

M.Sc. IN GEOLOGY

GEO 501: Advanced Geology of Saudi Arabia

3(2+1)

Study of Precambrian with emphasis on the development structure and correlation of the Arabian Shield. Correlation, Paleogeography of the Paleozoic, Mesozoic and Cenozoic sedimentary formations. Field applications.

GEO 522: Advanced Igneous Petrology

3(2+1)

Evolution and development of igneous rocks, illustrating the magma behavior by different diagrams as AFM. Igneous rocks classification and their field relations. Tectonic movements. Volcanism and Volcanoes. Thermodynamics of rocks. Special reference on problems about the origins of selected rock types from the Arabian Shield. Field work.

GEO 523: Advanced Metamorphic Petrology

3(2+1)

Origin and classification of metamorphic rocks textures, structures and reactions and their relationship. Physical and chemical principles of the metamorphic minerals, rocks and paragenesis. Metamorphism, metamorphic belts, problems associated with the reactions, progress of metamorphism, and relation to tectonism and tectonic theory. Cataclastic metamorphism and its significance. Facies and subfacies of metamorphic rocks illustrating metamorphism and origin by diagrams e.g., FMA, AKF, ACF. Field work.

GEO 532: Advanced Stratigraphy

3(2+1)

Latest developments, chronologic and chronostratigraphic records, principles and applications of correlation. Stratigraphic maps, biostratigraphy, lithofacies changes. Correlation in important sedimentary basins. Field applications.

GEO 533: Advanced Sedimentary petrology

3(2+1)

Bedding and depositions, Sedimentary structures, of eolian, alluvial deposits, shallow and deep marine deposits, and the interaction with wave, tides, and oceanic currents. Field applications.

GEO 534: Carbonate Rocks and Evaporites

3(2+1)

Carbonate sedimentation, marine evaporities, Carbonate facies, facies diagenesis, facis models, Coase histories.

GEO 536: Recent Sediments

2(2+0)

Weathering, Denudation and rates of disposition. lithification and diagenesis of alluvial. Eolian, glacial and marine sediments.

GEO 542: Invertebrate Palaeontology (I)

3(2+1)

Systematic Palaeontology, Morphology, Origin, Classification, The concept of species, Phylogeny, Organic evolution. Stratigraphy and the use of Paleontologic data, Field excursions.

GEO 543: Invertebrate Palaeontology (II)

3(2+1)

Systematic description of Cinidaria, Bryozoa, Brachiopoda, Annelida, and Arthropoda. Palaeoecology, Paeobiogeography. Origin and Evolution. Field applications.

GEO 544: Invertebrate Palaeontology (III)

3(2+1)

Systematic decription of the chiton, Gastropoda, Bivalvia, Cephalopoda, Echinodermata and Graptolithina. Palaeoecology, Palaeobiology, Origin and evolution, Field applications.

GEO 547: Advanced Microfossils

3(2+1)

Advanced study of Microfossils with special emphasis on the most important stratigraphic groups and their Taxonomy.

GEO 548: Advanced Paleoecology**2(2+0)**

Skeletal mineralogy, trace chemistry and distribution of trace element in skeletons and their paleoecological significance, Oxygen and carbon stable isotopes, Growth mechanism of different groups adaptive functional morphology, Population dynamics, opportunistic and equilibrium species, Types of dispersion, Ecosystems and communities.

GEO 554: Mining Geology**3(2+1)**

Application of Geologic Methods of Exploration and prospecting Mining Methods. Mapping Study of Geologic setting and structures of ore deposits. Evaluation and Estimation of ore reserves. Study of major associations of ore deposits.

GEO 555: Advanced Hydrogeology**3(2+1)**

Study of the climatic factors that affect the aquifer recharge. Estimation of the amount of recharge reaching the saturated zone. Determination of the physical properties which control the flow through aquifers, such as porosity, permeability, hydraulic, conductivity, and storage. Analysis of pumping test data. Study of the partial differential equation that describe ground water flow through porous medium. Solving the flow equation by using numerical methods and simple computer models. Study of the chemicals dissolved in water and their thermodynamic equilibrium status in order to solve some related problems.

GEO 556: Advanced Petroleum Geology**3(2+1)**

Sedimentary processes and accumulation of organic matter. Transformation of organic matter, Kerogen - Oil shales and petroleum. Nature of petroleum reservoirs Oil exploration. case histories.

GEO 561: Advanced Geochemistry**3(2+1)**

The Phase Rule. Phase Relations and its relationship with textures and fine structures. Thermometry. Barometry. Mineralization, Deposition, and Replacement reactions. Magmatic Evolutions. Mineralizing solution, and distribution of chemical elements and complex Ions. Stable isotopes and their cycles. Late stage magmatic processes. Sedimentation, chemical sediments, and Hydrous solutions under low temperatures. Hydrogeochemistry. Application problems

GEO 564: Geochronology**2(2+0)**

Absolute estimation and measuring geologic times. Study of fundamental measurements used in geologic research. Radioactive isotopes and their analytical methods. Potassium - Argon, Rubidium - Strontium, Uranium - Lead, Lead - Lead, and Carbon 12 - Carbon 14 systems and their Application to study the absolute ages of rocks especially in Precambrian Shields. Application problems.

GEO 566: Mineral Geochemistry**3(2+1)**

Stability of minerals, Geochemistry of Transition and Trace Elements. Application of thermodynamic laws and crystal chemistry to study minerals and rocks Phase Equilibrium. Application problems.

GEO 572: Applied Geophysics**3(2+1)**

Application of the reflection seismic and the gravity methods for prospecting of oil. Application of resistivity and refraction seismic methods for search of ground water. Application of the magnetic and electromagnetic methods for mineral exploration.

GEO 573: Interpretation of Well Logging**3(2+1)**

Principles of well logging (self-potential and resistivity, neutron and sonic logs; applications in determining rock porosity, fluid content, type of rocks thickness, dip and strike of formation; utilization of logging data in determining production pay - zone, producing applications.

GEO 586: Geodynamics

3(2+1)

Study of earth major structures. Principles of isostasy. Orogenic movements, Continental drift, Sea - floor spreading potential causes of earth deformation. Methods of study. Gained results, Data processing. Recent hypothesis and theories.

GEO 598: Seminar Geology

1(1+0)

Discussion of various topics in geology, given by graduate students under faculty supervision.

GEO 599: Special Topics

1(1+0)

Lecturing and discussion of different geologic topics selected and given by the faculty member holding the class.

GEO 600: Research Project

6(6+0)

M. Sc. Thesis research project prepared by the student including field work, laboratory experiments and writing the thesis.