Syllabus of courses in the department of Geology – Faculty of science – Damascus University – Applied Geophysics

Syllabus of courses in the Branch of Geology	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
Matrix- Algebra operations of matrix- Determinants- Numerical methods: Finding the roots of algebra equation, Calculation of numerical integration- Analytical geometry: Straight equations in a plane, Plane equation in a vacuum, Two equations of straight in a vacuum- Common chapter of two planes- Curves of second class- Probability: Methods of numbering ,Conditional probability, Probable distributions	2	2	Mathematics (1)	1.st	**First**
Physics quantities & measurement- Vectors- Movement on a straight line- movement on a curved path- Newton's laws of motion - force moment -work & Energy& power – momentum and impulse movement quantity – circular motion – Surface tension	3	2	Physics (1)		
Introduction-Basic laws in chemistry-Thermal chemistry & chemical thermodynamics-Atomic structures & atomic synthetics- Modern quantum theory & the atomic structure-Periodical table & periodical properties of elements-Chemical bonds & supportive elements-Crystallography-Nuclear chemistry& radioactivity	3	2	General chemistry (1)		
Introduction to geology – Study of the earth – origin and physics properties of the earth; structure and composition of earth's envelops-gravitational equilibrium of the earth's crust- history of the earth and stratigraphic column. Materials of the earth: introduction to crystallography and mineralogy (crystal and crystal properties; crystal symmetry; minerals and physical properties - main minerals of rock). Igneous rocks, sedimentary rocks, Metamorphic rocks.	2	3	Physical Geology (1)		
food: fuel or pleasure ? - if you really want to win, cheat - we are family - Ka-ching changing your life - race to the sun - in the office - modern manners - judging by appearances - if at first you don't succeed - renting a flat	-	4	Foreign language (1)		
Index of Grammatical Subject: The sentence structure – Different type of Arabic verb – Interrogation – Exclamation – Number and composition – The Subject – Oath – Nominal sentence – Call and Negative	-	2	Arabic language		

Syllabus of courses in the Branch of Geology	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
Numerical sequences- Finite & continuation-Continuation, Status of non-definition-un limited integrations- Properties of limited integration- area calculation-Calculation of curve length-Calculation of size	2	2	Mathematics (2)	2.nd	***First***
Introduction of Vectors Analyses -Electric Field - Electric Field lines – Electric Dipole - Gauss's Law – Electric Potential - Conductors in Electrostatic Equilibrium – Capacitance and Capacitors-Capacitance of isolated conductor – Electric capacitor – Parallel plate Capacitor - The magnetism – The Magnetic Field- Magnetic flux and magnetic field lines – Magnetic Induction	3	2	Physics (2)		
Introduction-Oxidation & reduction – electrical chemistry-Materials status-Chemical equilibrium-Solutions & properties-Kinetics chemistry-Chemistry of elements(Hydrogen -0xygene – water –basic elements of group 1 - basic elements of group 2- basic elements of group 3- basic elements of group 4- basic elements of group 5- basic elements of group 6- basic elements of group 7- transition elements	2	3	General chemistry (2)		
The External Geodynamical Actions-Wearing Away of The Land By Weathering-Mass Wasting-The Wind Geological Action and Deserts-Streams & Drainage System-The Ground Water Geological Action-Glaciers & Glaciations And their Geological Actions-The Oceans and Their Margins-The Lakes and Bogs -The Internal Geodynamical Actions-Volcanoes-The Earth Crust Deformation-Earthquakes	2	3	Physical geology (2)		
Solids - Projection systems used in geodesy Systems of geodesy coordinates - Surveying measures - Polygon & triangles - Clearance Longitude sectors - GPS system for measuring coordinates - GIS systems - Elevation & surveying modeling though using surveying apparatuses	2	2	geodesy		
Back to school, aged 35 - in an ideal world - still friends ? - a visit from a pop star slow down, you move too fast - same planet, different worlds - jop swap – meetings love in the supermarket - see the film….get on a plane - I need a hero - breaking news.	-	4	Foreign language (2)		

