



**Faculty of Earth Sciences**



**Geophysics Department**



**The Geological Society**  
*Accredited degree courses*

### ***ELECTROMAGNETIC EXPLORATION***

<b>Course Name</b>	<b>Course ID</b>	<b>Prerequisites</b>
<b><i>ELECTROMAGNETIC EXPLORATION</i></b>	<b><i>EGP 431</i></b>	<b><i>PHYS 203/EGP 331/EGP 341/MATH 203</i></b>

#### **Course Description**

Principles of electromagnetic theory, mutual inductance, concurrence of electromagnetic fields, phase and amplitude relations, electromagnetic instruments, ground electromagnetic survey systems, time domain electromagnetic, telluric and magnetotelluric systems, airborne electromagnetic systems, electromagnetic field procedures, data processing and interpretation, field examples and field trips

#### **Course Objectives**

1. Understand the basic principles of the different electromagnetic methods.
2. Understand how natural resources influence subsurface electrical properties measured in electromagnetic surveys.
3. Become comfortable with the different electromagnetic methods and their applications in real life.
4. Be able to present what he learned through class presentations

#### **General References for the Course: (Books/Journals...etc.)**

Students in this course can read from:

1. *An Introduction to Applied and Environmental Geophysics*, by Reynolds, J.M., 1997. John Wiley & Sons, Chichester.
2. *An Introduction to Geophysical Exploration*, by Keary, P., Brooks, B.M. and Hill, I., 2002. Blackwell Science Ltd, Oxford, UK.
3. *Electromagnetic Methods in Applied Geophysics*, by Nabighian, M.N., 1991.

Vols.1-2, Society of Exploration Geophysics.

4. *Environmental and Engineering Geophysics*, by Sharma, P.V., 1997. Cambridge University Press.
5. *Geophysical Field Theory and Method*, Part B, by Alexander A. Kaufman, 1994.
6. *Use of Electromagnetic Methods for Groundwater Studies*, by McNeill, J.D., 1990. *in* Geotechnical and Environmental Geophysics, V. 1, SEG, 1990, pp.191-218.

### **List of URLs for this Course**

- <http://geoweb.tamu.edu/Faculty/Everett/>
- <http://galitzin.mines.edu/INTROGP/index.jsp>

### **Course Outcome**

The students become familiar with the different electromagnetic methods and their applications. He is also supposed to know the following:

1. Student knows the topics that are covered range from charge transport in rocks to control–source electromagnetic to magnetotellurics.
2. Student knows the field techniques, instrumentation, and data processing.
3. Student can know the conceptual review of the governing laws of low-frequency EM indication.
4. Student knows the two important boundary value problems.
5. Student can know the non-inductive methods such as resistivity and ground penetrating radar.