REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE

MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH

The Educational committee of the National Domain of the Sciences of the Earth and the Universe

Domain : Sciences of the Earth and the Universe

Sector : Geology

Specialty: Geology Fundamental

OFFERS TRAINING LICENSE

Academic

LMD

Geology Fundamental

Annex of the decree n° of
fixing the program of the teachings of the common base license
domain "Science of the Earth and of the Universe"
of "Geology"

Semester 1

Teaching units	Entitled of contents	Credits	Coefficients	hourly Weekly			VHS (15 weeks)	Other*	evaluation Mode	
				Cours	TD	TP			CC*	Review
U E Basic Code : UEF 111 Credits : 8 Coefficients : 4	**Geology 1**	**8**	**4**	**3: 00**	**-**	**3: 00**	**90h00**	**67h30**	**40%**	**60%**
U E Basic Code : UEF 112 Credits : 11 Coefficients : 6	**Mathematics 1**	**4**	**2**	**1h30**	**1h30**	**-**	**45h00**	**45h00**	**40%**	**60%**
	Physics 1	**3**	**2**	**1h30**	**1h30**	**-**	**45h00**	**45h00**	**40%**	**60%**
	Chemistry 1	**4**	**2**	**1h30**	**1h30**	**-**	**45h00**	**45h00**	**40%**	**60%**
U E Methodology Code : EMU 11 Credits : 8 Coefficients : 4	**Biology 1**	**4**	**2**	**1.30**	**-**	**1.30**	**45h00**	**45h00**	**40%**	**60%**
	Geomorphology	**4**	**2**	**1.30**	**-**	**1.30**	**45h00**	**45h00**	**40%**	**60%**
U E Cross Code : UET 11 Credits : 3 Coefficients : 3	**Computer 1**	**2**	**2**	**1.30**	**-**	**1.30**	**45h00**	**45H00**	**40%**	**60%**
	Techniques of expression 1	**1**	**1**	**-**	**1h30**	**-**	**22: 30**	**22: 30**	**100%**	**-**
Total Semester 1		**30**	**17**	**12: 00**	**6: 00 am**	**7: 30 am**	**382h30**	**360h00**	**-**	**-**

.Other* = additional Work in consultation semi-annually, CC* = continuous Control

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Semester 2

Teaching units	Entitled of contents	Credits	Coefficients	hourly Weekly			VHS (15 weeks)	Other*	evaluation Mode	
				Cours	TD	TP			CC*	Review
core Code : UEF 121 Credits : 8 Coefficients : 4	Geology 2	8	4	3: 00	-	3: 00	90h00	67h30	40%	60%
EU Fundamental Code : UEF 122 Credits : 11 Coefficients : 6	Mathematics 2	4	2	1h30	1h30	-	45h00	45h00	40%	60%
	Physical 2	3	2	1h30	1h30	-	45h00	45h00	40%	60%
	Chemistry 2	4	2	1h30	1h30	-	45h00	45h00	40%	60%
EU Methodology Code : EMU 12 Credits : 8 Coefficients : 4	Biology 2	4	2	1.30	-	1.30	45h00	45h00	40%	60%
	introduction to the geological map	4	2	1.30	-	1.30	45h00	45h00	40%	60%
EU Cross Code : UET 12 Credits : 3 Coefficients : 3	Computer 2	2	2	1.30	-	1.30	45h00	45h00	40%	60%
	Techniques of expression 2	1	1	-	1h30	-	22: 30	22: 30	100%	-
Total Semester 2		30	17	12: 00	6: 00 am	7: 30 am	382h30	360h30	-	-

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Semester 3

Unit teaching	Materials		Credits	Coefficient	Volume weekly schedule			VHS (15 weeks)	Other*	evaluation Mode	
	Code	Entitled			Cours	TD	TP			Control Continuous	Review
core UEF 31 Credits : 12 Coefficients : 6	F311	Crystallography	6	3	1h30	3h		67h30	67h30	40%	60%
	F312	Mineralogy	6	3	1h30		3: 00	67h30	67h30	40%	60% of
EU Fundamental UEF 32 Credits : 6 Coefficients : 3	F321	Tectonics 1	6	3	1h30		3h 00	67h30	67h30	40%	60%
EMU 31 Credits : 9 Coefficients : 5	M311	Stratigraphy	4	2	1h30	1h30		45h00	45h00	40%	60%
	M312	Paleontology	5	3	1.30		2.30	60h00	60h00	40%	60%
EU Cross Code : UET31 Credits : 3 Coefficients : 3	T311	database Management.	2	2	1h30		1h30	45h00	45h00	40%	60%
	T312	English-Language 1	1.	1		1h30		22: 30	22: 30	100%	
Total semester 3			30	17	9	4: 30 am,	11: 30 am	375h00	375h00		

