



Faculty of Earth Sciences



Geophysics Department



The Geological Society
Accredited degree courses

GEOELECTRIC EXPLORATION

Course Name	Course ID	Prerequisites
<i>GEOELECTRIC EXPLORATION</i>	<i>EGP 331</i>	<i>PHYS 202 / EGP 211 / MATH 202</i>

Time Table for Course Lectures

GEOELECTRIC EXPLORATION (EGP 331)

Week	Lecture
1	Electrical Properties of Rocks and Minerals. ^[1] Electrical Potential, Their Types and Sources. Electrical Conductivities Types and Causes. ^[1]
2	Magnetic Permeability and the Relation between Magnetic and Electric Field ^[1] Maxwell's Equation 4 - Polarization Potentials Electrical Constants of Rocks and Minerals ^[1] Resistivities of Rocks and Minerals Dielectric Constants of Rocks and Minerals
3	Electrical Exploration Methods: ^[2] 1- Self Potential Method Origin, Equipment, Field Procedure Interpretation of Self Potential Data ^[2]
4	1st Periodical Test Telluric and Magneto Telluric Methods ^[2] - Origin and Characteristic of Magneto Telluric Fields.
5	Telluric and Magneto Telluric Methods ^[2] Field Equipment and Operations Interpretation of Telluric and Magneto-Telluric Currents ^[2]
6	Field Examples and Exercise ^[2]

	Resistivity Methods, ^[3] Elementary Theory
7	Current Distribution ^[3] Effect of Inhomogeneity in Current Flow and Potential. At Plane Interface Surface Potential due to Horizontal Beds Potential due to Buried Sphere ^[3] Effect of Anisotropic Ground Effect of Topography
8	Electric Resistivity Equipment: ^[3] Meters, Electrodes and Wires Electrode Layout and Field Procedures ^[3]
9	Interpretation of Profiling Resistivity Data ^[3] Interpretation of Vertical Sounding ^[3] Two Horizontal Beds
10	Interpretation of Vertical Sounding ^[3] Multiple Horizontal Beds 2nd Periodical Test
11	Lateral Mapping Using Resistivity Data (Vertical Contact, Vertical Dyke) ^[3] Field Examples and Exercises
12	Induced Polarization ^[4] Sources of Induced Polarization Effects Induced Polarization Measurements ^[4]
13	IP Field Operations Interpretation of IP Data ^[4]
14	3rd Periodical Test
15	Final Revision
16	Final Exam

References:

- [1] *Applied Geophysics*, by Telford, W.M., Geldart, L.P., Sheriff, R.E., 1990. Cambridge University Press, 770pp. (Chapter-5)
- [2] *Applied Geophysics*, by Telford, W.M., Geldart, L.P., Sheriff, R.E., 1990. Cambridge University Press, 770pp. (Chapter-6)
- [3] *Applied Geophysics*, by Telford, W.M., Geldart, L.P., Sheriff, R.E., 1990. Cambridge University Press, 770pp. (Chapter-8)
- [4] *Applied Geophysics*, by Telford, W.M., Geldart, L.P., Sheriff, R.E., 1990. Cambridge University Press, 770pp. (Chapter-9)

GEOELECTRIC EXPLORATION (EGP 331)

Time Table for Lab. Work

Week	Test Name
1	The Electrical Properties of Rocks and Mineral
2	Rocks Sample Resistivity and Dielectric Constant Measurements
3	Ohm's Law and Its Application in the Geoelectric Exploration

4	The Effect of the Sample Dimension Shape, Depth and Dip Direction on its Electrical Properties
5	Lab Test
6	Resistivity Survey (Instruments And Arrays)
7	Vertical Electrical Sounding
8	Electrical Survey Profiling
9	Interpretation of VES (Two-Layer Cases)
10	Interpretation of VES (Multi-Layer Cases)
11	Lab Test
12	VES Applications using Shlumberger Array
13	VES Applications using Venner Array
14	Induced Polarization Survey
15	Revision
16	Practical Final Exams

Reference:

[1] *Exploration Geophysics of the Shallow Subsurface*, by Burger, H.R., 1992. Prentice-Hall PTR, Englewood Cliffs, NJ.