

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NPED501	Enhanced Oil and Gas Recovery Methods	3	0	0	3

Course Objective						
<ul style="list-style-type: none"> Understanding of in-depth mechanisms of enhanced oil and gas recovery methods Contemporary improved recovery methods including those from unconventional reservoirs 						
Learning Outcomes						
<ul style="list-style-type: none"> Students will be competent in working on enhanced oil and gas recovery projects Competence in understanding production methods from unconventional reservoirs 						

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Principles of enhanced oil and gas recovery methods. IOR, EOR& EGR. Screening criteria for EOR methods.	4	Why EOR is required. Potential of EOR. Evaluation of reservoir characteristics for suitable EOR.
2	Displacement of fluids in reservoir: capillary force; viscous force; phase trapping; mobilization of trapped phases, and alteration of viscous/capillary force ratio.	5	Knowledge of the fundamentals on various microscopic forces acting during oil recovery.
3	Design aspects of chemical flooding. Case studies of surfactant, alkali, polymer, ASP flooding. WAG process, SWAG process, and Chemical augmented WAG process. Foam 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. Present status of chemical flooding and design aspects.
4	Miscible displacement performance modeling, design procedure and field experiences, CO ₂ miscible and immiscible flooding, carbonated water flooding and its design and case studies.	6	Knowledge of minimum miscibility pressure (MMP); Mechanisms of miscible flooding and design aspects.
5	Designing of thermal EOR methods. Optimization of operation parameters of in-situ combustion. Thermodynamics of thermal EOR.	6	Mechanisms of thermal EOR. Planning and implementation of different thermal methods.
6	Nanotechnology in EOR: nanoparticle, nanoemulsion, nano-surfactant and nano-polymer processes.	5	Advantages and efficiencies of different nanotechnology based EOR methods along with their mechanisms.
7	Advanced recovery methods: CBM, shale gas, shale oil, tight sand, oil sand and others.	5	EOR methods for unconventional oil and gas reservoirs.
8	Molecular dynamics simulation approach for EOR. Technical and economic feasibility studies.	5	Pore scale modeling of fluid flow through reservoir for different EOR methods.
Total contact hours		42	

Text Books:

- Enhanced Oil Recovery, Don W. Green and G. Paul Willhite, SPE Text Book Series, 1998.
- Fundamentals of Enhanced Oil Recovery, Lake et al., SPE Text Book Series, 2014.

Reference:

- Enhanced Oil Recovery: Field Planning and Development Strategies, Vladimir Alvarado and Eduardo Manrique, Gulf Publishing, 2010.