# 224.4022 – Seismic Processing and Imaging
## Semester B

**Instructor:** Prof. Yizhaq Makovsky

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**Teaching Assistants & Office Hours:** None

**Course Type:** Lecture

**Course Level:** MSC/PHD

**Pre-Requisites:**

Pre-requisites for this course are basic level courses in numerical methods and signal processing, such as the courses provided by the Department of Marine Geosciences or equivalent courses.

**Course Overview:**

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 intuitive 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

**At the end of the course students will be able to:**
Understand the basics of seismic and acoustic signal and data, their relation to earth properties and the related reflection seismology processing and imaging workflow.
Make knowledgeable decisions regarding seismic data acquisition and processing steps, and the relevant parameters.
Evaluate the benefit of various seismic methodologies.

**Requirements:** Attendance, Exam and Homework assignments

**Grading:**
Attendance – 20%
Homework assignments- 40%
Exam – 40%

**Website:** None. The course presentations are distributed to the students in class.

**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