

**UNIVERSITY OF SOUTHERN CALIFORNIA**  
Mork Family Department of Chemical Engineering and Materials Science  
PETROLEUM ENGINEERING PROGRAM

PTE 555 (Summer 2014) (tentative)  
**Well Completions, Formation Damage and Well Stimulation**

Time: 9:00 a.m. – 12:00 noon Thursdays

Instructor: Steve Cheung

Prerequisites: Graduate Standing in Petroleum Engineering

**COURSE OUTLINE**

1. Introduction
2. Well Productivity and Potential: Review of Fluid Flow Equations, Measures of Well Productivity, Productivity Index, Productivity Ratio, Damage Ratio, Inflow Performance, Causes of Low Productivity, Identification of Mechanisms of Low Productivity, Optimized Production Strategy.
3. Well Completion:
  - 3.1. Characteristics of Good Completions, Design Factors for Well Completions, Well Completion Types and Processes, Open Hole Completion, Cased Hole Completion, Slotted Liner Completion, Well Configuration, Advantages/Disadvantages, Multi-zone Completion and Multilateral Completion, Characteristics of Various well Completions.
  - 3.2. Perforating Cased Holes and Perforation Design: Types of Perforators, Perforation Design, Factors Affecting Productivity of a Perforated Well, Minimizing Perforation Damage, Under-balanced Perforation
  - 3.3. Sand Control Methods and Design: Methods of Controlling Sand Production, Perforated Pipes, Screen Liners, Gravel Packs, Sand Consolidation, Frac Packs, Down-hole Filters, Sand Control Process Design.
  - 3.4. Completion Fluids and Aspects of Horizontal and Multi-Lateral Well Completions
4. Formation Damage : Mechanisms of Formation Damage, Damage from Drilling and Completion Fluids, Damages from Injection Fluids, Damages in Production Wells, Damage from Acidizing and Fracturing Fluids., Damage Detection Methods, Formation Damage Control and Prevention, Formation Damage Removal.
5. Acid Stimulation: Acidizing Fundamentals and Methods: Acid Types and Chemistry of Acid-Formation Reactions, Mechanisms of Productivity Improvement and Damage Removal by Acidizing, Acid Wash, Matrix Acidizing Applications and Process Design, Fracture Acidizing Applications and Process Design, Acid Additives Types and Applications
6. Hydraulic Fracturing: Fundamentals and Mechanics of Hydraulic Fracturing, Rock and Fracture Mechanics, Fracture Geometry, Orientation and Growth, Fracture Flow and Pressure Analysis, Hydraulic Fracturing Process Design, Fracturing Process, Fracture Design Variables, Fracture Mapping and Diagnostics, Fracturing Fluids and Additives, Stimulation of Horizontal and Multi-lateral Wells

**Below are CANNOT MISS Dates:**

Midterm Exam:	July 3rd, 2014
Last Date to Drop with W:	July 29, 2014
Term Project:	Oral presentation July 31, 2014
Final Exam:	August 7, 2014

### **Statement for Students with Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

### **Statement on Academic Integrity**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: <http://www.usc.edu/dept/publications/SCAMPUS/gov/>. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: <http://www.usc.edu/student-affairs/SJACS/>.