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Semester 4

Unit teaching	Materials		Credits	Coefficient	Volume weekly schedule			VHS (15 weeks)	Other*	evaluation Mode	
	Code	Entitled			Cours	TD	TP			Control Continuous	Review
EU Fundamental Code : UEF41 Credits : 9 Coefficients : 5	F411	Petrology of igneous	5	3	1h30		3: 00	67h30	67h30	40%	60%
	F412	Petrology of sedimentary rocks	5	3	1h30		3: 00	67h30	67h30	40%	60%
EU Fundamental Code : UEF42 Credits : 10 Coefficients : 6	F421	Tectonic 2	5	3	1h30		3: 00	67h30	67h30	40%	60%
	F422	Micropaleontology	5	3	1h30		3: 00	67h30	67h30	40%	60%
EU Methodological Code : UEM41 Credits : 9 Coefficients : 5	M411	Geochemistry	4	2	1.30		2.30	60h00	60h00	40%	60%
	M412	Internship of	4	2				45h00	45h00	100%	
EU-Discovery Code : UED41 Credits : 2 Coefficients : 2	4q11	Geophysics	2	2	1h30	1h30		45h00	45h00	40%	60%
Total semester 4			30	18	9: 00 am	1h30	14: 30	420h	420h00		

Other* = additional Work in consultation semi-annual ; CC = Control continuous

MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH

COMMITTEE NATIONAL PEDAGOGICAL

Field

of Earth Sciences and the Universe

Die

Geology

Licensed Third Year : L3

L3 - Semester 5 :

Unit teaching	Materials		Credits	Coefficients	hourly weekly			VHS (15 s)	Other	evaluation Mode	
	Code	Entitled			Cours	TD	TP			Control Continuous	Review
EU Fundamental Code : UEF51 Credits : 12 Coefficient : 7	F511	Petrology of metamorphic rocks	5	3	1h30		3h	67h30	67h30	x	x
	F512	sedimentology	7	4	3h		3h	90h	90h	x	x
EU Fundamental Code : UEF52 Credits : 9 Coefficient : 5	F521	Geology history	4	2	3h			45h	45h	x	x
	F522	regional Geology	5	3	1h30		3h	67h30	67h30	x	x
EU Methodological Code : UEM51 Credits : 8 Coefficient : 4	M531	Geophysics	4	2	1h30	1h30		45h	45h	x	x
	M532	Geostatistical	4	2	1h30	1h30		45h	45h	x	x
EU Cross Code : UET51 Credits : 1 Coefficient : 1	T511	technical English	1	1	1.30			22: 30	22: 30	x	
Total semester 5			30	17	13: 30	, 3h,	9h	382h30	382h30		

L3 - Semester 6 : Geology Fundamental

Unit teaching	Materials		Credits	Coefficients	hourly weekly			VHS (15 weeks)	Other	evaluation Mode	
	Code	Entitled			Cours	TD	TP			Control Continuous	Review
EU Fundamental Code : UEF61 Credits : 8 Coefficient : 4	F611	Sedimentology	4	2	1h30		1h30	45h	45h	x	x
	F612	Paleontology	4	2	1h30		1h30	45h	45h	x	x
EU Fundamental Code : UEF62 Credits : 8 Coefficient : 4	F621	Microtectonique	4	2	1h30	1h30		45h	45h	x	x
	F622	Petrology/ geochemistry	4	2	1h30	1h30		45h	45h	x	x
EU Methodological Code : UEM61 Credits:12 Coefficient:6	M611	Geology of Algeria	8	4	3h		3h	90h	90h	x	x
	M612	Internship	4	2			3h	45h	45h	x	
EU Cross Code : UET61 Credits:2 Coefficient:2	T611	Ethics and professional conduct	1	1	1.30			22: 30	22: 30		x
	T612	project Management	1	1	1.30			22: 30	22: 30		x
Total semester 6			30	16	12: 00	, 3h,	9h	360h	360h		

Programmes detailed in the common core

STU

Semester 1 Semester 5

Semester : 1

Teaching unit : Fundamental

Subject : Geology 1

Credits : 10

Coefficient : 4

Teaching objectives:

The aim of teaching geology is to help students to understand the major natural processes that affect the Earth. It also aims to show that the Earth is an active planet which is always changing.

