



**Faculty of Earth Sciences**



**Geophysics Department**



**The Geological Society**  
Accredited degree courses

**MAGNETIC AND GRAVITY EXPLORATION**

Course Name	Course ID	Prerequisite
<b>MAGNETIC AND GRAVITY EXPLORATION</b>	<b>EGP 341</b>	<b>EGP 211 / PHYS 202 / MATH 202</b>

**Time Table for Course Lectures**

**MAGNETIC & GRAVITY EXPLORATION (EGP 341)**

Week	Topic
1	<b>Introduction to the Course</b> and General Meaning of Potential L/ Position Vector, Attraction of Point Mass, Partial; Derivative of Potential <sup>[1]</sup>
2	Volume Potential and Its Partial Derivatives / Direct and Inverse Gravimetric Problem For Simple Gravitating
3	Case of Sphere in One Dimension: $V_z(X)$ , $V_{zz}(X)$ , $V_{zzz}(X)$ . Depth Estimation from the Above Derivatives <sup>[2]</sup>
4	Case of $V_{xz}(X)$ and $V_{\Delta}(X)$ . Depth Estimation from the Above Derivatives, Initial Formula for Gravimetric Interpretation (2D)
5	Gravity Measuring Instruments, Stable and Unstable Types, Gravity Surveying on Land. Gravity Base Station, Observation Sites, Tide and Drift
6	Survey Operation. Gravity Reduction, the Latitude Adjustment, the Elevation Adjustment, the Excess-Mass Adjustment, Nettleton Method for Density Determination, Gravity Anomaly <sup>[3]</sup>
7	Concept of Isostasy, Different Hypothesis, <b>Midterm Exam</b>
8	Introduction to Magnetic Methods, Principles and Elementary Theory Magnetic Force, Field Strength, Moment, Dipole, Intensity of Magnetization
9	Magnetic Susceptibility, Induction, B-H Relation, Units, Magnetostatic Potential, the General Magnetic Anomaly, Poisson's Relation, Field Equations
10	Magnetism of the Earth, Nature of Geomagnetic Field, the Main Field, Origin of the Main

	Field, Curie Point, Secular Variations, External Magnetic Field, Cycles <sup>[4]</sup>
11	Local Magnetic Anomalies, Magnetism of Rocks and Minerals, Types of Magnetizations, Diamagnetism, Paramagnetism, Ferromagnetism, Ferrimagnetism.
12	Residual Magnetism: CRM, DRM, IRM, TRM, V And VRM, <b>Group Project Discussion</b>
13	Magnetic Susceptibilities of Rocks, Field Instrumentation, Surveying, Electronic Magnetometers, Flux-Gate Magnetometer
14	Proton Precession Magnetometer, Optical Pumped Vapor, Vertical and Horizontal Gradient Measurements. Field Techniques
15	<b>Group Project</b>
16	<b>Final Exam</b>

**References:**

[1] *Introduction to Geophysical Prospecting (4th ed.)*, by Dobrin, M. B. and C. H. Savit, 1988. McGraw Hill.

[2] *Teacher notes*

[3] *Fundamentals of Geophysics*, by Lowrie, W., 1997. Cambridge University Press.

[4] *Interpretation Theory in Applied Geophysics*, by Grant, F.S. and West, G.F., 1965. McGraw-Hill.

**Magnetic & Gravity Exploration (EGP 341)**

**Time Table for Lab. Work**

Wee k	Lab	Exp/Practical Title
1	Lab 1	Gravity Effect of Simple Geometrical Models: A Sphere
2	Lab 2	Vz, Vzz, Vzzz of a Spherical Model
3	Lab 3	Effect of Density and Depth Variation
4	Lab 4	Drift Correction*
5	Lab 5	Bouguer Reduction
6	Lab 6	Free-Air Correction
7	Lab 7	Effect Due to a Faulted Model, Depth Determination
8	Lab 8	Magnetic Effect of Simple Geometrical* Models: Effect of Magnetized Sphere
9	Lab 9	Effect of Magnetized Cylinder, Fault
10	Lab 10	Estimation of Depth Using Peter's Method
11	Lab 11	Estimation of Depth Using Straight Slope Method
12	Lab 12	Revision**
13	Lab 13	<b>FINAL LAB EXAMINATION</b>

\*Check File Labs, \*\*Collect Lab Files