FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Secondary Recovery of Petroleum

Information :

Course Code :	PE 503	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Department of Petroleum Engineering

Instructor Information :

Title	Name	Office hours
Professor	Adel Mohamed Salem Ragab	10
Assistant Lecturer	YOUSSEF ELSAYED ABDELHAFEZ KANDIEL	

Area Of Study :

The main objective of the course is to acquaint the students with the secondary recovery methods and their applications and is to give a solid background to the students on course of water flooding. Moreover, it provides a complete review of all aspects of water flood schemes being the most proven, lowest cost, and applicable to various types of reservoirs.

Description :

Oil recovery by water injection. Effects of wettability, capillary pressure, relative permeability, mobility ratio on displacement, sweep, and recovery efficiencies. Piston-like and Buckley-Leverett models. Fractional flow and frontal advance equation. Oil recovery prediction methods for linear and pattern water floods in single and multi-layered reservoirs.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Describe recovery expectations from reservoirs under primary depletion or pressure maintenance utilizing water or immiscible gas injection
2 -	Define reasons and causes for less than theoretically possible recovery
3 -	Describe appropriate methods (with their target applications, benefits, and limitations) for improving oil recovery from reservoirs under primary depletion or pressure maintenance utilizing water or immiscible gas injection
4 -	Recognize mechanisms responsible for recovery improvement in various IOR methods.
b.Intellectual Skills: :	
1 -	Select the suitable flooding patterns for water flooding operations
2 -	Calculate the overall recovery efficiency: displacement, areal, and vertical efficiencies
3 -	Predict the recovery performance for layered reservoir
4 -	Compare and summarize EOR methods using screening criteria
c.Professional and Practical Skills: :	
1 -	Apply appropriate methods (with their target applications, benefits, and limitations) for improving oil recovery.

2 -	Select a chemical (surfactant, polymer/micellar) etc. for chemical flooding, on the basis of their known properties
3 -	Select the suitable flooding patterns for water flooding operations
d.General and Transferable Skills: :	
1 -	Collaborate effectively within multidisciplinary teams.
2 -	Acquire entrepreneurial skills.
3 -	Refer to relevant literature.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to secondary recovery and EOR Screening criteria	6	Introduction	
Secondary Oil Recovery: Water Flooding	6	Petroleum Engineering Disciplines	Secondary Recovery
Overall Recovery Efficiency	6	As above	As above
Displacement Efficiency, Buckley and Leverett	6	As above	As above
Areal Sweep Efficiency	4	As above	As above
Vertical Sweep Efficiency	5	As above	As above
Methods of Predicting Recovery Performance for Layered Reservoirs	6	As above	As above
Chemical EOR, Thermal EOR, and Miscible/Immscible EOR	3	As above	As above
Technical Challenges and Futures Techniques	3	As above	As above

Teaching And Learning Methodologies :

- Interactive lecturing
- Problem solving
- Experiential Learning

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final Examination	40.00		
Homeworks	10.00		
Progress Exam 1	25.00		
Progress Exam 2	25.00		

Recommended books :

James J. Sheng, Ph. D.: ñModern Chemical Enhanced Oil Recovery, Theory and Practice,òGulf Professional Publishing is an imprint of Elsevier, Elsevier Inc., 2011.
2. Teknica Petroleum Services ltd :ñEnhanced Oil Recovery,òCalgary, Alberta, 2001.
3. Aurel Carcoana : ñApplied enhanced oil recovery,òPrentice-Hall, Inc., 1992.
4. Erle C. Donaldson, George V. Chilingarian, and The Fu Yen: ñEnhanced Oil Recovery II, Processes and Operations,òElsevier science Publishers B.V., 1989.
5. Van Poollen, H. K., and Associates : ñFundamentals of Enhanced Oil Recovery,òPenn Well Publishing company, Tulsa, Oklahoma, 1980.
6. Marcel Latil, et. Al. : ñEnhanced Oil Recovery,òInstitut Francais du Petrole, 1980. (Translated from the French bu Paul ELLIS)