Recommended prior knowledge:

Geological concepts acquired in secondary school.

Course content:

Chapter 1: The Earth in the Universe

1.1 Introduction: objects of geology
1.2 Structure of the universe and birth of the solar system
1.3 The Earth and the planets of the solar system.

Chapter 2: Internal geodynamics

2.1 Structure of the Earth and the concept of the geoid
2.2 Current distribution of land and sea
2.3 The Earth's magnetic field
2.4 Continental drift and plate tectonics
2.5 Earthquakes
2.6 Volcanoes

Chapter3: Tectonics

3.1. Brittle deformation: faults
3.2. Soft tectonics: folds
3.3 Overlapping and nappes
3.4. The formation of mountain ranges

Practical works:

Cartography:

- Topographic maps: Presentation of a topographic map, concept of scale, coordinate networks, orientation, definition and characteristics of contour lines.....
- Creating topographic profiles.

Assessment method: Exam(s), Continuous assessment during practical work.

Références

1. Charles Pomerol, Yves Lagabrielle, Maurice Renard, Stéphane Guillot. Eléments de Géologie. Dunod. 14ème édition, 2011. 944 pages.
2. Jean Dercourt , Jacques Paquet, Pierre Thomas, Cyril Langlois. Géologie : objet, méthodes et modèles. Dunod. 12ème édition, 2006, 534 pages.
3. Pierre Peycru, Jean-Michel Dupin, Jean-François Fogelgesang, Didier Grandperrin, Collectif. Géologie : Tout-en-un, 1e et 2e années BCPST. Dunod. 2008. 641 pages.
4. Alain Foucault, Jean-François Raoult. Dictionnaire de géologie. Dunod. 7ème édition, 2010. 416 pages.

Semester : 1
Unit : UEF112
Subject: Mathematics 1
Coeff. 2 Credit. 4
Course : 01: 30 TD : 01: 30

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Objectives of education
The objective of this module is to teach students the methods of processing of data to present, analyze, and use comments for the resolution of problems. This material contains the Analysis part which deals with the sets, suites numeric ; series digital ; the actual functions...

Prior knowledge recommended
Mathematics bachelor of Science, of the Nature and exact Sciences.

Content of the subject :
Course :

Analysis :

1 - Sets, Relations, Applications
- Sets of real numbers (defining axiomatic)
- Sets of complex numbers.

2 - Polynomials and rational fractions.

3 - numerical sequences : Definition, convergence

4 - Series digital :
- Definition, basic Properties.
- Series digital terms positive : convergence criteria.
- Series, digital-to-any

5 - real Functions of a real variable
- Limits, Continuity – Dérivabilité
- Integral Riemann : Definition, calculation of primitive
- Differential Equations 1^{er} order
- Differential Equations of the 2^{-th} order coefficient constant.

Tutorials :
Resolution of a series of exercises relating to each course

Mode of assessment :
Review + control Continuous

Bibliographic references :
- N. Piskounov. Differential and integral calculus. Volume 1. Editions Mir. 510 pages.
- C. Deschamps et al., Mathematics all-in-one MPSI. Dunod, 3^{th} edition, 2013, 1088 pages.
- B. Belaidi. Mathematical analysis. OPU, 2013, 312 pages.

Semester : 1
Unit : UEF112
Field: Physics 1
Course : 01: 30 TD : 01: 30
Coeff. 2 Credit. 3

Objectives of education
The purpose of the module is the acquisition of theoretical knowledge and experimental basic mechanisms in Physics.

