

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NGLD305	Coal Bed Methane, Shale Gas and Gas Hydrate	3	0	0	3

Course Objective

The primary objective of the course is to introduce fundamental aspects of coal bed methane, shale gas and gas hydrate such as origin, types, reservoir analysis and production to the students.

Learning Outcomes

Upon completion of the course, students will be able to understand

- The origin, types, reservoir analysis and production of coal bed methane, shale gas and gas hydrates.
- Geological exploration method for gas hydrate

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Coal bed methane and shale gas: generation and accumulation; Van Krevlen diagram, Micropore, Mesopore and macropore, cleat system	6	Origin of coal bed methane (CBM) and shale gas, and various types of pores
2.	Sorption: principles, sorption isotherms – types and interpretation. CO ₂ , CH ₄ and N ₂ adsorption – desorption, hysteresis, langmuir isotherm, Swelling and shrinkage of coal matrix, isotherm construction	6	Sorption isotherm and preparation of the isotherm
3.	CBM Reservoir analysis: CH ₄ content determination in coal seams; Coal bed methane reservoir analysis,	5	CBM reservoir analysis for production
4.	CBM Water: CBM Water production and disposal, injection wells, carbon dioxide sequestration	3	CBM water production and disposal
5.	Coalbed Methane Basins: Potential Indian coalbed methane basins and production, hydraulic fracturing of coal seams; CBM exploration	7	Hydraulic fracturing and various Indian CBM basins
6.	UCG: In-situ gasification; geological and engineering considerations for UCG, Shale gas geological setting, shale gas storage, production	4	Geological and petrographical aspects of underground coal gasification
7.	Gas hydrate: Gas hydrate, occurrence and origin; structure of gas hydrate, Types of gas hydrate	3	Origin and types of gas hydrate
8.	Geological setting: Geological setting of Hydrate; Stability of gas hydrates; Gas hydrate reservoir; Volume of gas in hydrate; inhibitors	4	Geological setting of gas hydrate
9.	Gas Hydrate Exploration: Geological exploration of gas hydrate; Prospect and potentialities of gas hydrate in India	4	Geological exploration method for gas hydrate
	Total classes	42	

Textbooks:

1. Coalbed Methane and Coal Geology-Eds. R.Gayer and I. Harris, Geological Society, London 1996.
2. Shale Gas: Exploration and Environmental and Economic Impacts, 2017 AM Dayal and D.Mani (eds) Elsevier.

Reference Books:

1. Fundamentals of Coalbed Methane Reservoir Engineering, 2011, John Seidle, Pennwell Corporation
2. Economic Geology of Natural Gas Hydrate, 2006, Michael D. Max, Arthur H. Johnson, William P. Dillon, Springer