

# PETE 609-700 Course Syllabus – Summer 2016

## M-W 02:00-03:50 pm- Distance Learning Section

**Instructor:** Dr. Berna Hascakir, Texas A&M University - Petroleum Engineering Department

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**Office Hours:** Tuesdays any time from 8:30 till 17:30

**Catalog Description:** Fundamentals and theory of enhanced oil recovery; polymer flooding, surfactant flooding, miscible gas flooding and steam flooding; application of fractional flow theory; strategies and displacement performance calculations. Lecture videos will be posted M-W and will consist of 110 minutes of content.

**Teaching Assistance:** Matthew Morte ([matthewmorte@tamu.edu](mailto:matthewmorte@tamu.edu))

**Office:** RICH 602

**Office Hours :** Fridays from 9 :00 AM – 2 :00 PM will be designated for answering emails but feel free to email anytime and I will do my best to respond in a timely fashion

### Instructional Objectives

#### Topics Covered:

1. Introduction
2. Microscopic Displacement of Fluids in a Reservoir
3. Displacement in Linear Systems
4. Macroscopic Displacement of Fluids in a Reservoir
5. Mobility-Control Processes
6. Miscible Displacement Processes
7. Chemical Flooding
8. Thermal Recovery
9. Microbial EOR
10. Mining

#### Contributions to Meeting the Curriculum Requirements of Criterion:

Math and Science	None
Petroleum Engineering	This course provides students with a fundamental background on the determination and evaluation of EOR methods. It also provides mathematical tools for the analysis and interpretation of data.
General Education	None

#### Course Learning Outcomes and Relationship to Program Outcomes:

Course Learning Outcome: At the end of the course, students will be able to...	Program Outcomes
<b>Describe</b> the EOR methods used in recovery unconventional reservoirs or depleting conventional reservoirs Explain the physical meaning and <b>evaluate</b> the impact of fluid properties in reservoir engineering and production problems.	11
<b>Compute</b> the oil bank, water bank, injected fluid bank movements.	1
<b>Calculate</b> the oil recovery factor, water recovery factor.	5
<b>Describe</b> the laboratory procedures required for a successful EOR process.	1,3,5
<b>Determine</b> and analyze the differences in EOR methods.	5
<b>Design</b> an EOR technology to recover a specific reservoir.	2,3,5
<b>Determine</b> and propose the most effective and environmental friendly EOR technology.	2,3

### Related Program Outcomes:

No.	PETE graduates must have...
1	An ability to apply knowledge of mathematics, science, and engineering.
2	An ability to design an EOR project by analyzing and interpreting data.
3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
5	An ability to identify, formulate, and solve engineering problems.
11	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

### COURSE SCHEDULE

Date	Lecture #	Topics	HW Assigned Date	Due Date
WEEK1	L1	Introduction		
	L2	Microscopic Efficiency of Immiscible Displacement	HW1	
WEEK2	L3	Microscopic Efficiency of Immiscible Displacement		
	L4	Microscopic Efficiency of Immiscible Displacement		
WEEK3	L5	Macroscopic Displacement Efficiency of a Linear Waterflood		
	L6	Macroscopic Displacement Efficiency of a Linear Waterflood		HW1
WEEK4	L7	Macroscopic Displacement Efficiency of a Linear Waterflood	HW2	
	L8	<b>Midterm Presentations- You will submit the work</b>		
WEEK5	L9	<b>Midterm Presentations- You will listen to all the students work and submit your questions for each paper.</b>		
	L10	Mobility Control		
WEEK6	L11	Mobility Control		HW2
	L12	Miscible Processes	HW3	
WEEK7	L13	Miscible Processes		
	L14	Miscible Processes		
WEEK8	L15	Chemical Flooding		
	L16	Chemical Flooding		HW3
WEEK9	L17	Chemical Flooding	HW4	
	L18	Thermal Processes		
WEEK10	L19	Thermal Processes		
	L20	Thermal Processes		HW4
Final		<b>AUGUST 10, 2016 at 4:00 pm will be submitted to e-campus</b>		

\* Scheduled program and the exam dates may change.

### COURSE POLICIES

**Prerequisites:** PETE 310

**Required Textbook:** Don W. Green and G. Paul Willhite, Enhanced Oil Recovery, SPE Textbook Series Vol. 6., 1998, ISBN:978-1-55563-077-5; Larry W. Lake, Russel T. Johnson, William R. Rossen, and Gary A. Pope, Fundamentals of Enhanced Oil Recovery, Society of Petroleum Engineers, 2014, ISBN: 978-1-61399-328-6; PETE 609 class notes; Related technical papers

**Attendance:** Texas A&M views class attendance as an individual student responsibility (<http://student-rules.tamu.edu/rule07>). Attendance is essential to complete the course successfully. Material presented in lecture and class discussion may expand upon points only briefly considered in the required text.

**Excused Absences:** Rules concerning excused absences may be found at <http://student-rules.tamu.edu/rule07>. Except for absences due to religious obligations, **the student must notify her or his instructor in writing (acknowledged e-mail message is acceptable) prior to the date of absence if such notification is feasible. In cases where advance notification is not feasible (e.g. accident, or emergency) the student must provide notification by the end of the second working day after the absence. This notification should include an explanation of why notice could not be sent prior to the class.** If the absence is excused, the instructor must either provide the student with an

opportunity to make up any quiz, exam or other graded activities or provide a satisfactory alternative to be completed within 30 calendar days from the last day of the absence.

