Description of Course Content:

- Introduction to the methods of acquisition and processing of seismic reflection data.
- Basic theory of seismic waves traveling through the Earth and how they interact with earth materials and interfaces.
- Structural and stratigraphic interpretation methods and pitfalls using two and three dimensional seismic data.
- The application of seismic data to exploration and production of hydrocarbon deposits.

Student Learning Outcomes:

The successful student will understand the basic principles of seismic reflection data and will be able to interpret seismic lines across a variety of structural and stratigraphic settings. The student will be familiar with the operation of seismic interpretation software commonly used in the oil and gas industry (Petrel).

Requirements:

Basic computer skills and an understanding of algebra and trigonometry.

Basic geologic knowledge (stratigraphy, sedimentology) is required, courses such structural geology, earth physics/introduction to geophysics and GIS as a must.
Course content
1. W1 - Introduction to seismic exploration (reflection, refraction, check shots,)
2. W1 - Basic principles (frequency, resolution, sampling, semblance, velocities, Snell’s law, basic rock physics, etc.)
3. W2 - The seismic survey: land, marine, geometries, topography, 2D/3D/4D
4. W2 - Introduction to data processing (S/N, CMP sorting, stacking, AGC, filters, deconvolution, static corrections, multiples), time migration

exam (1) – 20 questions
5. W3 - Interpretation fundamentals
   a. lab + exercise and 2D paper exercise (time domain)
6. W4 - Structural Interpretation & mapping: horizons, layers, faults, closure, unconformities, salt
   b. lab + exercise (Petrel/paper)
7. W5 - Intro to stratigraphic Interpretation: Basin through seismic, amplitude, wavelets, frequency, geometry of reflectors, DHI
8. W6 - Velocity analysis – NMO, RMS velocity, Interval velocity, Time to Depth Conversion, Structures in time and in depth
   c. lab + depth conversion exercise (velocity survey, Dix and updating interpretation)
9. W7 - Well Logs and synthetic seismograms, seismic - well Calibration
10. W8 - computerized Interpretation lab
    d. building a project
    e. horizons maps – exercise – time map
    f. time to depth conversion
11. W9 - Principles of 3D interpretation
12. W10 - Principles of 3D interpretation
13. W11 - 3D interpretation project
14. W12 - 3D interpretation project
    g. 3D interpretation project: exercise - mapping trap with description
Rules:
Lectures 1-4; twice double class (2 weeks) – presence >75%
Exam (1) 25%
3 exercise 3X5%
3D interpretation exercise 30%
Final exam 30%