

Rules of the Bylaw

1- Study System

- 1- The credit hour system (2 Semesters) is the system of study adopted by the faculty. The period of study for undergraduates consists of four class-years at least. The academic year is divided into two semesters. Each semester extends for 17 weeks. A summer semester extends for 8 weeks is a subject for approval by the faculty council.
- 2- The semester extends to 17 weeks and includes:
 - A) one week for registration.
 - B) 14 weeks of study.
 - C) Two weeks for the final written exams.
- 3- Bachelor of Science degree (B.Sc.) is granted for the students who successfully pass the required credit hours (138) according to the study scheme of the petroleum geology program and with a cumulative average (2) at least.
- 4- A credit hour (C.H.) is equivalent to:
 - A. A weekly one-hour lecture during the academic semester. Or

- B. Two-hours exercises per week during the academic semester. Or
- C. A practical or training session of 2-3 hours per week during the academic semester.

2- Registration

- 1- The vice Dean for Education and Student Affairs supervises the execution of the rules and procedure of registration. The registration department is responsible for preparing lists of student's name, the study groups, time schedules, grouping students and directing them to their academic tutors and issuing detailed statements of the courses of every student. All academic data are to be recorded in special approved records.
- 2- An academic tutor is appointed to guide every student and help him /her in selecting subjects and determining the number of credit hours registered according to his/her conditions and abilities, as well as helping solve his/her problems.
- 3- The student is allowed to make early registration, i.e. before the beginning of the next semester.
- 4- Registration of a new course depends on passing its prerequisite, if any.
- 5- Students who were unable to register in due time because of reasons accepted as compelling by the Dean can register during the 2nd week of the semester.

3- Academic load

- 1- The maximum load for registration is 18 credit hours in each semester, while the minimum is 12. The maximum load may be raised to 21 credit hours only for students in graduation phase. The minimum load may be also lowered only with the approval of the Dean of the faculty.
- 2- If the student gets a semester cumulative average less than (2.00) after registering 30 C.H., he/she receives the first warning and registers a maximum of 12 credit hours in the next academic semester. If the student's average continues to be less than (2.00) in the next semester, the student receives the second warning and is allowed to register less than 9 credit hours to improve his/her average. If this recurs, the student receives his third and last warning. The next step is to dismiss the student completely from the faculty and to cancel his/her registration.
- 3- The faculty council may accept the registration of graduates of other practical faculties or equivalent with a cumulative average (2.00) at least after equating the courses with those already studied by the student with a maximum of 50% of the total credits required for graduation. The student who obtained a B.Sc. and wish to register in a different specialization, his/her cumulative average should include the common courses that have been studied before.

4- Addition/Omission, Withdrawal and Transference

A-Addition or omission:

A student may add or omit one or two courses with the approval of the academic tutor before the end of the 2nd week of the semester.

B-Withdrawal:

A student may drop a course by the end of the 7th week of the semester as recommended by the academic tutor. The course will be included in the student's academic record with the grade 'withdraw' provided that the

student does not exceed the allowed days of absence before withdrawal. Crucial cases of withdrawal may be presented to the student Affairs Committee 2 weeks after the assigned date and their decision is final.

C-Transference:

Subject to the approval of the faculty council, a student may transfer from one specialization to another after equating the courses that he/she has accomplished.

5- Postponement or Quitting study

- 1- A student may postpone his/her study for not more than four academic semesters (continuously or separately) during his/her study in the faculty. He/she has to apply for the postponement by the end of the fourth week of the semester. The postponement is effective only after the approval of both the student Affairs Committee and the Faculty Council. If the student needs to postpone for a period more than four academic semesters, the matter altogether is referred to the University Council.
- 2- If the student quits studying in the faculty for a maximum period of two semesters for compelling reasons accepted by the Student Affairs Committee and the Faculty Council, he/she is given another chance for registration and resumes his/her study in the next semester. Moreover, this period is considered one of the chances of postponement available to the students. In the case of the disapproval of the committee, the student's registration is cancelled. The committee's decision is considered final after the approval of the Faculty Council.

6- Regular Attendance

- 1- The course professor has to record the names of the students who are present at the beginning of every lecture or a practical session in a list prepared by the Student Affairs Administration for every Course. This list should be handed on to his department at the end of the semester.
- 2- If the student exceeds 10% of absence from the course, the course professor has to inform the student Affairs Administration in order to send him/her the first written warning.
- 3- If the student exceeds 20% of absence from the course, the course professor has to inform the Student Affairs Administration in order to send him/her the second and final written warning.
- 4- If the student exceeds 25% of absence from the course, he/she is deprived of taking the final examination in this course and his/her estimation is (F). The Student affairs Administration should be informed to send a written notification to the student's legal guardian.
- 5- The Student Affairs Committee may consider the student's deprivation of taking the examination as withdrawal from the course if he/she presents an acceptable excuse. Its decision is final after the approval of the Faculty Council.
- 6- If the student wants to add a new course, his/her attendance is recorded starting with the date on which the course is added.

