Knowledge resources for the seismic Interpretation course GEOV272

The course uses the pedagogic principle of problem-based learning (PBL). This means that the students are themselves responsible for acquiring the necessary knowledge to fulfill the requirements set forward in the learning goals for the course and each case. Although the course supervisor will recommend reading to the students, the students must make sure that they have acquired the necessary knowledge. If in doubt, they should discuss this with the course supervisor.

E-LEARNING MODULES

The following e-learning modules give access to most of (but not all) the knowledge required in the course. Not everything in each module is relevant for the course and the students should avoid trying to go through everything in detail as this is far too extensive. Instead, they should focus on relevant parts necessary to fulfill the requirements set forward in the learning goals. Modules of specific interest are highlighted with bold title. Some of the modules have been published in **learningGEOSCIENCE**. These modules require only Flash plugin and can be viewed from any computer with a broadband connection to the Internet.

1. **Seismic Key Examples (Required) – in course directory on shared drive**

Author(s): Egil Tjåland
Producer(s): Camilla Hagelund
Abstract: Seismic sections from various geological settings. Slightly outdated, links to SeisAction do not work any longer.
Key words: Seismic data, seismic interpretation, tectonics, structural geology

2. **Seismic Data – How it works (Required) – Found on learning GEOSCIENCE**

Author(s): Rolf Mjelde
Producer(s): Ståle Solbakken, Sølve M. Skogland
Abstract: The module presents the basic geophysical needed to understand acquisition of marine multichannel seismic data.
Key words: Seismic acquisition, multichannel data, reflection seismic data

3. **Geophysical Principles (Required) – Found on learning GEOSCIENCE**

Author(s): Rolf Mjelde
Producer(s): Ståle Solbakken, Sølve M. Skogland
Abstract: The module presents the basic geophysical needed to understand acquisition of marine multichannel seismic data.
Key words: Seismic acquisition, multichannel data, reflection seismic data

4. **Seismic Equipment (Required – overview) – Found on learning GEOSCIENCE**

Author(s): Rolf Mjelde
Producer(s): Ståle Solbakken, Sølve M. Skogland
Abstract: Describes how the most important equipment used in marine multichannel seismic data acquisition work.
Key words: Seismic equipment, acquistion

5. **Seismic Recording (Optional)– Found on learning GEOSCIENCE**

Author(s): Rolf Mjelde
Producer(s): Ståle Solbakken, Sølve M. Skogland

Abstract: The module describes the most important aspects in recording of marine multichannel seismic data acquisition.
Key words: seismic, recording, acquisition

6. Processing (Required – overview) – Found on learning GEOSCIENCE
Author(s): Rolf Mjelde
Producer(s): Ståle Solbakken, Sølve M. Skogland
Abstract: The module describes the most important aspects in processing of marine multichannel seismic data.
Key words: seismic, processing, multichannel data

7. 3D Seismic (Required – overview) – Found on learning GEOSCIENCE
Author(s): Rolf Mjelde
Producer(s): Ståle Solbakken, Sølve M. Skogland
Abstract: The module describes the most important aspects in processing of marine multichannel seismic data.
Key words: seismic, processing, multichannel data

8. Seismic Stratigraphy (Required) –in course directory on shared drive
Author(s): Egil Tjåland
Producer(s): Camilla Hagelund
Abstract: Recognition, mapping and interpretation of unconformities, seismic sequences and depositional sequences.
Key words: Seismic sequences, depositional sequence, unconformities, seismic facies

9. Gullfaks (Optional) – Found on learning GEOSCIENCE
Author(s): Jonny Hesthammer
Producer(s): Petter S. Nielsen and Richard Kluge
Abstract: Gives a basic introduction to the Gullfaks Field (stratigraphy, production and structural geology).
Key words: Gullfaks, structural geology, stratigraphy

10. Closing the Gap (Required) – Found on learning GEOSCIENCE
Author(s): Jonny Hesthammer
Producer(s): Petter S. Nielsen and Richard Kluge
Abstract: The ability to map small-scale faults from seismic surveys depends upon resolution, noise content and acquisition/processing procedure. In addition, the geoscientist must possess a sound understanding of plausible geometries consistent with analyses of well data. The comparison of two seismic datasets from the Gullveig structure, northern North Sea, demonstrates that the lateral resolution of the data is strongly dependent on the signal-to-noise ratio. By combining a theoretical approach with statistics from well analyses, exemplified by data from the Gullfaks Field, it is possible to enhance our understanding of the limits of fault resolution on 3D seismic data.
Key words: seismic resolution, theoretical and practical resolution, Gullfaks and Gullveig

11. Seismic Attribute Analysis (Optional, slightly outdated) – Found on learning GEOSCIENCE
Author(s): Jonny Hesthammer
Producer(s): Richard Kluge and Petter S. Nielsen
Abstract: Seismic attribute maps provide a useful tool in interpreting faults particularly those close to or below seismic resolution. Dip, relief, azimuth, and amplitude maps are most useful. One of the challenges is to distinguish between anomalies related to real geological features and to seismic noise: -both of which may occur as linear or curvi-linear, continous features on the attribute maps. This challenge is solved by use of independent data as core data, dipmeter data, stratigraphic log correlation and forward modelling.
Key words: timedip map, azimuth map, amplitude map, relief map, Gullfaks

12. Use & Abuse of seismic data (Optional, slightly outdated) – Found on learning GEOSCIENCE
Author(s): Jonny Hesthammer

Producer(s): Richard Kluge and Petter S. Nielsen
Abstract: The article shows with examples from the Gullveig and Gullfaks Field how seismic data can be misinterpreted due to the presence of noise and how well data can provide information needed to distinguish real features from noise.
Key words: Seismic data, noise, Gullfaks

13. **Evaluation of the Timedip, Correlation and Coherence maps (Optional, outdated) – Found on learning GEOSCIENCE**

Author(s): Jonny Hesthammer
Producer(s): Petter S. Nielsen and Richard Kluge
Abstract: Investigation of the timedip, correlation and coherence attribute maps from the Gullfaks Field demonstrates that in areas of poor data quality, the timedip map is best for structural interpretation. Although the coherence map can be developed without having any seismic interpretation, the method will reveal numerous (curvi-)linear features that may be misinterpreted as faults unless quality controlled against well data. Control against well data shows that it is very easy to overinterpret the seismic data based on surface and volume attributes.
Key words: seismic attribute maps, Gullfaks, timedip

TEXT BOOKS

There is no need to buy any books for the students. Relevant reading material will be made available during the course. The following text books give access to the knowledge required in the course. However, the students should avoid trying to read everything as this is far too extensive. Instead, they should focus on relevant parts necessary to fulfill the requirements set forward in the learning goals.

1. **Herron, D. A. 2011: First steps in seismic interpretation, SEG, Geophysical Monograph series**. Fundamental concepts and practices of seismic interpretation. Will be made available as an ebook through the UiB library.
2. **Simm R. & Bacon M., 2014, Seismic Amplitude: an interpreters handbook**, Cambridge University Press. Very good background, more emphasis on quantitative work than book 1.
3. **PESGB 2014. The millennium atlas: petroleum geology of the central and northern North Sea.** Extensive source of geological background information. Available on the schared drive.

ARTICLES

Relevant articles from the literature will be made available during the course.