M.Sc. IN GEOPHYSICS

FIRST LEVEL:

No.	COURSE No. & SYMBOL	COURSE TITLE	UNITS
1	GPH 513	Advanced Seismic Exploration Methods	3 (2+1)
2	GPH 521	Geophysical Applications in Groundwater	3 (2+1)
3	GPH 565	Seismotectonics of the Arabian Plate	2 (2+0)
	Total		8 units

SECOND LEVEL:

No.	COURSE No. & SYMBOL	COURSE TITLE	UNITS
1	GPH 531	Potential Field Theory	3 (2+1)
2	GEO 553	Geophysical Data Processing	2 (1+1)
3	GPH 575	Selected Topics in Geophysics	2 (2+0)
	Total		7 units

THIRD LEVEL:
(The Department will select 9 Units)

No.	COURSE No. & SYMBOL	COURSE TITLE	UNITS
1	GPH 517	Quantitative Seismology	3 (3+0)
2	GPH 519	Seismic Hazards	3 (3+0)
3	GPH 535	Geodesy	3 (3+0)
4	GPH 541	Environmental Geophysics	3 (3+0)
5	GPH 543	Engineering Geophysics	3 (3+0)
6	GPH 555	Advanced Hydrogeology	3 (2+1)
7	GPH 586	Dynamic Geology	3 (2+1)
8	GPH 593	Earthquake Engineering	3 (3+0)
	Total		24 units

No.	COURSE No. & SYMBOL	COURSE TITLE	UNITS
1	GPH 600	Thesis	6 (0+6)

COURSE DESCRIPTION FOR M.Sc. GEOPHYSICS

GPH 513: Advanced Seismic Exploration Methods **3(2+1)**

Review of theories of seismic waves, recording, and data acquisition. Land and marine refraction procedures. Analog and digital data processing of refraction and reflection. Digital filtering and computer techniques in seismic data processing. Time and depth sections in model interpretation. Case histories.

GPH 517: Quantitative Seismology 3(3+0)
Elastic theory. Application of differential equations in three dimension media. Studies of sources of earthquake mechanisms and dynamics. Solutions of focal mechanism, free oscillation of the earth. Application of inverse problems in seismology. Design and analysis of digital seismic networks.

GPH 519: Seismic Hazards 3(3+0)
Earthquake prediction. Mapping of maximum intensity and acceleration of earthquakes. Quantitative and qualitative studies on earthquake risk sources and modeling. Field expedition . Programs for assessment of earthquake risk.

GPH 521: Geophysical Applications in Groundwater 3(2+1)
The use of advanced geoelectrical, electromagnetic and radiometric methods in delineating surface and groundwater. Intercalation of fresh water and salt water. Determination of three dimension of aquifers. Observation of groundwater pollution. Interpretation of subsurface models . Selected world groundwater aquifers and case histories.

GPH 531: Potential Field Theory 3(2+1)
Potential field theory. Uses of the potential theory in gravity, magnetic and electrical methods. Upgraded technology in the interpretation of Free air, Bouguer, isostatic, and magnetic anomalies. Advanced technologies in the interpretation of electromagnetic curves and modelling of different gravity and magnetic maps.

GPH 535: Geodesy 3(3+0)
Determination of Geoid from gravity methods. Reference spheroid-absolute gravity observations and gravimeters. The earth's internal structure-attraction of standard bodies. Green's and Clairant's theories. Reference spheroid and standard gravity formulae. Stocke's integral masses outside the geoid, gravity anomalies. Geoid surveys, gravity as a guide to internal densities. Determination of the recent movements of the earth's crust.

GPH 541: Environmental Geophysics 3(3+0)
Uses of Geophysical methods (seismic, gravity, ground penetrating radar, electrical and radioactive) in solving environmental problems. Detection locations and follow-up of pollution. Determination of the suitability of sites for dumping all kind of wastes. Determination of current displacement and fracture zones. Geophysical assessment for insuring the safety of engineering structures and their environmental conservation. Case histories.

GPH 543: Engineering Geophysics 3(3+0)
Theory of rock mechanics. Applications of shallow geophysical techniques (seismic refraction and electrical resistively) in investigating geological characteristics of building foundations, dams and hidden channels as well as determining mechanical behavior of soil. Using electrical methods in delineating fresh water/salt water interface. Applications of geothermal reservoir as an energy source.

GPH 553: Geophysical Data processing 2(1+1)
Review of Fourier Transforms, Fast Fourier Transforms and time series analysis. Fast Fourier transform application in window functions. Computer techniques in spectral analysis for global, regional and local

data. Numerical solutions and digital applications of transforms and filters in the treatment of geophysics data. Examples and case histories.

GPH 555: Advanced Hydrogeology 3(2+1)
Lithostratigraphic investigation of water-bearing zones. Mechanics of water flow in porous media which includes water flow net and delineating of hydrogeological zones. Pumping tests. Design of groundwater wells. Chemical analysis and thermodynamics of ground water. Applications of geophysical methods in determining thickness of water-bearing zones. Case histories.

GPH 565: Seismotectonics of the Arabian Plate 2(2+0)
Studies on tectonics of the Arabian shield and plate. Historical and recent seismicity and its relation to active faults. Crustal deformation studies using global positioning system. Examples and case histories of crustal structures.

GPH 575: Selected Topics in Geophysics 2(2+0)
Discussion of recent and case history of research projects in geophysical domain and its application, variable subjects will be presented according to current research projects and the visiting professors.

GEO 586: Geodynamics 2(2+0)
Studies on earth structure. Isostacy of earth's crust. Geosynlines and continental drift. Ocean bottom spreading. Application of modern theories in interpretation of the probable reasons of earth movement.

GPH 593: Earthquake Engineering 3(3+0)
Earthquake motions and their engineering interpretations. Earthquake effect on foundations. Dynamic stability of earth structures. Earthquake codes for design and construction. Liquefaction and cyclic conditions.

GPH 600: M.Sc. Thesis 6(0+6)