling operations.

Expected Learning Outcomes: Upon successful completion of this course the students will be able to:

- Apply basic knowledge of mathematics, science, and engineering in identifying, formulating, and solving engineering problems.
- Demonstrate the ability to analyze and interpret data from oil or gas fields.
- Design several components related to drilling operations.
- Use skills, techniques, and tools necessary for engineering practice.
- Demonstrate the ability to communicate effectively by preparing written reports.

Examination Schedule: Four Exams and Optional Final

Grading Policy:

Homework, Assignments and Quizzes	28%
Tests (4 midterms and optional final)	32%
Projects (4)	40%

The grades for late homework and project will be deducted by 20 points for the first day and 10 points for each additional calendar day.

Grade Assignments:

90 and above	A
80-89	B
70-79	C
60-69	D
59 and below	F

Attendance: Students are expected to attend all scheduled classes.

Textbook : The Fundamentals of Drilling Engineering, edited by A.D. Mitchell, and F.S. Young Jr., SPE Textbook Series, Vol.12, (2011).

PNGE 310 DRILLING ENGINEERING

Page 2 of 3

References:

- (1) Applied Drilling Engineering, by A.D. Bourgoyne Jr., M.E. Chenevert, K.K. Millheim, and F.S. Young Jr., SPE Textbook Series, Vol.2, (1986).
 - (2) Drilling Engineering, A Complete Well Planning Approach, by N.J. Adams, PennWell, (1985).
 - (3) Drilling Practices Manual, by P.L. Moore, PennWell, 2nd Edition, (1986).
 - (4) Well Design: Drilling and Production, by B.C. Craft, W.R. Holden, and E.D. Graves, Jr., Prentice-Hall, Inc., (1962).
 - (5) Petroleum Engineering: Drilling and Well Completions, by Carl Gatlin, Prentice-Hall, Inc. (1960).
 - (6) Oilwell Drilling Engineering: Principles & Practice, by H. Rabia, Graham & Trotman Inc., (1985).
 - (7) Introduction to Oil and Gas Technology, by Scientific Software-Intercomp, Inc., Intercomp Resource Development and Engineering, Inc., (1985).
 - (8) Practical Well Planning and Drilling, by S. Devereaux, PennWell, (1998).
 - (9) Horizontal Wells, by R. Aguilera et. al., Gulf Publishing, (1991).
 - (10) Introduction to Directional and Horizontal Drilling, by J.A. Short, PennWell, (1993).
 - (11) Underbalanced Drilling Manual, by Gas Research Institute, (1997).
 - (12) Drilling and Drilling Fluids, by G.V. Chilingarian and P. Vorabutr, Elsevier, (1983).
 - (13) Formulas and Calculations for Drilling, Production and Workover, by N.J. Lapeyrouse, Gulf Publishing, (1992).
 - (14) Air and Gas Drilling Manual, by William C. Lyons, Bayum Guo and Frank A. Seidel, Mc-Graw-Hill, Inc., (2001).
 - (15) Drilling Engineering, by J. J. Azar and G. R. Samuel, PennWell, (2007).
 - (16) Petroleum Engineering Handbook, Volume II: Drilling, by R.F. Mitchell, editor, SPE (2007)
- (17) Journals
- (a) SPE Journal - Drilling & Completion
 - (b) Petroleum Engineer International - Hart=s E&P
 - (c) Offshore Engineer
 - (d) Oil & Gas Journal
 - (e) World Oil

UNIVERSITY/COLLEGE POLICIES:

IMPORTANT: Where a conflict arises between the Policies and Expectations of this course with those of the University, the University Policies will supersede these course level practices.

By enrolling in this course you agree to the following University guidelines as outlined in:

<http://www.wvu.edu/~socjust/>

Social Justice Statement:

The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (304-293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu> "

Academic Integrity Statement:

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at <http://studentlife.wvu.edu/studentconductcode.html>. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.

Emergencies:

In the case of an emergency such as fire alarm, please evacuate the building and gather at least 100 feet away from the building. DO NOT return to the building until the emergency is over and it is cleared by the fire marshal or police.

Tentative Course Outline

- Introduction
- Drilling Rig Design
- Formation Pore Pressure, Fracture Pressure and Pressure
- Drilling Fluids
- **EXAM #1**
- Drilling Hydraulics
- Drilling
- Cement
- **EXAM #2**
- Down-Hole Pressure
- Casing
- **EXAM #3**
- Introduction to Directional Drilling
- Drill String Strength
- **EXAM #4**
- Drilling Problems
- Assessment test, SEI

Topics from ABET guidelines:

1. Well control
2. Casing design
3. Regulatory compliance
4. Mud program selection
5. Directional well path design
6. Wellhead/BOP equipment
7. Hydraulics program development
8. Solids control program
9. Cement design
10. Drilling optimization
11. Fishing operations.

All homework and other course related materials will be posted at the web page for this course. You will be using your campus logon and password to access the available documents related to this course. If necessary change your password after you logon and if you have difficulty to connect to this site let please let me know immediately.

Additional Notes: All assignments, reports and projects must be prepared using word processors, data bases, spreadsheets, and graphics programs whenever applicable. They should contain a cover page with information about the course number and title, department and university affiliation, the name of person preparing the assignment, date submitted, assignment number and a descriptive heading for the work performed. All documents relevant to the assignments will be converted to "pdf" format and uploaded to the course webpage on eCampus before the due date and time. If necessary upload other documents related to the assignment such as spreadsheets and programs.