

Course Type	Course Code	Name of Course	L	T	P	Credit
DE2	PED402	Enhanced Oil Recovery Techniques	3	0	0	9

Course Objective

The objective of the course is to provide the basic knowledge of enhanced oil recovery systems.

Learning Outcomes

Upon successful completion of this course, students will:

Have the ability to select and apply the compatible EIOR method to a particular oil field.

Have the ability to monitor the progress of the production of oil.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Historical background and review of primary and secondary recovery, injection rates & pressures in secondary recovery. Flood patterns and coverage.	6	Strong knowledge base of primary and secondary recovery techniques.
2	Microscopic displacement of fluids in a reservoir: Capillary forces, viscous forces, phase trapping, mobilization of trapped phases.	5	Knowledge of the fundamentals on various microscopic forces acting during oil recovery.
3	Macroscopic displacement of fluids in a reservoir: Areal sweep efficiency, vertical sweep efficiency, displacement efficiency, mobility ratio, well spacing.	5	Knowledge of the fundamentals on various macroscopic effects during oil recovery, ex. various sweeps.
4	Chemical flooding: Polymer flooding and mobility control processes, micellar/ polymer flooding, phase behavior of micro-emulsions, phase behavior and IFT, wettability alterations, alkali flooding.	6	Knowledge of the fundamentals of chemical flooding, alkali and polymer flooding, with the emphasis on the phase behavior and IFT of the fluids and wettability alterations of the porous medium.
5	Miscible displacement processes: Mechanism of miscible displacement, phase behavior related to miscibility, high pressure gas injection, enriched gas injection, LPG flooding, carbon dioxide flooding, alcohol flooding.	7	Knowledge of the fundamentals of miscible flooding, i.e. phase behavior related to miscibility, high pressure and enriched gas injection, LPG, CO ₂ and alcohol injection
6	Thermal recovery processes: Mechanism of thermal flooding, hot water flooding, cyclic steam injection, estimation of oil recovery from steam drive, in-situ combustion, air requirement for in-situ combustion.	6	Knowledge of the fundamentals and mechanism of thermal flooding which includes hot water, steam, and in-situ combustion drives.
7	Microbial oil recovery.	4	Fundamentals of MEOR mechanism, operation and types of microbes used in the process.
8	EOR project evaluation.	3	Ability to evaluate an EOR project.
Total contact hours:		42	

Text Books:

1. Smith C.B.-"Mechanics of Secondary Oil Recovery"
2. Lake, L.W., "Enhanced Oil Recovery"
3. Chilingar, "Enhanced Oil Recovery", Vol. I & II

References:

1. Craig F.F., "The Reservoir Engineering Aspects of Water Flooding"
2. Cosse, R., "Basics of Reservoir Engineering"
3. Van Poollen H.K., "Fundamental of Enhance oil recovery" Petroleum Production Systems, Economides et al., Prentice Hall, 2012