7- Assessment

Students' assessment is done according to the following steps:

- 1- Researches, field works, scientific trips and periodical short exams oral, written or applied held in the study rooms and recorded by the course professor.
- 2- The mid- term exam should be between the 6th and the 9th weeks of the semester. The time of this exam should not exceed half the time allocated to the course and in the same time of the lecture.
- 3- The final practical exam is held in the last practical session.
- 4- The final written examination is held within the last two weeks of the semester according to a time-table prepared by the Student Affairs Administration and approval by the dean of the faculty. It is possible to change the date of the final exam with the approval of both the Student Affairs administration and the dean.
- 5- The time allowed of the final written exam for each course is equal to course credit hours with maximum three hours.
- 6- If the course includes lectures and practical periods, both the mid- term exam and the final exam should include theoretical and practical parts and the marks should be divided in proportion to the credit hours given to each part.
- 7- If the practical courses are separated from the theoretical courses, assessment will be according to the above mentioned items (1), (2) and (3).
- 8- It is possible for the student to see his/her answer sheet for the periodical, mid-term and final exams after correction according to the basis and rules approved by Faculty Council and accepted by university council.
- 9- The honors degree is awarded to the student who gets a cumulative average of 3.00 or more in every academic semester on the condition that he/she has never failed any course during his/her study in the faculty or in the faculty from which he/she has been transferred.

8- Dividing marks

Each course is given 100 marks.

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- 1- Courses given in lecturers without practical periods are evaluated according to the following:
 - A) 10% of the total course marks for term (Semester) assessments that include periodic short tests, homework and field trips.
 - B) 10% of the total course marks for oral exam .
 - C) 30% of the total course marks for mid-term exam
 - D) 50% of the total course marks for the final written comprehensive examination
- 2- Courses given in lectures and practical periods are evaluated according to the following:
 - A) 10% of the total course marks for term (Semester) assessments that include periodic quizzes, homework and field trips.
 - B) 10 % of the total course marks for mid-term exam.
 - C) 10% of the total course marks for oral exam .
 - D) 20 % of the total course marks for practical exam.
 - E) 50 % of the total course marks for final written comprehensive exam
- 3- Courses have only practical periods are evaluated according to the following
 - A) 20 % of the total marks for term assessments.
 - B) 20 % of the total marks for mid-term exam.
 - C) 10% of the total marks for oral exam.

D) 50 % of the total marks for final exam.

4- Research Project :

A) 50% of the total marks for general activities during period of the research project (given by the student's supervisor).

B) 50% of the total marks for final presentation and discussion (Committee Departmental).

Numerical and symbolic counterparts of the marks and grades

Grades	Symbols	No of points	Mark
Excellent	A	4.0	90 – 100%
	A-	3.7	85 - < 90%
Very Good	B+	3.3	80 - < 85%
	B	3.0	75 - <80%
Good	B-	2.7	70 - < 75%
	C+	2.3	65 - < 70%
Pass	C	2.0	60 - < 65%
	C -	1.7	57 - < 60%
Exceptional pass	D +	1.3	55 - < 57%
	D	1.0	50 - < 55%
Fail	F	0.0	< 50%
Absent	F	0.0	-

In case of recurring failure of a student in a course, it will be considered once in his/her cumulative average. However, all registration times for the course will remain on his/her academic record.

- Semester average (Grade Point Average): is the average points gained by a student in a single semester approximated to two decimals only. It is calculated as follows:

Semester average (GPA) =

$$\frac{\text{Sum of semester course points}}{\text{Sum of semester credit hours of those}}$$

- Cumulative Grade Point Average (CGPA) is the average points gained by a student during his/her previous study period and approximated to two decimals only. It is calculated as follows:

$$\text{CGPA} = \frac{\text{Sum of course points in all semesters}}{\text{Sum of credit hours of those semesters}}$$

- The minimal grade for the cumulative average CGPA for graduation is 2.

Program structure and features

First: University Requirements

A- Compulsory Courses (4 credit hours)

Code	Course Title	Prerequisite Course(s)	hours/week		
			L	P	C
UR015	English Language (1)		2	-	2
UR020	English Language (2)	UR015	2	-	2
UR050	Human Rights		2	-	0

B- Elective Courses (6 credit hours)

Code	Course Title	Prerequisite Course(s)	hours/week		
			l	p	c

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UR011	Management	-	2	-	2
UR012	History of Science	-	2	-	2
UR013	Health Feeding	-	2	-	2
UR014	Scientific Thinking	-	2	-	2
UR015	Teaching Methods of Science	-	2	-	2
UR016	Arabic Language	-	2	-	2
UR017	Principles of Labor Law	-	2	-	2
UR018	Music	-	2	-	2
UR019	Selected Topics of Egypt's Modern History	-	2	-	2

Second: Faculty Requirements

Compulsory Courses (29 credit hours)

Code	Course Title	Prerequisite Course(s)	hours/week		
			L	P	C
M100	General Mathematics (1)	-	2	2	3
M105	General Mathematics (2)	M100	2	2	3
P100	Physics (1)	-	2	3	3
P105	Physics (2)	P100	2	3	3
C100	Chemistry (1)	-	2	3	3
C105	Chemistry (2)	C100	2	3	3
G100	Fundamentals of Geology	-	2	3	3
Z100	General Zoology	-	2	3	3
B100	General Botany	-	2	3	3
MC100	Computer	-	1	2	2

Third: Compulsory specialized courses (57 credit hours)