Prior knowledge recommended
Concepts of Physics acquired in high School**.**

Content of the subject :
Course :

Chapter 1 : Introduction
- Operations on vectors : scalar product and vector
- Dimensional analysis, physical quantities and their units of measurement.
- Uncertainties and calculation errors

Chapter 2 : Mechanics of the material point

2.1 - Kinematics
- Vector position, velocity, and Acceleration
- Study of a few specific movements: mouvements straight and in the plan

2.2 - Dynamic
- Fundamental laws : Law of Newton : Mass, force and weight

2.3 - Work and energy
- Work and power,
- The principle of the conservation of energy
- Force deriving from a potential

2.4 - Gravitation
- Kepler's laws
- Fields and gravitational energy and the value of " g "
- Planetary motion

Chapter 3 : Optical

3.1 - geometrical Optics
- General
- Elements of geometrical optics
- Instruments of geometrical optics

3.2 - Optical wave
- General
- Polarization

- Interference
- Diffraction.

Chapter 4 : sound Waves

- Sound waves (generation, propagation and detection)
- Ultrasonic waves
- Applications (hearing, ultrasound,..)

WORK PRACTICES :

- Physical measurements and calculations of errors
- Free fall
- Rectilinear motion
- Curvilinear motion
- Dynamic movement in a straight line horizontal plane and inclined
- Core strengths
- Study of friction
- Pendulum torsion
- Reflection – plane mirror
- Creedmoor plan and blades parallel sides
- Prism
- Goniometer
- Focométrie
- Microscope.
- Diffraction

Mode of assessment :
Continuous + Review

References :

-E. J. Finn, M. Alonso, general Physics. - Volume 1, Mechanics and thermodynamics, 2nd edition, Dunod, 2001, 538 pages.

-N. E. Hakiki, general Physics. OPU, 2009, 359 pages.

-Courses and exercises corrected online, Faculty of Physics, USTHB, Algiers, algeria : http://www.usthb.dz/fphy/spip.php?rubrique56

Semester : 1
Unit : UEF112
Field: Chemistry 1
Course : 01: 30 TD : 01: 30
Coeff. 2 Credit. 4

Objectives of education
This module allows the student to the acquisition of basic concepts in chemistry, including the structure and composition of the material.

Prior knowledge recommended
Concepts of Chemistry acquired in high School**.**

Content of the subject :
Course :

I. 1. General:

- Atom, nucleus, isotope,

- Stability and cohesion of the nucleus, binding energy per nucleon,...

I. 2. Radioactivity:

- Definition

- Natural radioactivity : the main types of radiation

- Artificial radioactivity

- Law of radioactive decay

- Different types of nuclear reaction

I. 3. The electronic configuration of atoms :

- The Introduction of quantum numbers

- Principles governing the electronic structure of an atom :

- Rule energy, rule, Pauli exclusion and ...

I. 4. The periodic table :

- Group (Column), Period (row)

- Evolution of physical properties within the periodic table : atomic radius, the energy of ionization, electron affinity....

I. 5. Chemical bonds :

- Introduction

- Representation of the chemical bond : Diagram of Lewis

- Different types of strong bonds (covalent, ionic bond, link

Metal.

- Geometry of molecules

1.6. Reactions in aqueous solutions

WORK PRACTICES

1: fundamentals of chemistry (atoms, molecules, atoms, grams, moles, calculation of concentrations)
2: The electron and the periodic table of the elements
3: chemical bonds and structures
4 : reactions in aqueous solutions

Mode of assessment :
Continuous + Review

Referencesto the relevant literature.

-R. Ouahes, R. Devallez, general Chemistry. OPU, 1150 pages.

-A. Addou. Chemistry core curriculum. OPU, 214 pages.

-N. Boulekras. Atomistic (compendium of corrected exercises). OPU, 245 pages.

Semester 1:
Unit 2 : UEM11
Material : Biology 1
Course : 1h 30 TP : 1h 30
Coeff. 2 Credit. 4

Objectives of education

Know the major groups of living organisms plans : general Architecture, Features, and Systematic and Evolution. Particular emphasis will be given to the updating of the classification and groups zoos.

Content of the subject :

Course :

PART I. SYSTEMATIC

Chapter 1. Presentation of the animal kingdom

-Bases of the classification
-Zoological Nomenclature
-Evolution and phylogeny
-Numerical Importance of the Animal kingdom

Chapter 2. General information on the Sub-kingdom Protozoa

Chapter 3. Sub-kingdom Metazoa

-Branching Sponge
-Phylum Cnidaria
-Phylum Annelids
-Phylum Mollusca
-Phylum Arthropoda
-Spur of the Echinodermes
-Phylum of the Chordates

Chapter 4. Class of Vertebrates

General and Systematic General

Work practices :

TP n°1 : the Study of some species types of Protozoa
Trypanosomarhodesiense, Leishmania major, Leishmania infantum, Trypanosomagambiense, Entamoebahistolytica, Parameciumspp
TP n°2 : Study of some species types of Arthropods :Crustaceans (Shrimp, royal, Squille, morphology and appendices biramés), Chélicérates (Scorpio), Insects (Locusts, Bee).
TP n°3 : Study of some species types of Echinodermes : Echinides (sea Urchin), Astérides (sea Star).