Syllabus of Geophysical courses	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
Structure of material-Growth of crystals-Measurement of angles-The projection-Symmetry elements-Combination of symmetry elements-Symbols of symmetry elements-Crystal notation-Orientation of crystals and choosing the unit_face-Main lines of studying the crystal structure-Simples crystal forms-Internal symmetry of crystal and lattice structure-X_ray radiation-Structure of typical crystals	2	2	Crystallography	1.st	Second
General Mineralogy, crystallochemistry of minerals, Physical properties of minerals, Genesis of minerals, Descriptive mineralogy, Classification of minerals, The (native elements, sulfides, halide, oxides and hydroxides, silicates, borate, carbonates, nitrates, phosphates, molibdates and tungsten, organic mineral)class, gemstones .	2	3	Mineralogy		
Time in geology-Stratigraphic (unites- events-and gaps)-physical methods in Stratigraphy-sedimentologic methods-Chemical methods-biostratigraphic methods	2	2	Stratigraphy (1)		
Radial analysis-Fundamental definitions-Operations of radiation- Decimal analysis: Basic definitions-Operations of decimal numbers-Deferential equations-Basic definitions-Study of some types of differential equations- Linear programming-Basic definitions-Finding out ideal solutions for the linear programs (Simplex method)	2	2	Mathematics (3)		
The structure of earth -Magma - forms of the rock deposition (surface –subsurface –deep) – Classification of igneous rock (origin – minerals) - Kinds of igneous rocks –Structure\matrix of igneous rocks – metamorphic rocks(classification – facies)	2	3	Petrography of igneous and metamorphic rocks		
Introduction, Fossilization, Methodes of collecting fossils, Determination and nomenclture of fossils, Systematic paleontology, Paleontology and evolution; Paleontology and stratigraphy, Paleontology and ecology, Groups of fossils having stratigraphical significance, Invertebrate fossils .	2	2	Paleontology (1)		
The subject “English for Science” consists of 12 lessons; each lesson talks about one of natural scientific topics, such as, The Solar System- what makes a Hurricane? – How Sedimentary Rock forms.	-	4	Foreign language (3)		

Syllabus of Geophysical courses	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
Basic of hydrogeology and hydrogeological studies, Formation of ground-water deposits and occurence forms in the earth's crust, Hydrogeological properties of rock, Physical propeties of ground-water,Geochemistry of ground-water, Ground- water flow, Classification of ground-water.	2	2	General hydrogeology	2.nd	Second
Introduction 1- Cosmology and solar system 2- Gravitational field and shape of the earth 3- physical characteristic of the earth 4-geomagnetic field 5- Geothermal field 6- Geoelectric field	2	2	General geophysics		
Principles of stratigraphy – Lithological and sedimentological principles – methods of stratigraphy	2	2	Stratigraphy (2)		
General definitions-calculation systems-representation of data in cumputer-algorithms and programming languages-symbols used in computer-input and output instuctions of data-instructions of transition-circles-functions and procedures-files-plotting-fundamental concepts of statistics- single field experimental distribution- multiple fields experimental distribution-applications in geo_statistic	2	2	Programmig & geostatistics		
General properties of sedimentary rocks – (structure ,formation stages, changing stages ,classification) of Sedimentary rocks – Descriptive study of sedimentary rocks – group of clastic and shale rocks – group of bio_chemical rocks – combustible materials	2	3	Petrography of sedimentary rocks		
Invertebrate fossils : phylum prof.fer; phylum coelenterate ; phylum brachiopod ; phylum annelid ; phylum mollusce ; phylum protocordata ; graptolithina ; conodonts. Vertebrate fossils : plant fossils ; examples of vertebrate fossils.	2	2	Paleontology (2)		
The subject "English for Science"consists of 13 lessons, each lesson talks about one of natural scientific topics. Such as, Exploring the Undersea World –What is Sound? – Climate and the Change of Seasons – Recycling reduces Pollution.	-	4	Foreign language (4)		