CODE	COURSE TITLE	PREREQUISITE COURSE(S)	HOURS/WEEK		
			L	P	C

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PG211	Principles of Stratigraphy	G100	2	2	3
PG226	Basics of Petrophysics	G100 P100	2	2	3
PG232	Basics of Igneous and Metamorphic Petrology	G100	2	3	3
PG235	Crystallography and Mineralogy	G100	2	3	3
PG253	Principles of Geophysics	G100	2	2	3
PG264	Basics of Petroleum Geology	G100	2	2	3
PG304	Field Techniques and Mapping	G100 PG211 PG232 PG325 PG347	2	2	3
PG313	Micropalaeontology and Palynology	PG211 Z100 B100	2	3	3
PG316	Chrono- and Biostratigraphy	PG313	2	3	3
PG325	Sedimentology and Depositional Systems	G100 PG211	2	3	3
PG332	Organic Geochemistry	PG313	2	2	3
PG347	Principles of Structural Geology and Rock Mechanics	G100	2	3	3
PG351	Geophysical Exploration for Oil and Gas	PG253 PG264	2	4	3
PG401	Research Project	Accomplishing 100 CRH	-	-	2
PG404	Field Course	PG304	-	3	1
PG405	Geology of Egypt and Petroleum Potentialities	PG211 PG316 PG347	2	2	3
PG426	Seismic and Sequence Stratigraphy	PG253 PG316	2	2	3

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		PG325	
PG427	Basin Analysis and Sedimentary Basins in Egypt	PG211 PG325 PG347	2 2 3
PG462	Sandstone and Carbonate Reservoirs	PG264 PG325	2 2 3
PG463	Well Logging	PG351	2 2 3

Fourth: Elective specialized courses (21 credit hours)

CODE	COURSE TITLE	PREREQUISITE COURSE(S)	Hours/WEEK		
			L	P	C
PG202	Geostatistics	G100 MS241	2	2	3
PG208	Geographic Information Systems (GIS)	G100	2	2	3
PG209	Geomorphology	G100	2	-	2
PG217	Invertebrate Palaeontology and Palaeoecology	G100	2	3	3
PG224	Fluid Inclusions in Petroleum Exploration	G100 PG325	2	2	3
PG263	Basics of Health and Safety	---	2	-	2
PG265	Principles of Hydrogeology and Hydrogeochemistry	G100	2	2	3
PG302	Geologic Hazards and Disasters	PG232 PG253 PG347	2	-	2
PG308	Subsurface Mapping	PG347	2	2	3
PG309	Special Course in Geology	Department Council	2	2	3
PG326	Marine Geology	PG211	2	-	2

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		PG313 PG325	
PG348	Photogeology and Remote Sensing	PG232 PG 347	2 3 3
PG353	Seismic Modelling	PG253	2 2 3
PG364	Structural Styles in Petroleum Geology	PG347	2 2 3
PG365	Core Analysis	PG226	2 2 3
PG367	Risk Assessment and Decision Analysis	PG264	2 - 2
PG402	Environmental Geology	PG211 PG253 PG325 PG347	2 - 2
PG425	Oil Shales and Clay Mineralogy	PG325	2 - 2
PG433	Isotope Geology	PG235 PG332	2 2 3
PG464	On-shore and Off-shore Drilling and Construction	PG351	2 2 3
PG468	Oil and Gas Provinces in The World and Middle East	PG405 PG427	2 - 2
PG469	Special Course in Petroleum Geology	Department Council	2 2 3

Fifth: Compulsory non-Geology courses (12 credit hours)

Code	Course Title	Prerequisite Course(s)	hours/week L P C
MS241	Biostatistics	M105	3 - 3
P225	Principles of Modern Physics	P105	2 2 3
C451	Chemistry for Petroleum and Petrochemicals	C105	2 3 3
E200	Plane Surveying	M100	2 2 3

Sixth: Elective non-Geology courses (9 credit hours)

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Code	Course Title	Prerequisite Course(s)	hours/week		
			L	P	C
M214	Differential Equations for non-Mathematical Students	M100 M105	2	2	3
MC300	Mathematical and statistical Packages	MC100	2	2	3
M337	Numerical Computation	MC100 M214	2	2	3
M338	Fluid Dynamics	M214	2	2	3
P352	X-ray Diffraction and its Applications	P225	2	2	3
P212	Physics of Vibrations and Waves	P105	2	2	3
C211	Organic Chemistry for non-Chemistry Students	C105	2	3	3

Symbols used for course codes:

UR University Requirement

M Mathematics

P Physics

C Chemistry

G Geology

PG Petroleum Geology

MS Statistics

B Botany

Z Zoology

MC Computer Science

E Engineering

Courses offered by the Department of Geology for the Petroleum Geology Program

CODE	COURSE TITLE	COURSE CONTENT	PREREQUISITE COURSE(S)	HOURS/WEEK		
				L	P	C
G100	Essentials of Geology	Origin of Planet Earth: Constituents of the Earth's crust (crystals, minerals, rocks) – Classification of rocks Internal Processes: Dynamics, structures and plate tectonics – Development of structural traps and ore deposits External Processes: Weathering – Erosion – Wind action – Geological work of waters (surface, groundwater, seas and oceans) – Formation of hydrocarbons and sedimentary ores – Development of stratigraphic traps Time scale: Geologic timescale and fossil records	---	2	2	3
PG202	Geostatistics	Introduction – <u>Data</u> collection - <u>Variance</u> & Covariance - Basic statistics - Univariate statistics - Detrended correspondence analysis, DCA - Principal component analysis, PCA - Multivariate (ordination) statistics (e.g.; Redundancy analysis, RDA; Canonical correspondence analysis, CCA) - Cluster analysis – Spatial aspects of data	G100 MS241	2	2	3
PG208	Geographic Information Systems (GIS)	Components of GIS Technology - The digital map - Devices and file types - GIS data and data sources - Georeferencing and modeling - Spatial vs. attribute data - Raster vs. vector data -Vector data structures - Reference systems and datums - Map features (points, lines, polygons) - Topology and spatial analysis - Symbolizing layers and classifying continuous variables - Interpolation and GIS application fields	G100	2	2	3