Mode of assessment :
Review

Semester 1:

Unit: UEM11

Subject: Geomorphology

Lecture: 1.5 hours Practical work: 1.5 hours

Coefficient: 2 Credits, 4

Course Objectives

Geomorphology is the study of landforms and the processes that shape them, generally through erosion, transport, and deposition. This introductory course to geomorphology examines landforms at different spatial scales and the processes that shape and modify the environment.

Course Content:

Course:

• **Basic definitions:** Topography, landforms, geomorphology, orders of magnitude of the Earth's crustal relief, etc.

• **Brief history of geomorphology:** catastrophism (Georges Cuvier), uniformitarianism, evolutionists, the Davis model, the W. Penck model, the Eduard Brückner model, and the Albrecht Penck model.

• **Tectonic forms** (plate tectonics, types of plate movement, plate convergence), orogeny, deformation (folding, faulting, fractures, and joints), jointing, domes and basins, Horst and Graben, rift valleys, major mountain ranges of the world (Rocky Mountains, Appalachians, Andes, European Alps, Himalayan range)

• **Volcanic landforms:** intrusive igneous rocks (batholiths, plutons, sills, laccoliths, Monadnock dikes), extrusive igneous rocks (cinder cones, shield volcanoes, stratovolcanoes, calderas, lava domes, volcanic hotspots, volcanic necks, flood basalts)

• **Karst landforms:**

- the karst environment (karst and pseudokarst),

- karst and pseudokarst processes: solution and precipitation (limestone, dolomites, evaporites and silicate rocks), slow mass movements and collapses, fluvial and hydrothermal processes,

- surface and internal karst forms (caves, sinkholes, ouvalas, limestone pavements or karst lapiaz, polje, karst springs, karst towers, etc.)

• **Fluvial Systems and Forms:** Fluvial Systems and Processes

Longitudinal Profile and Watersheds, Dams and Lakes. Mountain streams, braided, meandering, or winding rivers, entrenched meanders, branching rivers, straight rivers, floodplains, fluvial terraces, waterfalls, alluvial deltas, etc.

• **Glacial forms:** Alpine ice and glaciers, ice fields and ice caps, Piedmont glaciers, erosion processes and forms (abrasion, snaking, fluvio-glacial and glacio-karst erosion, roches moutonnées, glacial cirques, U-shaped glacial valleys, hanging valleys, arêtes, horns and passes, locks and umbilicus, etc.);

accumulation forms: glacial deposits (lateral, medial, and terminal moraines, drumlins, erratics, etc.); fluvio-glacial deposits (sandur, eskers, kames, terraces).) and glaciolacustrine deposits.

• **Aeolian landforms:** Aeolian environments, landforms shaped by wind erosion (Reg, Hamada, Yardan, etc.), landforms shaped by aeolian deposits (dunes, loess, riparian dunes, and sandbanks, etc.)

• **Coastal landforms:** coastal environments (swells, waves, currents, and tides), coastal erosional landforms (cliffs, abrasion platforms, etc.), coastal deposit forms (beaches, beach rock, beach crescents, spits, tombolos, barrier islands, etc.), estuaries, deltas, and mangroves.

Practical work

The practical work in Geomorphology focuses primarily on the analysis of topographic maps, aerial photographs, satellite images, and digital terrain models.

Assessment method:

Exam + continuous assessment

Bibliographic References:

-Derruau, M. 1994 : *Les formes du relief terrestre*. Masson, Paris, 115 p.

-Hugget R.J. 2003 : *Fundamentals of Geomorphology*. Routledge Fundamentals of Physical Geography, Routledge, London, 386

-Tricart, J. 1977 : *Précis de Géomorphologie*. Sedes, Paris, 345 p.

-Coque, R. 1977 : *Géomorphologie*. Coll. U, A. Colin, Paris, 430 p.

