

PETE 7241- Advanced Well Stimulation and Applied Geomechanics Methods

Fall 2016

Main Instructor

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Office hours: W 2:30 – 3:30.

Lecture

T- Th 16:30 – 17:50
Location: Lockett Hall 009

Course Description

The main objective of the course is to transfer the knowledge on geomechanical aspect of design and assessment of hydraulic fracturing and acidization treatments in low and high permeability reservoirs. The first part of the course deals with the fundamentals of rock mechanics. This includes Stress and strain definitions, theories of elasticity, finite deformations, borehole stresses, and failure mechanics. Then due to the significance of natural fractures in economic production from some unconventional reservoirs, special attention will be given to natural fractures characterization. In the second part of the course, the emphasis will be on hydraulic fracturing design and collecting data (such as in situ stresses and rock mechanical properties) for a proper fracture design. Injection tests and Nolte-Smith analysis will be introduced toward the end of the course for fracture assessment purposes. sand production analysis in unconsolidated formations will be studied and frackpack design will be discussed. The course will be finished with an overview of acidization treatments. The participant will also gain knowledge on how to identify the problems associated with previous fracturing treatment and learn how to select the candidates for refracturing treatments.

Course Outline

- Review on fundamentals of Elasticity and poroelasticity
- Hydraulic Fracturing modeling and design
- Injection tests
- Hydraulic Fracturing assessment and appraisal
- Overview of refracturing treatments

- Wellbore stability analysis
- Acidization treatments (modelling and design)
- Economics of new unconventional resources
- Sand Production analysis in producer and injector wells
- Frack-pack and gravel-pack design.

References

Hydraulic Fracturing, Smith M. and C. Montgomery published by CRC Press 2015.

Reservoir Stimulation, 3rd Edition by Michael J. Economides and Kenneth G. Nolte (Jun 9, 2000).

Petroleum production systems, Economides, Michael J., A. Daniel Hill, and Christine Ehlig-Economides, Second Edition, 2012.

Petroleum Engineering Handbook, Volume VI: Emerging and Peripheral Technologies, 2007, Edited by: H.R. Warner Jr.

Fundamentals of Rock Mechanics by John Jaeger, N. G. Cook and Robert Zimmerman , 2007

Grading

Quiz	10%
Midterm	20%
Homework	30%
Small Project	10%
Final Project	30%

Academic Integrity

Louisiana State University adopted the Commitment to Community in 1995 to set forth guidelines for student behavior both inside and outside of the classroom. The Commitment to Community charges students to maintain high standards of academic and personal integrity. All students are expected to read and be familiar with the LSU Code of Student Conduct and Commitment to Community, found online at www.lsu.edu/saa. It is your responsibility as a student at LSU to know and understand the academic standards for our community. All work must be completed without assistance unless explicit permission for group or partner work is given by the faculty member. This is critical so that the professor can assess your performance on each assignment. If a group/partner project is assigned, the student may still have individual work to complete. Students who are suspected of violating the Code of Conduct will be referred to the Office of Student Advocacy and Accountability. For undergraduate students, a first academic violation could result in a zero grade on the assignment or failing the class and disciplinary probation until graduation. For a second academic violation, the result could be suspension from LSU.