Syllabus of Geophysical courses	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
Oscilations & waves-propagation of waves – interferences of waves –body and radiation- Atomic physics and spectra – nucleus-radioactive materials –nuclear safty and calibration- Accelerators	3	2	Physics (3)	**1.st**	**Third**
introduction of the seismic method , importance of using in the geo-physics exploration- Methods of field works and the field seismic methods- Apparatuses and equipment used in field surveying –correcting data- basis of refractive_seismic method – drawing of seismic planes of both refractive & reflective and their depth calculation through various ways to be used- using the seismic method	2	2	Seismic refraction methods (1)		
Stress and strain – faults – joints – folds – vertical movements – plate tectonics – mountain chains and orogeny	2	2	Structural geology		
General introduction geomagnetism- fundamental principles of magnetism- the magnetic effect of magnetical bodies- magnetometers- magnetic survey methods- interpretation of magnetic data- Archaeomagnetism, Archaeomagnetic prospecting,6 environmental magnetism	2	2	Magnetic methods		
Introduction – Electrical properties of rocks - The equipment and tools are used in electrical prospecting- Factors affecting the field measurements- The theoretical basis and mathematical basic of exploration electric dc theory- General information about the resistivity methods- Horizontal scanning electrode- Interpretation of measurements of the horizontal scanning- Vertical sounding- Qualitative interpretation of sounding curves and draw a vertical section is equal to the virtual resistivity- Build section geo- electric section- geo- electric Survey 2D and 3D- The way the body charged .	2	2	Geoelectrical methods (1)		
East Mediterranean region geology frame work- regional geology of Syria-Tectonics-Volcanism-Earthquakes-Stratigraphy-Mineral resources-Underground water	2	2	Regional geology		

Syllabus of Geophysical courses	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
Vibration movement- combination of two Sinusoidal waves of the same frequency- combination of two Sinusoidal waves of different frequency-attenuation of waves and resonance-free oscillations springs-elasticity and Young's modulus - Doppler effect- the speed of transverse and longitudinal waves in a string-Fourier's analysis of the periodic movement- Sound propagation in air	2	2	Physics (4)	**2.st**	**Third**
Set of normal differential equations- Macro-differential equations (Biffa differential equation)- Laplace's transformations- Fourier's sequences & integration- partual differential equation	2	2	Mathematics (4)		
Introduction to Seismology-Seismological waves-Seismological observation instruments-Seismological record-Caculation of earthquake coordinates-Earthquake scales-Geographic distribution of earthquakres-The mechanism of the earthquake-Prediction of earthquakes-Volcanic earthquakes and nuclear explosions-The geotechnical engineering effect of earthquake-Seismic activities in syria	2	2	Seismology		
Introduction in identity of geophysics science ,seismology and historical evolution- Flexible geology medium and rock properties- Flexibility factors of geologic means-Basis principles of seismic propagation- Influential factors on the seismic speed-Theoretical basis of refractive surveying- Time_distance relation and the form of wave paths- The way of curve _change of the refractive surface	2	2	Seismic refraction methods (2)		
Introduction - Telluric and magnetotelluric methods: theoritical physical principles,instruments,field surveying methods,data interpretaion-Electromagnetic methods-Induced polarization methods:field surveying methods (frequency domain and time domain)- Vertical sounding-horizontal sounding	2	3	Geoelectrical methods (2)		
Field geology:Definition-Preparation steps of field process-Individual & collective filed provision -Field lab-Geology surveying & maps – Topographic & aerial basis-Basic rules of achieving the geological maps: Presentation of rocky horizontal placements on the geological maps-Presentation of mono-tendency rocky placements on the geological maps	3	3	Geological Mapping and Geological Camp		
properties and shapes - location - structure - measurement - function and ability - actions and sequence - quantity - cause and effect - proportion - frequency - tendency - probability - igneous rocks - sedimentary rocks - metamorphic rocks – electrical-methods - gravity methods - magnetic methods - seismic methods.	-	4	English language		

