



## PETE 693—WELL STIMULATION

### Course Information

Title:	Well Stimulation
Course Number:	PETE 693
Semester:	Spring 2014
Credits:	3
Prerequisite:	Permission of instructor
Class Meetings (Fairbanks):	MWF, 9.15 to 10.15am
Room (Fairbanks):	BROOKS 302

### Instructor Information

Instructor Name:	Dare Awoleke
Office location:	DUCK 407
Office hours:	4-5.30PM, Mondays and Wednesdays
Telephone:	(907) 474-7574
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### Course Readings/Materials

**Note:** The student is strongly encouraged to have access to the following books. Handouts (if necessary) and slides will be provided. **It is expected that students will extensively reference technical papers for data throughout the course duration. Therefore, it is assumed that students have access to OnePetro.**

- Petroleum production systems [electronic resource @ UAF library], Economides et al., 2<sup>nd</sup> Ed.
- Design and appraisal of hydraulic fractures by Jack R. Jones & Larry K. Britt

### Reference Material

- Recent Advances in Hydraulic Fracturing, edited by: John L. Gidley, Stephen A. Holditch, Dale E. Nierode & Ralph W. Veatch Jr.
- Oil Well Stimulation by Robert Schechter

### Software used:

MATLAB, Fracpro

### Course Description

The course will introduce the student to the discipline of well stimulation, taken to include matrix acidizing and hydraulic fracturing (proppant and acid fracturing). The course covers the design and execution of acidizing and hydraulic fracturing treatments. It will also cover the estimation of stimulated well performance. The primary topics that are covered will include reservoir inflow, formation damage, skin estimation and well stimulation.



### **Course Goals**

The goals of this course are the following:

1. To help the student understand the meaning of concepts like skin and inflow performance and to help the student relate these concepts to well stimulation.
2. To familiarize the student with the physical and chemical phenomena that is critical to understanding well stimulation techniques.
3. To help the student be able to design and evaluate well stimulation treatments.
4. To help the student to become aware of the practical considerations while executing stimulation treatments.
5. Research into frontier areas in well stimulation.

### **Student Learning Outcomes**

At the end of this class, the student will be able to:

1. Understand why skin and other measures of well productivity are important to well stimulation.
2. Understand the physical and chemical phenomenon that is essential to both theoretical and experimental model development in well stimulation.
3. Be able to design, execute and evaluate well stimulation treatments in different well configurations.

### **Instructional Methods**

Three-hour lecture per week

### **Tentative Course Calendar**

Week 1	Course Introduction and Basic Concepts
Weeks 2-8	Acid and Hydraulic Fracturing—Design, execution and evaluation
Weeks 9-12	Matrix Acidizing—Design, execution and evaluation
Weeks 13-14	Class Presentations

### **Grade Policy and Distribution**

Midterm (Friday before spring break)	25%
Homework	25%
Final Exam	25%
Final Project and Presentation	25%

### **Letter grade cut-offs**

A+ (100%); A (99.99-95%); A- (94.99-90%); B+ (89.99-85%); B (84.99-80%); B- (79.99-75%); C+ (74.99-70%); C (69.99-65%); C- (64.99-60%)

### **Final Project**

The purpose of the final project is to conduct an in-depth study into a sub-area in well stimulation. At the start of the semester, I will assign a paper to each student in the class. The goal of the student will be to reproduce the results obtained in the assigned paper. The student might need to learn about additional mathematical/statistical methods in order to be able to reproduce these results.



### **Attendance**

Attendance in class is your responsibility. Having said this, class attendance is important. I will be supplementing the material in the recommended textbooks with additional published and unpublished material. Therefore, I encourage you to attend class regularly. Note that students are responsible for making up any missed work (lectures and homework). Students are encouraged to arrive to class on time because late-coming disrupts the flow of the class for both the instructor and the other students.

### **Laptops and phones**

All laptops and phones must be powered off during class. No texting is allowed. If you need your laptop for a particular exercise, you will be informed by the instructor.

### **Homework Policy**

Homework is due at the end of class on the designated date. Hand-written homework submissions are not acceptable. Late homework will be docked at the rate of 10 points per day after due date. You can discuss the homework problems with your peers but you must work out the problem **independently** and turn in a **personal** solution. **A duplicate of someone else's solution/work is cheating.** If you want your work re-graded, inform the instructor within **a week** of when the work was returned to you.

### **Make-up Exam Policy**

There will be no early, late or make-up exams unless the student obtains prior approval of the instructor. Approval for make-up exams will only be granted for family and medical emergencies. In case a student misses a test or exam, the student needs to provide legitimate documentation related to the incident no later than the next class after the test. If the absence is determined to be a non-excused absence, the student will receive a score of zero for the exam that was missed.

### **Academic Dishonesty**

We follow the university guidelines for plagiarism/academic integrity as outlined in the link given below:

<http://www.alaska.edu/bor/policy/09-02.pdf>. The student is encouraged to read this document and note the definition of all the different types of academic dishonesty. Also note that as a UAF student, you are subject to UAF's Honor Code:

*"Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.*

*Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses and other reports.*

*No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors.*

*Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion."*

### **Disability Services**

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities in accordance with the following link: <http://www.alaska.edu/bor/policy/09-06.pdf>