

Course Description

Geology

G701: Advanced Mineralogy (2)

701ج: علم المعادن المتقدم (2)

Crystal structure, chemistry, origin and paragenesis of major rock-forming and ore minerals. Point groups, Space groups, Diffraction techniques, Spectroscopic methods, Classification schemes, Structure stabilities, XRD and DTA of minerals identification. Use the computer programs in mineral calculations.

G702: Metallic Resources

702ج: رواسب الخامات الفلزية

The economic geology of Iron ore deposits- Chromium ore deposit types-Geochemical properties of copper deposits-Orthomagmatic to magmatic hydrothermal copper sulphide ore in carbonatite-Porphry Cu-(Mo-Au) deposits- Plutonic, metamorphic and placer gold deposits- Rare earth ore deposits types. Properties of tantalum and niobium metal ore deposits. The most common antimony ore minerals.Geochemical concentration of antimony.

G703: Advanced Geochemistry (2)

703ج: جيوكيمياء متقدم (2)

Using geochemical data for geothermometry, geobarometry and thermodynamic models of minerals, rocks and magmas. Stable and radioactive Isotope Geochemistry: Recent Perspectives and using recent program such as Isoplot for age determination. Archaeological applications of isotopic and elemental geochemistry.Geochemistry and secular geochemical evolution of the Earth's mantle and crust.Recent analytical methods and instruments in geochemical prospecting. Microbial geochemistry: at the intersection of disciplines. Nanogeochemistry: Nanostructures and their reactivity in Natural Systems. Urban geochemistry (such as environmental chemistry, toxicology for As, Pb and Cd, pollution of water and groundwater and air by toxic minerals or elements from minerals and rocks). Pollution of groundwater by As and Cd from chemical weathering of rocks and minerals.

G704: Advanced Igneous and Metamorphic Rocks (2)

704ج: صخور نارية و متحولة متقدم (2)

Binary and Ternary system applications.Oxygen fugacity and its application.Processes which modify the composition of primary magmas.magma generation and its relation with plate tectonics. Basalt magma generation and basaltic magmatism. Volcanism and the upper mantle: investigations in the Kurile Island Arc. Origin of granite and related rocks in different tectonic settings. Metamorphic rocks at different tectonic settings. The Contact Aureole and Its Rocks, Interactions between the Intrusion and the Contact Aureole. Metamorphic phase diagram and modeling for various rocks. Compositional groups of metamorphic rocks. Environments and processes of metamorphism.Prograde and retrograde metamorphism, Replacement and overgrowth in prograde and retrograde metamorphism.Metamorphism of Ultramafic-mafic Rocks in Mg-Si-Ca system.A Key to determine metamorphic grades and major reaction-isograds or isograds in common rocks.

G705: Non-Metlic Resources

705ج: رواسب الخامات اللافلزية

Talc and pyrophyllite- Vermiculite- Muscovite and phlogopite- Kaoline deposit types- Source and formation of diamond deposits- Mineralogy and Geochemistry of phosphate deposits- Fluorite deposit types-Salt minerals and salt rocks-Salt formation today-salt lakes-sabkha-marine salt lagoons-shallow water evaporites. Seawater in the geological past.

G706: Ophiolitic rocks**706ج: صخور الأوفايوليت**

Definition of ophiolites. Plate tectonics and ophiolites. General discussion of ophiolite assemblages. Classification of ophiolites and ophiolitic rocks. Metamorphism of ophiolitic rocks. Ore Deposits in Ophiolite. Emplacement Tectonics. Geologic, tectonic, and petrologic nature of ophiolites (Bay of Islands Ophiolite in Newfoundland, Semail ophiolite in Oman, Troodos ophiolites in Cyprus, Coast Range ophiolite in California, Papua ophiolite in New Guinea, Egyptian ophiolites).

G707: Diatomite & Calcareous Algae**707ج: أحافير الدياتومات والطحالب الجيرية**

Morphology, systematic and evolution of calcareous nannofossils. Paleoenvironmental and paleogeographic applications of calcareous nannofossils. Biostratigraphic application. Standard Mesozoic and Cenozoic of calcareous nannofossils zonation. Morphology of diatoms, Ecology/palaeoecology of diatoms and their Evolutionary history (Range).

G708: Limestone Micro Facies**708ج: السحنات الدقيقة للصخور الجيرية**

The Microfacies concept. Methods of facies analysis. Recent carbonate sedimentation. Carbonate mineralogy and sedimentation in marine environments, Lacustrine and terrestrial carbonate sedimentation. Carbonate diagenetic processes and diagenetic environments. Microfacies types and characteristics. Facies diagnosis and facies models.

G709: Sand & Sandstones**709ج: الرمل والحجر الرملي**

The Fundamental Properties of Sandstones: Mineral and Chemical composition, Texture, Sedimentary structures and bedding. The Petrography and Classification of Sandstones. Formation processes and provenance of sands. Diagenesis. Sand deposition and Environments. Seminars and reports are required.

