Leon H. Charney School of Marine Sciences
UNIVERSITY OF HAIFA

Seismic processing and imaging – 2 credits

Course Number: 224.4022

Lecturer: Prof. Yizhaq Makovsky

Office Hours: Available by appointment, tel. 0523020406, e-mail: yizhaq@univ.haifa.ac.il

Course Type: Lecture

Course Level: MSc/ PhD

Prerequisites: Pre-requisites for this course are the Department courses in numerical methods and signal processing or equivalent courses.

Course Description:

Seismic imaging is the primary applied geophysical method used in research and industry. The purpose of this course is to provide the student with the understanding of the guiding principles and various technical applications of this technique. Practical exercises utilize MATLAB programming for simple calculations of synthetic seismograms, basic ray tracing, and more.

Topics:

1. Introduction.
2. Geophysical waves – Basic principles.
3. Geometry of seismic waves in the Earth.
4. Factors affecting the waves amplitude.
5. Resolution and sampling.
6. Waves at an interface.
7. Elasticity and seismic waves.
8. Types of seismic waves.
9. Recording seismic waves.
10. Seismic processing.
11. Estimation of seismic velocities.
12. Factors affecting seismic velocities.
13. Seismic and acoustical methods.

Learning Outcomes:

At the end of the course, students will be able to:

1. Understand the seismic signal and data, their relation to earth properties and the related processing and imaging workflow.
2. Make knowledgeable decisions regarding seismic data acquisition and processing steps, and the relevant parameters.
3. Evaluate the benefit of various seismic methodologies.

Requirements: Attendance, Exam, Homework assignments.

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Grading:

1. Attendance – 20%.
2. Homework assignments- 40%.
3. Exam – 40%.

Reading List:

1. MB Dobrin, CH Savit, 1988, Introduction to geophysical prospecting, McGraw Hill Book Co.
2. R.E. Sheriff and L.P. Geldart, 1995, Exploration Seismology, Cambridge.
3. O. Yilmaz, Seismic data analysis, Investigations in Geophysics, No. 10 (2 volumes), Society of Exploration Geophysicists (SEG); 2 ed edition, 2001.
4. O. Yilmaz, Seismic data processing, Society of Exploration Geophysics, 1987.
5. X. Lurton, 2002, An Introduction to Underwater Acoustics: Principles and Applications, Springer.
6. W.M. Telford, L.P. Geldart, and R.E. Sheriff, 1990, Applied Geophysics, Cambridge.