PNGE 343 - Petroleum Reservoir Engineering I

2017/18 Fall

Syllabus

Code	3740343
Prerequisites	3570219, 3740220, 3740218
Time & Place	Tu.: 9:40-12:30, Classroom TZ-07
Instructor	Dr. Emre Artun
	Office T-138 • **Phone** 3014 • **e-mail** artun@metu.edu
	Office hours Open door, or by appointment.

Objectives

To equip students with basic understanding of petroleum reservoirs, their classification, and conventional quantitative reservoir engineering methods to estimate hydrocarbon reserves in place and future reservoir performance with natural drive mechanisms.

Content

Estimation of hydrocarbon pore volume and recovery factor. Classification of oil reservoirs. Reservoir performance prediction for solution-gas, water, gas-cap, drainage and combination drive reservoirs using material balance approach. Water influx theory. Water and gas coning in oil producing formations. Decline curve analysis.

Outline & weekly schedule

Week	Topics & Activities
Week 1	Introduction to reservoir engineering practice
Week 2	Reservoir drive mechanisms, water/gas coning
Week 3	Reserve estimates and fluid pressure regimes
Week 4	Material balance equations (MBE)
Week 5	MBE for different drive mechanisms, Havlena-Odeh Method
Week 6	Midterm Exam-1 (November 7, during class hours)
Week 7	Predictive methods for reservoir performance (Tarner's method)
Week 8	Predictive methods for reservoir performance (Schiltuis' method)
Week 9	Water influx (steady-state)
Week 10	Water influx (unsteady-state)
Week 11	Water influx (pseudo-steady-state)
Week 12	Midterm Exam-2 (December 19, during class hours)
Week 13	Decline curve analysis (Exponential decline)
Week 14	Decline curve analysis (Harmonic and hyperbolic decline)

Reference Books

- Dake, L.P. (1978). Fundamentals of Reservoir Engineering, Elsevier, Amsterdam. (Chp.1,3,9; http://www.knovel.com/web/portal/main)

- Craft, B.C., Hawkins, M.F. (1959). Applied Petroleum Reservoir Engineering, Prentice Hall, New Jersey (Chp.3-5).

- Amyx, J.W., Bass, D.M., Whiting, R. (1960). Petroleum Reservoir Engineering: Physical Properties, McGraw-Hill (Chp.7-8)

- Dake, L.P. (2001). The Practice of Reservoir Engineering, Elsevier, Amsterdam. (Chp.1,3; e-book can be accessed via METU's Knovel subscription: http://www.knovel.com/web/portal/main)

Course Policies

- Grading Policy
  2 Midterm exams (open books/notes): 27% each, 54% total (November 7 and December 19, during class hours in TZ-07)
  Final exam (open books/notes): 36% (TBA by Registrar's Office)
  Homework problems: 10%

- Make-up exam: No make-up exam will be given unless an official excuse is submitted.

- Class announcements: ODTUClass will be used regularly for postings and announcements with at least 24-hours notice. Therefore, students are responsible for checking for their ODTUClass/E-mail inbox everyday.

- Homework problems: Homework problems will be individually-assigned and group work will not be allowed. While discussion with the instructor and classmates are strongly encouraged, all of the work must be done individually. Rather than emailing questions to the instructor, I encourage you to post your questions to the related forums in ODTUClass. It is not allowed to use someone else's files or data at any step of the calculations. Copied work will be penalized with a 'zero' grade, and disciplinary action may be taken.

- Conditions for NA grade:

  – failing to take at least 1 midterm examination

  – failing to take the final examination

  – failing to submit at least 50% of the assignments

  – missing more than 15 lecture hours (excluding 6 midterm hours)

- Attendance: Although not directly included in the grading, attendance will be taken to be used as a bonus/NA grades:

$$\text{Missed lecture hours exc. midterms, n} \begin{cases} \leq 5, & \text{+2 bonus points added to final grade} \\ 5 < n \leq 10, & \text{no effect to the final grade} \\ 11 < n \leq 15, & \text{-2 bonus points added to the final grade} \\ > 15, & \text{NA grade} \end{cases}$$

- Final Grading: If the class average for final grades is less than 69, curved grading is going to be utilized based on the overall grade distribution. Otherwise, the final grading will be based on the grade scale indicated in Article 24 of Academic Rules and Regulations for Undergraduate Education determined by the University which can be found in the following web page: http://ncc.metu.edu.tr/ro/undergraduate-education-regulation

Academic Integrity

Please note that PNGE 343 adopts METU NCC's Academic Code of Ethics. When a breach of the code of ethics occurs (cheating, plagiarism, deception, etc.) a faculty member has several (non-exclusive) such as giving a 'zero' grade for the relevant exam, project, assignment, and/or a larger part or all of the coursework, givingoptions a failing letter grade for the course, or forwarding the case to the discipline committee. The METU NCC Academic Code of Ethics and its processes for dealing with academic integrity issues can be found at: http://ncc.metu.edu.tr/sites/default/files/ETHICAL_RULES.pdf