G710: Advanced Vertebrate Fossils**710ج: أحافير فقارية متقدمة**

Definitions; Subphylum: Vertebrata contains Superclass: Pisces and Superclass: Tetrapoda (Amphibia, Reptilia, Aves and Mammalia). Dinosaur paleobiology and the origin of birds. Major mammalian lineages and Primate origins. Importance of Fayoum province in Egypt as a famous locality for vertebrate fossils. Wadi El-Hitan as a world heritage protectorate in Egypt. Also the study includes examples of each class in the laboratory.

G711: Facies Analysis**711ج: تحليل سحنات**

Identification of depositional processes on land and in the sea based on the textural and structural characteristics of sedimentary deposits. Facies Model Concepts for Siliciclastic and Carbonate Successions. Application of facies analysis in interpreting sedimentary successions. Seminars and reports are required.

G712: Mud rocks & Clays**712ج: الصخور الطينية والطفلة**

Nomenclature and definitions. Importance of mudrocks. Creation of Mud and Mudrocks. Depositional environments of Mudrocks. The mudrock cycle. Important properties of mudrocks. Composition of mudrocks. Major clay minerals and provenance. Seminars and reports are required.

G713: Biostratigraphic Applications**713ج: تطبيقات طباقية حيوية**

Biostratigraphic models and its economic applications. The industrial utility of microfossil types and assemblages. Biostratigraphic geological settings relevant to the hydrocarbon exploration.

G714: Seismic Data Processing**714ج: معالجة البيانات السيزمية**

Review of seismic data acquisition, recording of seismic data, analog recording, digital recording, analog to digital convertor- Seismic data processing – Seismic signal, definition of signal and noise, Analog and Digital signals, Sampling theorem, Nyquist frequency and Aliasing, multiplexing and demultiplexing, correlation, convolution and filtering operations, Static Correction: Elevation correction, weathered layer (datum) correction, Normal Moveout (NMO), Dip Moveout (DMO), stacking, velocity determination, velocity analysis, time sections, migration; manual migration, automated migration, pre-stack migration, post-stack migration, time to depth conversion, depth imaging.

G715: Paleomagnetism

ج715: مغناطيسية قديمة

Fundamentals of rock magnetism and paleomagnetism, origin of the Earth's magnetic field, geomagnetism and dynamo current in core, the physics of magnetism, rock magnetism, magnetic susceptibility, magnetic domains, induced and remanent magnetism, Paleomagnetism, Remanent magnetism of rocks, Thermoremanent magnetization, Detrital remanent magnetization, Chemical remanent magnetization, Isothermal remanent magnetization, Viscous remanent magnetization, Paleomagnetic procedure, Collecting samples, laboratory procedures for isolating various components of magnetic remanence and data analysis, geomagnetic polarity, secular variations and magnetic reversals, magnetic lineation of the sea floor, Poles and apparent polar wander, Plate tectonic reconstructions, Application in Paleogeography.

G716: Boreholes Geophysics

ج716: جيوفيزياء الآبار

The course will cover three geophysical fields in an integrated approach for optimizing interpretation of petrophysical parameters and rock physics. (1) Well logging techniques; Caliper logs, Gamma ray logs, Spontaneous potential, Resistivity logs, Sonic logs, Dipmeter, Borehole image and Porosity logs. (2) Vertical seismic profile (VSP), check shot, different configuration of shot and receivers, seismic well tie, synthetic seismograms, recognizing of horizons of interest and improving the vertical resolution.

G717: Advanced Seismic Data Interpretation

ج717: تفسيرات البيانات السيزمية المتقدمة

Review of 3D seismic interpretation concepts, inline sections, crossline sections, horizontal sections. Picking faults, horizons and geobodies, manual picking against automated picking (2D & 3D Autotracking). Generating surfaces, stratal slices, phantom slices, time structure maps, horizons and surfaces seismic attributes, dip, dip azimuth, etc., Classification of seismic attributes, amplitude, frequency, time and attenuation attributes. Seismic inversion techniques, post-stack seismic inversions, pre-stack inversions. Four Dimensional (4D) seismic techniques for reservoir monitoring and recovery enhancement.

G718: SEISMIC STRATIGRAPHY

ج718: طباقية سيزمية

Definition and scope of Seismic Stratigraphy: Tectonic control on eustatic sea level changes. Sea level changes and offlap, onlap, downlap surfaces. The concept of depositional sequence. Theories related to relative changes in coastal onlap and the construction of depositional sequences. Seismic sequence analysis. Seismic facies analysis and mapping of reef patterns. Relationship between seismic facies and depositional energy, reflection patterns. Parasequences. Lowstand, transgressive and highstand system tracts. Seismic Prospecting revisited: Review of seismic reflection data acquisition and processing for stratigraphy: Wavelet processing; Bandwidth and temporal resolution. Vertical seismic profiling (VSP). Seismic modeling for Stratigraphy.

G719: Earthquakes and its Applications

ج719: علم الزلازل وتطبيقاته

Introduction, Internal structure of the Earth, Elasticity theory, Seismic waves and propagation, Earthquake seismology, Conditions for Earthquake Generation, Earthquakes Focal Mechanisms

Solutions, Travel Time Curves , Low-Velocity Zones, Earthquake Hazard, Historical Seismicity, Recent Seismicity, Earthquake and Plate tectonics, Global Seismicity, Faulting Dynamics and Siesmotectonics. Locating Earthquake epicenters.