

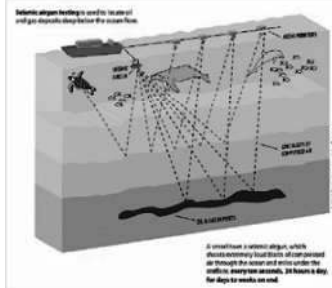
# 19PE211 PETROLEUM EXPLORATION

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	15	-	25	50	-	-	5	5



**SOURCE:**  
<https://krisenergy.com/company/about-oil-and-gas/exploration/>

**PREREQUISITE COURSES :** Petroleum Geology

## COURSE DESCRIPTION AND OBJECTIVES:

This course mainly deals with exploring and analyzing active processes of the earth through physical measurement. The objective of this course is to expose students to a broad spectrum of geophysics, including resource exploration, environmental geophysics, seismology and tectonics.

## COURSE OUTCOMES :

Upon completion of the course, the student will be able to active the following outcomes :

COs	Course Outcomes	POs
1	Identify the physics and geology that form the basis for geophysical observation and measurements	2
2	Formulate seismic, magnetic & gravitational methods of exploration	2
3	Apply skills developed in fundamentals of geophysical problems	1
4	Interpret different seismic profiles.	4
5	Analyze the principles of geophysical measurement and application of physics based mathematical models	4
6	Design a reservoir model by using appropriate software	5

## SKILLS:

- ✓ Identify the physical processes governing the behavior of common geophysical systems.
- ✓ Explain the principles of applying geophysical methods to societally relevant problems, including natural hazards, resource exploration and management, and environmental issues.
- ✓ Quantitatively describe the behavior of natural systems and the principles of geophysical measurement with physics-based mathematical models.
- ✓ Identify different oil bearing structures from different geophysical measurements viz, magnetic gravity, seismic and analyzing the same.

**UNIT-I****L-9, T-3**

**REFLECTION SEISMIC** : Basic principle and objective; Theory of seismic wave propagation; Types of seismic waves; Absorption and attenuation, reflection, refraction, diffraction and mode conversion of seismic waves.

**UNIT-II****L-9, T3**

**2-D AND 3-D SEISMIC DATA ACQUISITION** : Survey objective; Geological plan; Logistics in the area; Recording technique; Seismic velocities; Geometry of seismic wave path; Recording systems, geophones, cables and ground electronics; Common depth point technique.

**UNIT-III****L-9, T3**

**SEISMIC DATA PROCESSING** : Objective, concept of auto-correlation; Cross-correlation and convolution; Understanding processing parameters such as de-convolution, NMO, velocity analysis, filtering, stacking and migrations; Understanding the concept of time domain and frequency domain for seismic wave and fourier transform; Processing systems.

**UNIT-IV****L-9, T3**

**SEISMIC DATA ANALYSIS AND INTERPRETATION** : Objective; Understanding seismic data in terms of geological information, structural information, stratigraphic information, seismic attributes; Direct detection of hydrocarbons: AVO technique; Inversion integrating geophysical data with geological understanding and identifying prospects for drilling.

**REFRACTION METHOD** : Basic principle; Geometry of refracted wave path; Methodology of refraction profiling; Field surveys; Recording instrument and energy source; Corrections applied to refraction data; Interpretation of refraction data for understanding basin configuration.

**UNIT-V****L-9, T3**

**GRAVITY METHOD** : Basic principle and objective, recording instrument, recording technique, data analysis including various gravity corrections, gravity anomalies and geological features.

**MAGNETIC METHOD** : Basic principle and objective, recording instrument, data analysis including various magnetic corrections, magnetic anomalies and geological features.

**AEROMAGNETIC METHOD** : Recording technique and objective, operations advantage.

**TEXT BOOKS:**

1. Lowri, W., "Fundamentals of Geophysics", 2<sup>nd</sup> edition, Cambridge University Press. 1997.
2. Telford, W. M, Geldart L.P., Sheriff, "Applied Geophysics", 2<sup>nd</sup> edition, R.E., Keys, D.A.1990.

**REFERENCE BOOKS:**

1. Dobrin M. B., "Introduction to Geophysical Prospecting", McGraw-Hill, New York, Inc.1960
2. Robinson, E. S. and Coruh C., "Basic Exploration Geophysics", 2<sup>nd</sup> edition, John Willey and Sons, New York, 1998.
3. Anstey N. A., "Seismic Interpretation : The Physical Aspects", Boston, IHRDC.