Advanced Drilling Engineering

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Course Name : Advanced Drilling Engineering

Course Code : PET E 664

Instructor : Ergun Kuru

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Lecture Hours : MWF 10.00 -10.50 am

Office Hours : M 2.30-4.00 pm or by appointment

Course Objectives:

- Discuss factors controlling drilling cost, introduce concepts for drilling performance evaluation and optimization of drilling operational parameters.

- Introduce design concepts for Drillstring Design – BHA Design-Deviation Control

- Introduce design concepts of drilling directional, horizontal, and multilateral wells.

- Discuss solutions of the problems encountered in drilling directional, horizontal and multilateral wells.

- Discuss the design considerations of modern drilling technologies such as, underbalanced drilling, and managed pressure drilling.

Reference Books:

1. “Fundamentals of Drilling Engineering” Mitchell and Miska, SPE Textbook Series, Vol.12, 2011.

2. “Advanced Drilling and Well Technology”, Aadnoy, B.S., et al., SPE,2009.

3. “Developments in Petroleum Engineering,” Collected works of Arthur Lubinski, Edited by Stefan Miska, Gulf Publishing Company, Vol.1, Houston, Texas, 1987.

Lecture Notes and Assignments:

Copies of the lecture notes will be posted at the Canvas (https://canvas.ualberta.ca/).

All assignments and the solutions will also be posted at the Canvas.

Course Evaluation and Grading

Assignments	**30%**	
Midterm Exam	**30%**	**October 20**
Final Exam	**40%**	**December 12**

All exams are open notes. i.e., Students are allowed to use their lecture notes, other course material and handouts provided by instructor during the exam.

Evaluations will be completed and expressed in row marks throughout the course.

Grades will be assigned only to the final distribution of mark totals for the course.

Such assignment will be based on a combination of absolute achievement and relative performance in this class and remain unofficial until approved by the faculty council.

Academic integrity and honesty:

“The University of Alberta is committed to the highest standards of academic integrity and honesty.

Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect.

Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence.

Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.”

COURSE OUTLINE

1. **Drilling Performance Analyses and Cost Control**
   - Factors Controlling Drilling Rate
   - Drilling Cost Evaluation
   - Chevron-Texaco Drilling Model Based on Mechanical Specific Energy
   - **Assignment-1**
   - Technical Limit of Drilling Rate
   - Optimization of Drilling Hydraulics Design
   - **Assignment-2**

2. **Drillstring Design – BHA Design-Deviation Control**
   - Fundamentals of Drillstring Design
   - BHA Design
   - Deviation Control
   - Buckling Considerations
   - **Assignment-3**

COURSE OUTLINE

3. Horizontal Well Drilling Technology

Drainage Area Estimation

Selection of Rig Location and Types of Horizontal Wells

2-D / 3-D Trajectory Planning

Planning The Kick-Off And Trajectory Change

Assignment-4

4. Underbalanced (UBD) and Managed Pressure (MPD) Drilling

Candidate Selection

Engineering Design Considerations