**Excused Absences for Religious Holy Days:** Texas House Bill (effective 9/1/03) states “An institution of higher education shall excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable amount of time after the absence.”

**Makeup Policy:** Makeup exams will be given without question for excused absences as defined by University Regulations. If you miss an exam for any other reason, you may request a makeup, but the makeup exam may have a different format from that given in class, must be completed within one week of the original exam date, and there will be a 5% penalty.

**Exams:** There will be two exams during the semester, one during class and one during the final exam period. Each exam will cover approximately one to two months of material presented in the class. Exams will be accomplished in teams. Each team will have four students maximum. Students will select an unconventional reservoir and will propose an EOR solution to recover the unconventional reservoir effectively and in an environmentally responsible manner. **You can select your MENG projects.** The midterm will consist of a presentation, where each group will make a 10-15 minutes presentation and also prepare questions from each presentation of the class. Both presentations and questions will be graded by the end of each presentation. Prepared presentations, presentation skills, the ability to ask intelligent and meaningful questions will be evaluated as the midterm grade for the presenters. The students who are auditing the presentations need to appear in the class prepared and are required to prepare questions for each presentation. The question quality will be evaluated for the students who are auditing the presentations and this evaluation will be included in the midterm grade. **If a student or students performs plagiarism, their works will be graded as ZERO and the entire group members will be reported to the university according to the University Honor Code.**

**Extra Credits:** There may be opportunities to earn extra credit during the semester. These activities will be announced in class. **There are no make-ups or substitutions for extra-credit opportunities.**

**Assignments:** Late assignments will normally be given a grade of zero. Every week, a homework assignment will be posted to e-campus. Students are responsible to answer all homework problems and submit their work to the TA. Assignments should be neat, easy to understand, and straight forward. If the assignment is not legible or easy to follow then a grade of zero will be given.

**Grading Policy:** Your grading will be calculated according to the table given below. Letter grades will be assigned to the following guideline: A=90-100 (Excellent), B= 80-89 (Good), C=70-79 (Satisfactory), D=60-69 (Passing), F=59 and below (Failing); I=Incomplete.

Assignment	Details	% of Grade
1. HW	HW1 (5%), HW2 (5%), HW3 (5%), HW4 (5%)	20
2. In Class Activity	The solution of in class activities will be given during the class, students are responsible for watching all classes and following all class activities, not all class activities will be submitted, submission will be requested randomly by the class instructor.	10
3. Midterm Presentations	- Organization of Presentation Slides (15%) - Presentation skills (10%) - Question Quality (5%)	30
3. Final Exam	5 to 10 pages proposal - Scientific quality of the submitted work (15%) - Organization of the work (10%) - References (5%) (maximum 20 percent of the total references can be conference papers, most of the references will be selected from high quality journals (Q1), and for the journal selection, SCImago Journal & Country rank will be used ( <a href="http://www.scimagojr.com/journalsearch.php">http://www.scimagojr.com/journalsearch.php</a> ). For journal search, the following links can be used <a href="https://www.onepetro.org/">https://www.onepetro.org/</a> <a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a> <a href="http://pubs.acs.org/journal/enfuem">http://pubs.acs.org/journal/enfuem</a> <a href="https://scholar.google.com/">https://scholar.google.com/</a> <a href="http://library.tamu.edu/advanced-search/">http://library.tamu.edu/advanced-search/</a>	40

**Your grade in this class is earned, not awarded.** I will NOT consider rounding up your overall grade. Throughout the semester, after each assignment or exam, you will be informed of your average grade.

**Student Conduct: Academic Integrity Statement and Policy, Aggie Code of Honor** “An Aggie does not lie, cheat, or steal or tolerate those who do.” Upon accepting admission to Texas A&M University, a student immediately accepts a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their

commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For more information: <http://aggiehonor.tamu.edu/>. Each work that you turn in for this class MUST include your signature and the following statement. "On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

**Classroom Behavior:** Texas A&M University supports the principle of **freedom of expression for both instructors and students**. The university respects the rights of the instructors to teach and the students to learn. Maintenance of these rights requires classroom conditions that do not impede their exercise. Classroom behavior that seriously interferes with either (1) instructor's ability to conduct the class or (2) the ability of other students to profit from the instructional program will not be tolerated. An individual engaging in disruptive classroom behavior may be subject to disciplinary action. For additional information please visit <http://student-rules.tamu.edu/rule21>.

**ADA Policy Statement: (Texas A&M University Policy Statement)** Americans with Disabilities Act (ADA) Policy Statement

The following ADA Policy Statement (part of the Policy on Individual Disabling Conditions) was submitted to the UCC by the Department of Student Life. The policy Statement was forwarded to the Faculty Senate for information.

The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit <http://disability.tamu.edu>.

**Coursework Copyright Statement: (Texas A&M University Policy Statement)**

The handouts used in this course are copyrighted. The term "handouts" refers to all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, **you do not have the right to copy them**, unless you are expressly granted permission.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writing, etc., that belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions about plagiarism and/or copying, please consult the latest issue of the *Texas A&M University Student Rules*, under the section "Scholastic Dishonesty".

**Prepared by:** Berna Hascakir, May 06, 2016.