

Unconventional Hydrocarbon Resources

1.1 Course Number: PE421

1.2 Contact Hours: 2-0-0 Credits: 6

1.3 Semester-offered: 4th Year- Odd

1.4 Prerequisite: Petroleum Engineering Practices / Petroleum Geology / Formation Evaluation / Reservoir Engineering / Drilling Engineering / Production Engineering

1.5 Syllabus Committee Member: Dr. Satish Kumar Sinha

Objective: This course is designed to give the students an overview of the latest developments happening in oil and gas industry: unconventional hydrocarbon energy resources such as shale gas/oil, CBM, gas hydrates, deepwater as well as technological advancements. Class project will be an integral part of this course where each group of students will research on assigned topics.

2. Course Content:

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Coal Bed Methane	Introduction to Unconventional Hydrocarbon resources, Coal Bed Methane: Geological controls in CBM plays, Resource estimation, Drilling, completion and production performance of a CBM well, Indian Scenario	7
2	Gas Hydrates	Gas Hydrates: Structure of gas hydrates and their stability, rock properties of formation bearing gas hydrates, distribution throughout the world, wireline logs and seismic characters of gas hydrates, producibility of gas hydrates and challenges, Indian scenario of gas hydrates	7
3	Shale Gas and Oil	Shale Gas / oil: Rock property evaluation of shales and resource estimation, production techniques applied for shale gas, monitoring techniques including microseismic, Indian basins for shale gas/oil potential	7
4	Deepwater	Deepwater Oil and Gas Technology: Deepwater exploration and production in the world, role of geophysical methods, technological challenges in deepwater drilling and production. Heavy oil: world resources of heavy oil, production technology and challenges	7
		Total	28

3. Readings

4.1 Textbook:

Students will be given lecture materials.

4.2 Reference books:

1. A guide to Coal Bed Methane from GRI
2. Gas Hydrates — Geophysical Exploration Techniques and Methods by Michael Riedel, Eleanor C. Willoughby and Satinder Chopra
3. Journals from the American Association of Petroleum Geologists
4. Journals from the Society of Exploration Geophysicists
5. Journals from the Society of Petroleum Engineers

5 Outcome of the Course:

- Understand the difference between conventional and unconventional hydrocarbons
- Know the potential sources of unconventional hydrocarbons
- Challenges associated with the development of unconventional hydrocarbons
- Distribution of unconventional hydrocarbons with emphasis on Indian resources.