-Malavoi, J.-R & Bravard J.-P., 2010 : *Éléments d'hydromorphologie fluviale*. Édité par l'Onema (Office national de l'eau et des milieux aquatiques), 224 p.

Semester 1:
Unit : UET11
Subject : Computer Science
Course : 1h 30 TP : 1h 30
Coeff. 2 Credit. 2

Objectives of education
The purpose of the module is the acquisition of knowledge about the computer hardware and operating systems.

Prior knowledge recommended
No.

Content of the subject :
Course :

- Hardware
  - ✓ Introduction to the concept of computer
  - ✓ Presentation of the computer
  - ✓ Types of computers
  - ✓ Constitution of the computer
- Operating systems
  - ✓ Windows
  - ✓ Linux

Mode of assessment :
Review+ control continuous

Semester 1:
Unit : UET11
Material expression Techniques 1
TD : 1h 30
Coeff. 1 Credit. 1

Objectives of education
This education aims to strengthen the ability of oral and written expression of students in foreign languages, particularly in French which is the language of instruction is most widespread in the sciences in the institutions of higher education algerians.

Prior knowledge recommended
No.

Content of the subject :
Course/TD

1-Presentation of the structure of the University, presentation of the LMD system, presentation of the program of TCE, with the objectives clearly explained to the student, supported by examples for a projection in the active life (within 3 years). **-Questionnaire-back to school** (to be completed during the session) that will allow the teacher to have a first evaluation of the level of expectation and aspiration of students.

2 - the use of The French language dictionary
About an input : pronunciation, part of speech, etymology, and different sense of the word with phrases-example / concepts of the article, word-mark, input, ...

3-taking notes (from the written or oral) :
The process of note-taking, different situations, and in the condition of taking notes, the equipment needed. The tools notes : abbreviations/ signs, symbols, abbreviations, / dashes, arrows, braces/ deletions of words / contractions of words / markers relations / replacements : nominalization, hyperonymes, synonyms ...

4 - Fiscal note-taking on the basis of short sentences and small texts written
or read excerpts of the newspaper articles, texts. and **Reminders of the rules of spelling female names** (ending in " -i ", " -s ", " -u ", " -or ", "tee-and -ity" and the exceptions.

5 - signs of the French language (accents, cedilla, diaeresis)
From cutting into syllables graphics, whether to place (or not) accents (acute and severe in the middle of words/ exceptions /end of the word grave accent followed by an " s " silent or sound / the different word families to circumflex/ the cedilla / the umlaut.

6- The choice of the right word: the use of the word specific to have an idea. Series of exercises
a- **verbs " passe-partout "** (do - say - you - give - view – set- ...) to be replaced by a verb precise, which correspond exactly to the action.

7- The choice of the right word(on), series of exercises
b- **The verb " confused "** (in the literal and figurative sense), such as : know / bring - bring - bring - bring - bring, ... / lend (loan) – borrow (loan), ...

8 - The **Confusion homonymic**

From exercises, review a maximum of a word is liable to be confused in writing, recalling the nature of the word, and the tip will be the use of different words in the same series with the same name. This-is-those / these-his-it-is-known - know / that-the-seven - set / little-can-can / almost-ready - pre / their-their - time-lure/ what(s)- it(s), quelle(s), ...

9 - verbs setpoint

It is found that many students do not meet the guidelines data into the topics of assessment, not necessarily because they don't know the answer, but because they simply do not understand what is required of them, what is expected of them and they do not analyze enough of the question asked. In the statements of evaluation, verbs, set correspond to different activities : observation, tracking, selection, classification, replacement, explanation, presentation, ...

10- The Letter administrative and envelope

On the basis of a model of the layout of the various fields that make up an administrative letter, submit the content of each field: sender, date/lieu, recipient, reference, object/ form of attack, the development of the subject, salutation/ layout of the elements on envelopes to be mailed or filed a secretariat.

11 -L**was writing a report** (access, manipulation, TP, mission, meeting, ...) : introduction / objective : to retain the essential and order ideas /conclusion / time employees / difference between report and report.

-Summary: the principle of a summary / structure of a summary / number of words to follow.

12 - The ordinal numbers and the cardinal and roman numerals.

Mode of assessment :

Review and control continuous

References

(Books and handouts, websites, etc.):

Semester : 1
Teaching unit : Fundamental
Subject : Geology 1
Credits : 10
Coefficient : 4

Teaching objectives:

The aim of teaching geology is to help students to understand the major natural processes that affect the Earth. It also aims to show that the Earth is an active planet which is always changing.