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PG209	Geomorphology	The scope of geomorphology - Some fundamental concepts & principles - The fluvial geomorphologic cycle - Karsting & karst topography - Arid landscapes - Influence of geologic structures upon topography - Applied geomorphology	G100	2	-	2
PG211	Principles of Stratigraphy	Principles of Stratigraphy – laws and guidelines – Stratification – Lithostratigraphy – Unconformities – Concept of sequence stratigraphy –The geologic column - Geochronology – Chronostratigraphy of Crypto- & Phanerozoic – Boundary stratigraphy - Regional Stratigraphic Correlation of Oil and Gas Fields – Inter-regional Stratigraphic Correlation (biological, chemical, magnetic and geophysical)	G100	2		3
PG217	Invertebrate Palaeontology and Palaeoecology	Invertebrate Palaeontology: Fossil and fossilization - Mode of preservation – Fossil record – Taxonomy and evolution - Description and geologic importance of major invertebrate fossil groups - Fossils in core thin sections Palaeoecology: Environmental definitions and terminology – Operational data bases – Nature of fossil record – Taphonomic processes – Taxonomic uniformitarianism – Environmental tolerance of organisms – Community palaeoecology – Applications for palaeoenvironmental reconstructions	G100	2	3	3
PG224	Fluid Inclusions in Petroleum Exploration	Organic and inorganic fluid inclusions – Fluid inclusions and their application to understand maturation of organic matter and oil migration. Using fluid inclusions to explore for oil and gas – Fluid inclusions stratigraphy – Using fluid inclusions in recognizing past and present petroleum distribution – Fluid inclusions in relation to product type and quality, filling processes, seal integrity, fluid pressure compartments, oil-water transition zone and reservoir connectivity	G100 PG325	2	2	3
PG226	Basics of Petrophysics	Rock Physics: Mechanical behaviour of dry and fluid-saturated rocks - Acoustic properties - Electric conductivity - Di-	G100 P100	2	2	3

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		electric properties - Thermal conductivity - Magnetic properties Applied Petrophysics: Fundamental concepts - Basic rock properties - Depositional systems and petrophysical rock parameters -Porosity and permeability - Formation resistivity and water saturation - Capillary pressure - Wettability - Petrophysical impact on economic uncertainty - Petrophysical data processing		
PG232	Basics of Igneous and Metamorphic Petrology	Igneous Petrology: Structures, textures and classification of igneous rocks - Petrogenesis, movement and modification of magmas - Basalts & ultramafic volcanic rocks- Rhyolites & Pyroclastic rocks - Andesites and related rocks - Ultramafic – Mafic complexes and related rocks - Granites, Granodiorites and related rocks - Alkaline igneous rocks and Carbonatites Metamorphic Petrology: Agents and conditions of metamorphism - Structures, textures and classification of metamorphic rocks - Regional metamorphism - Dynamic metamorphism	G100	2 3 3
PG235	Crystallography and Mineralogy	Basics of Crystallography: Crystals – Symmetry – Crystal forms and parameters – The main crystallographic systems – Stereographic projection. Basics of mineralogy: Atomic structures - Isomorphism and polymorphism - Continuous and discontinuous reaction series - Silicate and non-silicate minerals – Rock-forming minerals - Crystallography and mineral optics	G100	2 3 3
PG253	Principles of Geophysics	Basic physical properties of rocks, minerals and soils – Introduction to main geophysical methods (seismic reflection and refraction, resistivity, electromagnetic, gravity and magnetic) - Basic equations, field measurements and methodology and correction - Interpretation of gravity and magnetic surveys and different applications - Seismic interpretation	G100	2 2 3
PG263	Basics of Health and Safety	Basics of Health: Health risk assessment - Health impact assessment - Health and medical emergency facilities - Fitness for duty - Food and water hygiene - Thermal extremes - Industrial hygiene - Psychological and social agents	---	2 - 2

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		Basics of Safety: Safety techniques for hazards - Hazards control - Safety culture - Chemical and biological agents – Work environment - Fire safety - Scaffold safety - Noise and vibration		
PG264	Basics of Petroleum Geology	Definition – Composition and occurrences of hydrocarbons - Sedimentary versus igneous origin – Source and reservoir rocks - Hydrocarbon traps - Classification of petroleum traps and seals - Outline of geological, geophysical, geochemical and subsurface exploration for petroleum - Drilling and well logging - Outlines of petroleum engineering - The economics of exploration and development - Transportation and marketing of petroleum	G100	2 2 3
PG265	Principles of Hydrogeology and Hydrogeochemistry	Hydrogeology: Water Cycle in Nature- Groundwater resources - Water Falls & surface Water- Hydrogeology of groundwater reservoirs – Groundwater flow properties - Aquifer properties - Water wells - Well tests - Groundwater flow laws - Groundwater exploration - Groundwater quality - Groundwater pollution - Ground water management – Water and oil in petroleum exploration Hydrogeochemistry: chemical composition of natural and contaminated groundwaters; inorganic parameters in natural waters; Calculation and presentation of hydrochemical data as a basis for interpretation; Chemical reactions and processes in groundwater systems; Chemical evolution of groundwater; Aqueous geochemistry; Equilibrium and disequilibrium; Dissolution and precipitation of minerals; Carbonate system	G100	2 2 3
PG302	Geologic Hazards and Disasters	What is a geohazard – Processes and mechanisms of geologic hazards – Vulnerability and mitigation - Hazard risk assessment - Drought, Desert hazards – Mass movements and landslides – Flood, tsunami and volcanic hazards -Tectonic hazards (earthquakes) - Seismic hazards and hydrocarbon exploration – Oil rig disasters and preventing blow-outs	PG232 PG253 PG347	2 - 2
PG304	Field Techniques and Mapping	A- Definitions, terminology and field equipments – Devices of geological surveying– Field characteristics of rocks – Field relations – Types of contacts – Measuring stratigraphic sections – Sampling procedures - Geological cross-sections and mapping – Recognition of geological features – Geological reporting B- Short (1-2 days) field excursions to nearby desert areas, and	G100 PG211 PG232 PG325 PG347	2 2 3