Syllabus of Geophysical courses	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
History of seismic methods-Reflection field methods- Field layouts- Field layouts of Reflection seismic methods-Field layouts of Refraction seismic methods- Land energy sources-Land Equipment- Marine surveying and marine Equipment- Array theory-Specialized seismic techniques-Specialized seismic applications-Appendix - field seismic applications	2	3	**Seismic reflection methods (1)**	**1.st**	**Fourth**
Principle of seismic data processing-types of signals-signals at 'time and frequency domain'-transferring of signals-analysis of signal phase-seismic recording as time sequence-convolution in time-frequency domain-auto,cross correlations-digital filtering-migration	2	3	**Seismic data processing (1)**		
General Introduction – History of well Logging – Petrophysical properties used in well logging - Natural Gamma Ray Logs – Spontaneous Potential Logs – Resistivity Logs – Induction Logging – Electromagnetic Propagation Logs – Imagistic measurements - Geometry Measurements – Resitivity Logs in Cased holes	2	3	**Well logging(1)**		
Introduction-the scientific radioactive and geothermal concept-the atomic nucleus concept and the different facies of the element-radioactive series and natural radiation-radioactive transforming and radioactive equilibrium rules- the intensity of the thermal and radioacrive elements and its measuring units-the species of nuclear radiations and its measuring methods-the most important radioactive element and thermal energy sources-field surveying methods	2	3	**Geothermal & radioactive methods**		
Mineral deposits (distribution Areas, shape,composition,sructure,texture) Origin Classification of mineral deposits-Factors controlling the distribution and deposition of mineral deposits-Prospecting and extraction –Economic Mineral Deposits in Syria	3	3	**Geology of Ore Deposites**		
Introduction in algorithms- structure, elements and instructions of Turbo Pascal language-functions and procedures-display methods on screen-unites and files	2	2	**Programming languages**		
Geological time scale-Sedimentary , igneous and metamorphic rocks Mineral deposits-Theoretical geophysics-Exploration geophysics Surface water and rainfall, underground water and the water	-	4	**Modern Geophysics (2) in Foreign**		

Syllabus of Geophysical courses	Hour / Week		Subject	Semester	Year
	Practical	Theoretical			
Seismic waves in non-homogeneous mediums-tracks of elastic waves(3D)-introduction in improvement of seismic data-display of seismic data-equipping (2D,3D)-seismic interpretation procedures-interpretation of reflection seismic waves(2D,3D)-3D surveying-evidences about reservoirs-seismic data3D	2	3	**Seismic reflection methods (2)**	**2.nd**	**Fourth**
Introductuion-Data acquisition-Demultiplexing-Gain recovery-Vibroseis processing-Display seismic data-Deconvolution-Filtering-CDP sorting and statics-velocity analysis-residual statics-NMO,muting and stacking-Migration-Decon&Filter after stack – Depth conversion-mixing-Filming-Special processing-Computer operations	2	3	**Seismic data processing (2)**		
Density methods and Developments – Neutron Methods and Developments – Determination Lithology and Fluids from measurements crossplots – Seismic Methods in and between wellbore – Formation tester Tools and outputs – nuclear magnetic resonance measurements and its outputs - Producibility Logs – full interpretations of measurements	2	3	**Well logging (2)**		
Using of Geophysical methods in environment section- Magnetic Methods– Gravity methods -Geoelectric Methods – Seismic refraction methods – Seismic reflection methods – Georadar (GPR) methods –	3	2	**Environmental geophysics**		
Natural hydrocarbons : definition – Petroleum media and mother rocks – Reservoir rocks and oil-bearing rocks – Petroleum traps and their types – Liquids in Petroleum deposits and migration – Petroleum provinces – Petroleum deposits in the middle and Syria – Prospecting , exploration and reserve estimation	3	3	**Petroleum geology (principles)**		
Basic principles of gravity-Gravitational force , The Earth gravity field-The gravity field over some regular objects-Gravity survey instruments-Absolute value instruments-Relative value instruments-Methods of performing Gravity survey in the field-On land method- Marine method-Gravity data processing and interpretation-Gravity corrections -Determination of density – presentation of results-Anomaly separation and determination of Underground structures	2	3	**Gravity methods**		