Catalog Designation: Professional elective
Semester: Spring 2017
Class schedule: Lecture: 1 session/week, 140 minutes/session

Pre-requisites:
1. PNGE 333: Petroleum Reservoir Engineering
2. PNGE 420: Production Engineering
3. MAE 243: Mechanics of Materials

Instructor: Dr. Ali Takbiri, 333D Mineral Resources Building
304-293-3973, altakbiri@mail.wvu.edu

Location: ESB-E 801
Office Hours: Open door or by appointment (altakbiri@mail.wvu.edu)

Textbook and/or Other Required Material:
1. Modern Fracturing: Enhancing Natural Gas Production, Economides and Martin Editors, 2007

Course Learning Outcomes:
The main emphasis of this course will be on designing interpreting hydraulic fracturing treatments. Students will be able to evaluate near wellbore damage caused by various operations such as drilling, completion, etc. on the well productivity. Students will be able to make justification on selection of stimulation methods (matrix acidizing, hydraulic fracturing and acid fracturing) for different types of reservoir/well candidates. Students will understand mechanical properties of rocks, fracture models, rheology of the fracture fluid, proppant, etc. required to design a fracturing job. Students will be able to provide post-fracturing evaluation by estimate of fracture half length, fracture conductivity, formation permeability and folds of increase in productivity.

Topics covered:
1. Introduction & overview: hydraulic fracturing and acidizing
2. Productivity enhancement from stimulation and candidate selection
3. Rock mechanics, in-situ stress and fracture geometry
4. Rheology of fracture fluid
5. Mini-frac test
6. 2D fracture models and 3D fracture models
7. Fracture treatment design
8. Treatment pressure analysis and Post-treatment evaluation

Grading Policy:
Midterm Exam, 25%
Final Exam, 25%
Attendance, Paper Summary, Quizzes and Homework, 30%
Final Project, 20%

Homework should be given to me before the due date! If there is any emergency (such as bad weather condition), electronic version of the homework should be emailed to me.

**Grade Assignment:**
- 100 – 90 A
- 89 – 80 B
- 79 – 70 C
- 69 – 60 D
- 59 – 0 F

**Attendance Policy:**
Attendance is mandatory. Consistent with WVU guidelines, students absent from regularly scheduled classes because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor.

**Social Justice Statement:**
“West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.

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 arrangement with Disability Services (293-6700).”

**Academic Integrity:**
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 [http://studentlife.wvu.edu/office_of_student_conduct/student_conduct_code](http://studentlife.wvu.edu/office_of_student_conduct/student_conduct_code). 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.