Recommended prior knowledge:
Geology concepts taught in Geology 1 (semester 1).

Course content :

Chapter 1: Materials of the Earth's crust
- 1.1 Minerals
  - 1.1.1 Basics of crystallography and crystal systems
  - 1.1.2 Mineralogy: definition of mineral and classification
- 1.2 Rocks: Definitions and main groups of rocks.
  - 1.2.2 Magmatic rocks
  - 1.2.3 Sedimentary rocks.
  - 1.2.4 Metamorphic rocks
  - 1.2.5 The rock cycle

Chapter 2: External geodynamics
- 2.1. Role of water: runoff, ice.
- 2.2. The role of wind
- 2.3 Erosion and isostasy.

Chapter 3: Historical geology
- 2.1. Principles of stratigraphy
- 2.2. Discordances and stratigraphic gaps
- 2.3. Time in geology: relative and absolute dating
- 2.4. The stratigraphic scale

Chapter 4: The main structural features of Algeria:
- 4.1. North-south section of Algeria
- 4.2 Summary of structural evolution

Practical work
- Petrography, mineralogy and palaeontology:
  - Macroscopic determination of a few minerals: quartz, calcite, feldspar, amphibole, pyroxene, biotite, muscovite, pyrite, galena, graphite.
  - The main groups of rocks: magmatic rocks; sedimentary rocks; metamorphic rocks.
- Fossils: Observation and description of some groups;

Références

1. Charles Pomerol, Yves Lagabrielle, Maurice Renard, Stéphane Guillot. Eléments de Géologie. Dunod. 14ème édition, 2011. 944 pages.
2. http://www.elements-geologie.com/
3. Jean Dercourt , Jacques Paquet, Pierre Thomas, Cyril Langlois. Géologie : objet, méthodes et modèles. Dunod. 12ème édition, 2006, 534 pages.
4. Pierre Peycru, Jean-Michel Dupin, Jean-François Fogelgesang, Didier Grandperrin, Collectif. Géologie : Tout-en-un, 1e et 2e années BCPST. Dunod. 2008. 641 pages.
5. Alain Foucault, Jean-François Raoult. Dictionnaire de géologie. Dunod. 7ème édition, 2010. 416 pages.
6. Denis Sorel, Pierre Vergely. Atlas d'initiation aux cartes et aux coupes géologiques. Dunod. 2ème édition, 2010. 120 pages.
7. Alain Foucault, Jean-François Raoult. Coupes et cartes géologiques. SEDES. 1975. 150 pages.
4. Alain Foucault, Jean-François Raoult. Dictionnaire de géologie. Dunod. 7ème édition, 2010. 416 pages.

Semester: *2*
Unit : UEF122
Subject: Mathematics 2
Coeff. 2 Credit. 4
Course : 01: 30 TD : 01: 30

Objectives of education
Interpretation of the data series, the treatment of gaps in the same series, and the graphic presentation of these performances

Prior knowledge recommended.
Statistics

Content of the subject :
Course :

- Descriptive statistics : parameter dispersion and position graphs usual.
- Method of least squares, regression, adjustment functions, powers
- Parametric statistics : confidence intervals, test of equality of means and equality of variances of two samples.
- Nonparametric Tests : tests of the adequacy of the chi-squared test for comparing two samples
- Probability : basic Vocabulary, basic Probability, conditional Probability, random Variables discrete random Variables continuous

WORK DIRECTED :
Application exercises on the topics of theoretical courses

Mode of assessment :
Review + control continuous

References :

1- N. Piskounov. **Differential and integral calculus. Volume 1.** Editions Mir. 510 pages.
2- Dodge .Y (2003). **First steps in statistics,** Springer
3- Droesbeke, J. J. (1997). **Elements of statistics,** Editions of the free University of Brussels/ Ellipses.
4- Baillargeon G., (1984). **Statistical Techniques,** Edition SMG

Semester: *2*
Unit : UEF 122
Field: Physics 2
Coeff. 2 Credit. 3
Course : 01: 30 TD : 01: 30

Objectives of education
Acquire basic notions on the fluid dynamics and the : concept of pressure, the notion of constraints, relations between stresses and strains (law of Hooke, Young's modulus, Poisson's ratio) or between stresses and velocities of flow (viscosity).

