

Course Name: Applied Oil and gas seismic data analysis and advanced interpretation

Course Instructor: Dr. R. David Koilpillai, Qualcomm Institute Chair Professor, Department of Electrical Engineering, IIT Madras

Dr. Rajesh R Nair, Professor, Petroleum Engineering Programme, Department of Ocean Engineering, IIT Madras

Shri. R K Dhasmana, Ex- Executive Director and Basin Manager KG Basin, ONGC; EdTech Director, Zemblance Hydrocarbons

Objectives: The course "Applied Oil and Gas Seismic Data Analysis and Advanced Interpretation" aims to develop students' skills in analyzing seismic data for the purpose of identifying subsurface structures and potential hydrocarbon reservoirs. Students will learn various techniques such as seismic data processing, imaging, attribute analysis, and interpretation workflows. The course will also cover advanced interpretation methods, including seismic stratigraphy, amplitude analysis, and AVO analysis, to enhance reservoir characterization and exploration outcomes.

Course Contents:

Introduction to Seismic Data Analysis: Overview of seismic data acquisition and interpretation, Principles and concepts of seismic data analysis in the oil and gas industry

Seismic Data Processing and Imaging: Data conditioning and noise reduction techniques, Migration methods for accurate imaging of subsurface structures

Seismic Attribute Analysis: Introduction to seismic attributes and their interpretation, Attribute analysis techniques for reservoir characterization

Seismic Inversion: Principles and methods of seismic inversion, Application of seismic inversion for reservoir property estimation

Interpretation Workflows: Workflow design and best practices for seismic interpretation, Integration of well data, geological models, and seismic data for interpretation

Seismic Stratigraphy: Principles and applications of seismic stratigraphy, Identification and characterization of stratigraphic features using seismic data

Amplitude Analysis: Principles of amplitude variation with offset (AVO) analysis, Interpretation of amplitude anomalies and hydrocarbon indicators

Advanced Interpretation Techniques: Seismic inversion for reservoir characterization, Time-lapse seismic interpretation for monitoring reservoir changes

- The course will end with velocity optimization concepts, as well as integration of seismic data and well data in order to generate depth and isochore maps

Reference Text books:

Roy Chowdhury, K. (2011). Seismic Data Acquisition and Processing. In: Gupta, H.K. (eds) Encyclopedia of Solid Earth Geophysics.

"Seismic Data Analysis: Processing, Inversion, and Interpretation of Seismic Data" by Öz Yilmaz