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		longer (10 days) field excursion to a chosen Egyptian region: The trip should concentrate on field techniques, data recording and interpretation. Practical skills will be gained in mapping and logging sedimentary sequences - field recording and interpretation including structural data, current directions, construction of cross-sections, reconstruction of palaeoenvironments and field palaeontology		
PG308	Subsurface Mapping	Concepts on mapping - Various types of maps and cross sections - Constructing maps in conventional ways as well as using modern techniques including computer approach - Contouring and contouring techniques - Cross sections - Isopach maps - isolith maps - Isocore maps - Fault maps (Fault shapes and displacement distributions) - Constructing fault-plane maps - Fault-cutoff lines in computer mapping -Structure maps - Integration of geophysical data in subsurface mapping - Log correlation techniques - Juxtaposition diagrams for trap and seal analysis	PG347	2 2 3
PG309	Special Course in Geology	Geological topics chosen by the Department Council	Department Council	2 2 3
PG313	Micropalaeontology and Palynology	Micropalaeontology: Study of main faunal microfossil groups (morphology, taxonomy and stratigraphy) – Application for palaenvironmental and palaeoceanic reconstruction – Role of microfauna in oil exploration Palynology: Plant kingdom and its ancient representatives - Dinoflagellates - Pollen, spores and other acid-resistant palynomorphs - Palynofacies - Plant fossil record - Qualitative and quantitative palynology - Palynology and sedimentation – Palynostratigraphy – Kerogen and optical source rock evaluation - Palynofacies and palaeoenvironmental reconstruction – Palynology and palynofacies in oil and gas exploration	PG211 Z100 B100	2 3 3
PG316	Chrono- and Biostratigraphy	Chronostratigraphy: Geochronology - Time scales - Derivation & origin of names of fundamental chronostratigraphic units - Global Stratotype Sections and	PG313	2 3 3

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		Points (GSSPs) - Biochrons & geomagnetic polarity reversal history of the Phanerozoic- Global stratigraphic correlation - Astronomical time scale - Problems in Chronostratigraphy and updating of the GSSP and the stratigraphic guide Biostratigraphy: Biostratigraphy and biozonation – Fossils and biogeography – Geologic time keepers – Dating and correlation of fossil associations –World Phanerozoic index fossils		
PG325	Sedimentology and Depositional Systems	Sedimentology: Textures- Sedimentary structures - Mineral composition – Provenance - Classification of sedimentary rocks and their diagenesis - Role of diagenesis in petroleum exploration Depositional Systems: Depositional processes - Methods of diagnosis – Classification and types of sedimentary environments – Detailed characteristics of selected sedimentary environments (continental, transitional, marine) and their petroleum potentialities	G100 PG211	2 3 3
PG326	Marine Geology	General introduction to marine geology - Ocean morphology – Divisions of marine realm – Biogenic processes at the seafloor - Marine Fauna – Nearshore processes - Rock and biogeochemical cycles and hydrothermal circulation – Ocean circulation patterns - Sea level and climate - Gas hydrates and climate - Reading global changes within oceanic sediments - Marine sedimentation and hydrocarbons – Palaeoceanography	PG211 PG313 PG325	2 - 2
PG332	Organic Geochemistry	Basics of organic geochemistry – Production, preservation and degradation of organic matter - Fate of organic matter - Conditions of accumulation of organic rich sediments - Formation of humic material, coal and kerogen - Generation and composition of petroleum - Organic geochemistry of Sulfur - Environmental behaviour of organic compounds - Source rock quality, maturity, and potential – Rock-Eval pyrolysis – Biomarkers - Geochemical correlation: oil-to-oil, oil-to-source rock	PG313	2 2 3

