EAS 4510: Exploration Geophysics Interpretation and Field Methods Course
Laboratory exercises

Date and lab.
There are 15 available lab periods.

24 August In Lab (maps design survey)	Seismic theory, field design
31 August In field, seismic unit	Seismic refraction/reflection acquisition
7 September In Lab, Computer program	Seismic refraction analysis
14 September Field, LF geophones	Seismic surface wave acquisition
21 September In Lab, free reflection data	Seismic reflection analysis
28 September In Lab, dispersion analysis	Seismic surface wave analysis
5 October Gravity Meter	Gravity vertical gradient acquisition and reduction
12 October Gravity Meter	Gravity field data acquisition.
19 October Lab, computer program	Gravity data reduction and modeling.
26 October Magnetometer	Magnetic field data acquisition
2 November Lab, Computer program	Magnetic data modeling
9 November Resistivity meter	Electrical DC resistivity acquisition
16 November EM 31	Electrical EM acquisition/analysis
23 November (no lab) Comparison of two methods	Electrical data analysis
30 November GPR	Ground Penetrating Radar Acquisition and analysis
7 December	

Topical Outline

1. General comments of the geophysical methods, acquisition and applications.
2. Principles of seismic wave propagation. Elastic properties of solids, seismic velocities in earth materials
3. Shallow refraction, application to determination of depth to hard rock, interpretation of structural irregularities..
4. Cross-hole and VSP surveys.
5. Introduction to the principles and applications of the seismic reflection methods
6. Data processing in seismic reflection, time series analysis, filtering.
7. Reflection data survey methods and interpretation.
8. Surface wave techniques.
9. Ground Penetrating Radar.
10. Introduction to potential theory.
11. Measurements of gravity: Absolute and relative measurements.
12. Gravity instruments, and measurement theory.
13. Field and data reduction of gravity data.
14. The Earth's magnetic field.
15. Magnetic properties of materials. Susceptibility and remnant magnetization.
16. Computation of magnetic and gravity anomalies. Line integral methods used in computer assisted modeling. 30-D modeling of anomalies. Potential field continuation
17. Instrumentation for measurement of remnant and induced magnetic field strength.
18. Resistivity methods including the Wenner and Schlumberrger configurations for depth sounding and profiling.
19. Introduction to electromagnetic (EM) methods and measurement techniques.
20. Interpretation of radioactivity data.

The laboratory will use the following instruments to obtain data and investigate techniques for analysis of the data.

Computer Programs

- Seismic Unix
- Windows interface for SU (if not too expensive)
- Gravity/magnietc inversion Northwest Geophysical (300 lab profiles version)
- Electrical inversion TBD
- EM inversion. TBD

GPS systems - ch out (needs tripod)
Smart Seis, geometrix seismic acquisition system.
Gravity meter- LaCost Romberg G meter
DC resistivity using ER-2
EM-31 purchased
Magnetometer (proton precession)
GPR