



Faculty of Earth Sciences



Geophysics Department



The Geological Society
Accredited degree courses

PHYSICS OF THE EARTH

Course Name	Course ID	Prerequisites
<i>PHYSICS OF THE EARTH</i>	<i>EGP 312</i>	<i>EGP 211, MATH 110</i>

Course Description

Introduction to field theory, earth gravitational field and its components, methods of measuring absolute value of the gravitational acceleration, earth figure, earth magnetism: source, components and variations. Main geometric field, dipole method. Measurements and computations of fields intensity. Paleomagnetism, Seismic waves and their propagations; earthquakes; tectonic earthquakes in the Arab world and plate tectonics. Geothermal volcanic activity, thermal energy and its utilization. Electric currents, their origin and applications. Rock dating and earth's interior composition.

Course Objectives

From this course the student will be able to know the physical aspects of most of the processes on the earth. This is a major and a necessary course or all geophysical techniques that will be later given to the student. To summarize, the knowledge of the following items should be transferred to the students:

1. Learn basics of potential theory/Physical properties of rocks/Gravitational force, Acceleration, and potential, Gravitation potential, Newton's Law 1 & 2
2. Attain knowledge of what is Earth's gravity field and relation to exploration,
3. Definition of geoid
4. Instruments used for measuring gravity field, absolute and relative
5. Magnetic force, magnetic intensity, magnetic induction, Elements of the geomagnetic field, separation of magnetic fields of external and internal origin, Energy density spectrum of the geomagnetic field, the dipole field

6. Basics of palaeomagnetism, data representation, magnetic units, elements of the Geomagnetic field. Earth's age, thermal and electrical properties.
7. Radioactivity (Coulomb force) radioactive decay, Radiometric age determination, Radioactive carbon, Mass spectrometer, Rubidium-strontium, Potassium-argon, Argon
8. Physical basis of geoelectricity, Electrical principles, Electric field lines around charges, Electric field and potential, Ohm's law, types of electrical conduction

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

Students in this course can read from:

1. *Applied Geophysics*, by Telford, W.M., Geldart, L.P., Sheriff, R.E., 1990. Cambridge University Press.
2. *Fundamentals of Geophysics*, by Lowrie, W., 1997. Cambridge University Press.
3. *Introduction to Geophysical Prospecting, 4th Edition*, by Dobrin, M.B. and C.H. Savit, 1988. McGraw Hill.
4. *Palaeomagnetism & Diagenesis in Sediments*, by Turner, P. and Tarling, D.H., 1999. Geological Society of London.
5. *Geophysics/Leading Edge*.

List of URLs for this Course

- www.seg.org/
- www.geo.utep.edu/
- <http://utam.geophys.utah.edu/stanford/>

Course Outcome

The student will be able to understand the basic earth structure surface movement, different physical concepts behind dynamics and tools of geophysical methods. He also suppose to know the following:

1. Student can know the basics of the potential theory, gravity.
2. Student can know the isostasy
3. Student can know the basics of magnetism, susceptibility distribution, geomagnetic fields.
4. Student can know the energy density spectrum, palaeomagnetism.
5. Student can know the age, temperature, distribution, radiometric age determination.