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PG347	Principles of Structural Geology and Rock Mechanics	Structural Geology: Levels and types of structural studies Folds and Folding: Geometric and kinematic classification - theoretical analysis of folding - Diapirs and impact structures- Brittle failure - Joints and veins, Origin and tectonic interpretation of joints. Faults and Faulting: Geometry, characteristics of fault zone - Fault systems – Genetic classification of faults –Faulting and society. Cleavage- Foliation and lineation Structural analysis techniques Rock Mechanics: Mechanical properties of rocks – Forces and stress – Strain types –Stress - Strain diagrams - Factors influencing rock deformations	G100	2 3 3
PG348	Photogeology and Remote Sensing	Photogeology: Introduction and characteristics of aerial photographs- Stereoscopic vision - Parallax and height difference formula- Analysis of aerial photographs (Geomorphologic, lithologic and structural interpretation) - Geologic mapping using aerial photographs. Remote Sensing: Fundamental Considerations - Electromagnetic spectrum -Satellite imagery and image characteristics – Common remote sensing techniques- Digital image processing and enhancement applications of remote sensing in geology, environmental science, mineral and petroleum exploration	PG232 PG347	2 3 3
PG351	Geophysical Exploration for Oil and Gas	A- Principles, data acquisition - Data processing, interpretation approach and applications of magnetic, gravity, seismic, and electrical surveys - Using magnetic and gravity anomaly maps in primary delineation of rock types and basinal configuration - Application of magnetic and gravity survey projects, for the successful exploration of the hydrocarbon bearing structures - Recognizing common geological structures and features from seismic sections B- Summer training in, for example, petroleum companies and related laboratories	PG253 PG264	2 2 3 - 2 -
PG353	Seismic Modeling	Review of the physical basis of the seismic method - 2D and 3D seismic acquisition and processing - Time structure	PG253	2 2 3

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		Map – Depth converted structure map - Stacking and deconvolution – Migration - Reprocessing - Post-stack processing - Coherency processing - Particular characteristics and pitfalls for 2D and 3D seismic methods - Techniques for viewing seismic data - Project preparation - Building the database - Velocity data acquisition - Editing and integration of sonic and density logs - VSP - Synthetic seismograms - Structural interpretation - Stratigraphic interpretation – AVO - Seismic attributes		
PG364	Structural Styles in Petroleum Geology	Structural families and styles - Fold and fault geometry - Predicting structure from stratigraphy - Regional arches and domes - Compaction and substratal solution - Wrench faults: simple, convergent, and divergent - Fold-thrust belts - Fault-related folds - Basement-involved contraction - Vertical and rotational block uplifts - Half-graben and full graben rift systems – Diapirs - Salt sheets - Plate-tectonic habitats of structural assemblages	PG347	2 2 3
PG365	Core Analysis	Basic: Core handling - Sidewall coring – Measuring porosity and permeability – Grain density - core gamma Special: Resistivity index – Formation factor – Cation exchange capacity - Relative permeability – Capillary pressure – Wettability – Porosity and permeability under overburden pressure	PG226	2 2 3
PG367	Risk Assessment and Decision Analysis	Decision models; low probability, high-consequence events, flexibility and control; project threats and opportunities - Monte Carlo Simulation: portfolio problems; optimization; advantages and limitations - value measures; multiple objectives; risk aversion - Modeling the Investment: sensitivity analysis; modelling correlations - Basic Probability and Statistics: four fundamental rules; choosing distribution types; common misconceptions about probability; avoiding biases in estimation - Pitfalls to avoid - Guidelines for good analysis practice; team analyses; computer tools (discussion and demonstrations); mitigating risks	PG264	2 - 2

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PG401	Research Project	Research Project: The Department Council designs the research project (or projects) to be carried out by the students	Accomplishing 100 CRH	-	-	2
PG402	Environmental Geology	An overview of our planetary environment - Internal processes (general principles of plate tectonics – Earthquakes, earthquake-related hazards and their reduction – Volcanoes, volcanoes-related hazards and predictions); Surface processes (Stream and flooding – Coastal Zones and process – Mass movements – Geology and climate: (Glaciers, Deserts and desertification, Global climate trends) – Natural resources - Hazard assessment - Hazard management	PG211 PG253 PG325 PG347	2	-	2
PG404	Field Course	Field work and training (10 days field work), applying different techniques and methods using stratigraphical, sedimentological, petrological, palaeontological and structural principles. Each student should prepare an oral presentation besides a geological report which is evaluated as a practical paper	PG304	-	3	1
PG405	Geology of Egypt and Petroleum Potentialities	Outline of the geomorphologic and tectonic provinces of Egypt - Outline of the basement geology of Egypt – Details of the distribution, stratigraphy and facies of the Phanerozoic of Egypt – Onshore and offshore Phanerozoic oil and gas potentialities	PG211 PG316 PG347	2	2	3
PG425	Oil Shales and Clay Mineralogy	Oil Shales: Definition, petrology, organic matter, and origin of oil shales - Oil shale extraction and exploitation – Mining and processing – In situ conversion process - Examples of famous world oil shales - Oil shale resources and stratigraphy in Egypt – Tar sand Clay Mineralogy: Definitions -Composition of clay minerals - Classification and nomenclature of clay minerals -Structure and x-ray diffraction of clay minerals - Clay minerals in oil exploration	PG325	2	-	2
PG426	Seismic and Sequence Stratigraphy	Sequence Stratigraphic Seismic Tool: Principles of seismic stratigraphic interpretation - Resolution of seismic data - Seismic processing and display for stratigraphic interpretation - Seismic reflection termination patterns - Seismic facies and attribute patterns Principles of Sequence Stratigraphy: Concept of scale sequence	PG253 PG316 PG325	2	2	3

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		stratigraphy vs. lithostratigraphy and allostratigraphy - Sea level changes and base line - Accommodation and shoreline shifts - Orders and causes of stratigraphic cycles - Surfaces and their criteria (type-1 & type-2 sequence boundaries, transgressive surface, maximum flooding surface) - Hierarchies in sequence stratigraphy (sequences, systems tracts, parasequences). Outlines of siliciclastic and carbonate sequence stratigraphy - Examples of the sequence stratigraphy of some Egyptian oil fields		
PG427	Basin Analysis and Sedimentary Basins in Egypt	Basin Analysis: What is basin analysis – Controls on basin analysis (sediment supply, tectonics, sea level) -Types of basins (rift basins, passive margin basins, subduction-related basins - intracontinental basins) – Outlines of methods of sedimentary basin analysis – Application to petroleum play assessment Sedimentary Basins in Egypt: Distribution, origin and petroleum potentialities of the Western Desert, Nile Valley and Delta basins - Gulf of Suez and northern Red Sea basins and the Mediterranean offshore basins	PG211 PG325 PG347	2 2 3
PG433	Isotope Geology	Introduction – Atomic structure – Decay of atoms – Radioactive decay – Absolute measuring of geological time – Application of isotope geology in rocks, water, sulphide minerals and oil	PG235 PG332	2 2 3
PG462	Sandstone and Carbonate Reservoirs	Sandstone Reservoirs: Geometry of sandstone bodies and their characteristic log patterns - Prediction of reservoir size, shape, and trend – Integrated interpretation of a sandstone reservoir in terms of its geometry (3D) - Pinched-out, palaeoflow and lateral distribution across the sedimentary basin - Analysis of sandstone depositional systems - Petrography and diagenesis of the different sandstone types - Sedimentary controls on cementation - Porosity and permeability – Sandstone reservoir quality Carbonate Reservoirs: The carbonate factory in space and time - Carbonate platform type and development – Distribution of the carbonate grains and fossils in the different sedimentary environments - Carbonate facies models – Petrography and diagenesis of carbonates - Models of dolomitization - The carbonate–evaporite system - Characteristics of carbonate pore	PG264 PG325	2 2 3

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		systems - Fate of early formed porosity - Carbonate reservoir modeling - Exploration strategies in carbonate terrains		
PG463	Well Logging	I) Well drilling, Well bore environment, porosity, permeability and formation factor, borehole resistivity, nuclear and sonic logging theories, Logging practice II) Open-hole logging techniques: Caliper logs, self potential, unfocused and focused resistivity logs, microresistivity, dipmeter and Induction logs, nuclear logs (GR, density and neutron logs), sonic logs, borehole televiewer, gravity and magnetic logs. III) Data processing and interpretation methods : a) porosity and petrofacies; b) permeability; c) lithology and texture; d) sedimentary structural features and sequences; e) sediment diagenesis; f) fracture detection and g) fluid saturation	PG351	2 2 3
PG464	On-shore and Off-shore Drilling and Construction	Basic drilling technology - Produced formation water - Directional drilling – Completing the well – The dry well – Drilling fluid – Rig and cementing equipments -Offshore (oil) platforms - Oil and gas pipelines – Subsea oil and gas production – well control operations -Hole problems	PG351	2 2 3
PG468	Oil and Gas Provinces in The World and Middle East	The major world 27 regions of oil and gas fields - Tectonic control of the world oil and gas fields - World oil and gas production and consumption - Future of the world oil and gas - Characteristics of the main Middle East dominant oil-producing reservoirs (Jurassic Platform Carbonates - Zagros Fold Belt - Cretaceous Sandstone Reservoirs - Cretaceous Rudistid Reefs - Paleozoic of Arabia and Oman)	PG405 PG427	2 - 2
PG469	Special Course in Petroleum Geology	Geological topics chosen by the Department Council	Department Council	2 2 3

Courses offered by the Department of Mathematics for the Petroleum Geology Program

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CODE	COURSE TITLE	COURSE CONTENT	PREREQUI SITE COURSE(S)	HOURS/WEEK		
				L	P	C
M100	General Mathematics (1)	Calculus: Functions of one variable - Limits and Continuity - Derivatives - Applications of Differentiation - Taylor and McLaurin series, Indefinite and definite integrals. Algebra: Mathematical induction - Series - Partial fractions - Matrices and systems of linear equations - Approximate solutions of non-linear equations	-	2	2	3
M105	General Mathematics (2)	Calculus: Techniques of integration - Definite integrals and their properties– fundamental theorem for differential on integral improper integral – numerical integration - Applications of definite integrals. Geometry: Coordinate systems in the plane - Straight lines and circles in general forms - Conic sections - Geometric transformations in the plane - Coordinate systems in the space - The plane and the straight lines in the space and surfaces of revolution of second order	M100	2	2	3
M214	Differential Equations for non-Mathematical Students	Formation of ordinary differential equations (ODE's) - ODE's of first order and first Degree – ODE's of first order and higher degrees – Applications – Numerical solution of ODE's of the first order and the first degree – Linear ODE's of higher orders with constant coefficients - Linear ODE's of higher Orders with variable coefficients (Euler and Lagrange methods)	M105	2	2	3
M337	Numerical Computation	Numerical solution of linear systems of equations, Numerical interpolation, least squares, differentiation and integration . Numerical methods for nonlinear equations, ordinary differential equations and partial differential equations	MC100 M214	2	2	3
M338	Fluid Dynamics	The basics concepts and definition – Outlin of fluid motion with friction – Derivation of the equations of motions of compressible and incompressible viscous fluid – Dimensionless variables - General properties of Navier-Stocks equations – Exact solution of NSEs – Mechanics of	M214	2	2	3

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		flow through porous media – Heat transfer in porous media – Introduction to turbulent flow - Examples treated in the computer labs		
MC100	Computer	Fundamentals of programming and computer languages - Algorithm and Flowcharts - Elements of language under case - Basic instructions in language under case - Control instructions - Arrays and dimension statement – Subprograms - Some applications	-	1 2 2
MC300	Mathematical and Statistical Packages	Using the mathematical and statistical packages (Matlab, Mathematica, Min Tab, SPSS, ...etc) for matrices – Functions – Graphics – Data Fitting – Applied statistics	MC100	2 2 3
MS241	Biostatistics	Some basic probability concepts – Some important sampling distributions – Estimation Hypothesis testing – Analysis of variance - Regression and correlation – Multiple regression and correlation – Goodness of fit test	M105	3 - 3

Courses offered by the Department of Physics for the Petroleum Geology Program

CODE	COURSE TITLE	COURSE CONTENT	PREREQUISITE COURSE(S)	HOURS/WEEK		
				L	P	C
P100	Physics (1)	Physical quantities - units and dimensional analysis – Vectors - The laws of motion in one- and two- dimensions and its applications - Work and energy - Heat and heat conduction - The kinetic theory of gases - Specific heat of gases - Liquefaction of gases - First law of thermodynamics	-	2	3	3
P105	Physics (2)	The nature and propagation of light - Reflection and refraction at plane surface - Reflection and refraction of spherical waves - Lenses, eye's structure and camera - Microscopes and Telescopes - Coulomb law and electrostatic fields - Electrostatic potential- Capacitance and dielectrics- Electric current and DC circuits - Magnetic field and magnetic force -Electromagnetic induction	P100	2	3	3

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P212	Physics of Vibrations and Waves	The simple harmonic motion - The simple harmonic motion in mechanical and electrical systems - The damped oscillation in mechanical and electrical systems - The forced damped oscillation in mechanical and electrical systems - Summation of the simple harmonic motions in two dimensions - Types of the waves, reflection and transmission of the waves - The ultra-sonic waves - Doppler's effect	P105	2	2	3
P225	Principles of Modern Physics	Nature and characteristics of modern physics - Black-body radiation, Planck's law of radiation, photo-electric effect - The Hydrogen atom, Rutherford model of the atom - Bohr's theory , Sommerfeld's theory of elliptic orbits - Compton effect - Dual nature of matter, De Broglie waves, the uncertainty principle - Galilean and Lorentz transformations - Michelson-Morley experiment, Doppler effect - Special theory of relativity	P105	2	2	3
P352	X-ray Diffraction and its Applications	X-rays, Production & Detection – Review of crystalline Structure - Basic idea of diffraction, X-ray cameras - Reciprocal space - Models for diffracted intensity - Small-angle scattering of X-rays - Electron diffraction	P225	2	2	3

Courses offered by the Department of Chemistry for the Petroleum Geology Program

CODE	COURSE TITLE	COURSE CONTENT	PREREQUISITE COURSE(S)	HOURS/WEEK		
				L	P	C
C100	Chemistry (1)	Atomic Spectra – Electron orbital and quantum numbers – Quantum energy Levels in atoms – Basic concepts of bonding Electronegativities – Lewis structure – The octet rule – Dipolemoment – Resonance - Hybridization in Molecules – Geometrics of molecules – Orbital configuration for diatomic molecules - State of matter – Introduction in Surface and Colloids Chemistry – Electrolytic cell	-	2	3	3

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		– Electrochemical cells – Potential of electrode (Selected practical experimental)		
C105	Chemistry (2)	Chemical Equilibrium – Ionic equilibrium – Basic of qualitative analysis – Solution chemistry - Bonding in organic compounds – Hybridization in carbon compounds – Physical properties of organic compounds – Nomenclature, synthesis and chemical reactions of alkanes, alkenes and alkynes (Selected practical experimentals)	C105	2 3 3
C211	Organic Chemistry for non-Chemistry Students	Chemistry of aliphatic compounds – Chemistry of selected aromatic compounds (selected practical experimentals)	C105	2 3 3
C451	Chemistry for Petroleum and Petrochemicals	Crude oils – Evaluation of crude oils - Refining of petroleum – Petrochemicals derived from petroleum fractions (Selected practical experimentals)	C105	2 3 3

Courses offered by the Department of Zoology for the Petroleum Geology Program

CODE	COURSE TITLE	COURSE CONTENT	PREREQUISITE COURSE(S)	HOURS/WEEK		
				L	P	C
Z100	General Zoology	Protoplasm - Organization and function of animal cell - Study of the animal tissues - Life functions - Introduction to early development of animals - Characters and classification of the major animal phyla	-	2	3	3

Courses offered by the Department of Botany for the Petroleum Geology Program

CODE	COURSE TITLE	COURSE CONTENT	PREREQUISITE COURSE(S)	HOURS/WEEK		
				L	P	C
B100	General Botany	Cell structure – plant tissues – Anatomy of primary plant organs – Classification of plant kingdom – General aspects of virus, bacteria, algae and fungi – Flower structure, inflorescences and fruits – Selected families of flowering plants	-	2	3	3

Courses offered by the Faculty of Engineering for the Petroleum Geology Program

CODE	COURSE TITLE	COURSE CONTENT	PREREQUISITE COURSE(S)	HOURS/WEEK		
				L	P	C
E200	Plane Surveying	Major topics in surveying engineering technology including field instrumentation, boundary surveying, topographic surveying, computer-aided drafting, route surveying, global positioning system and geodesy, map projections, photogrammetry, remote sensing and geographic information systems	M100	2	2	3