Prior knowledge recommended
Physical 1 of the L1*; and fundamental Physics*

Content of the subject :
Course :

- Concept of pressure,
- The Notion of constraints, relations between stresses and strains (loide Hooke, Young's modulus, Poisson's ratio)
-Constraints and speed of flow (viscosity).
-Concept of fluid mechanics
-Fluid dynamics
- Application to simple cases
Laws of Bernoulli, de Poiseuille, to Store.
-Concepts of flow, convection and diffusion, applications on the balance sheets of matter and energy in open systems (Fourier equation).

Tutorials
Series of Exercises on the chapters of the course

Mode of assessment :
Review + control continuous

References
(Books and handouts, websites, etc.):

Semester : 2
Unit : UEF122
Field: Chemistry 2
Coeff. 2 Credit. 4
Course : 01: 30 TD : 01: 30

Objectives of education
This module allows the student to the acquisition of basic concepts in thermodynamics and chemical kinetics.

Prior knowledge recommended
Concepts of Chemistry acquired in high School**.**

Content of the subject :
Course :

Chapter 1 : Introduction to the Thermodynamics
-System concept, sizes and status function (application to ideal gas)
-1er principle of the THD (Energy, work and heat (U,W,Q))
-Thermochemistry (enthalpy and heat of reaction)
-2th Principle of THD : entropy and gibbs.

Chapter II : chemical kinetics
- Definition, reaction speed, the laws of speed and order of a reaction
- Factors influencing the rate of reaction :
    - Nature of the reactants
    - Concentration of the reactants
- Concentration and time
    - Rate of reaction, theory of collision
    - Reaction mechanisms
    - Catalysts

Chapter III : chemical equilibria
- Concepts of database
- The equilibrium constant
- The use of the equilibrium constant
- Factors affecting the balance
- Effect e the pressure on a system in equilibrium
- Effect of pressure on a system in equilibrium
- Relationship Kp and Kc

Chapter IV : physical Methods of analysis
- UV-visible.
- IR.
- RX

WORK DIRECTED

N°1: Thermodynamics

N°2: acid-base Reactions
N°3: oxidation-reduction Reactions
N°4: reaction mechanisms
N°5: chemical Kinetics

Mode of assessment :
Review + control continuous

Referencesto the relevant literature.

1. **Paul-Louis Fabre. Thermodynamics and chemical kinetics.** Ellipses Marketing, 1998, 224 pages.
2. Boucif BELHACHEMI. During Exercises and solved problems of chemical thermodynamics. OPU, 2003, 235 pages.
3. N. Chelali. During thermodynamic and kinetic electrochemical. OPU, 2004, 134 pages.

Semester 2:
Unit : UEM12
Material : Biology 2
Coeff. 2 Credit. 4
Course : 01: 30 TP : 01: 30

Content of the subject :
Course :

Introduction to botany - Definitions, concepts and criteria of classification. Systematics of the great groups of the reign "vegetable" followed by a general knowledge of ecology

FIRST PART: Algae

1. Algae
1.1. Algae prokaryotic (Cyanophytes / Cyanobacteria)
1.2. The eukaryotic Algae
1.3. Morphology
1.4. Systematic and characteristics of the major groups

SECOND PART: The Embryophytes

2. Bryophytes : Morphology of the different branches
2.1. Morphology
2.2. Systematic and characteristics of the major groups
2.3. Bryophytes s. str.

3. The Pteridophytes : Morphology of the different branches
3.1. Lycophytes
3.2. Sphenophytes (= Equisétinées)
3.3. Filicophytes

4. Gymnosperms *sensu lato*
4.1. Morphology
4.2. Systematic and characteristics of the major groups

5. Angiosperms
5.1. Morphology
5.2. Systematic and characteristics of the major groups

TROISIEMME PART : general Ecology

CHAPTER I:
1.1. Definition of the ecosystem and of the constituents (Notions of biological communities and ecological factor.)
1.2. Areas of intervention

CHAPTER II: ENVIRONMENTAL FACTORS
2.1. Abiotic factors
- Climate
- Edaphique
- Water

2.2. Biotic factors

- Competitions
- Predators and pests
- Interaction of cooperation and symbiosis
- Parasitism

2.3. Interaction of the environment and of the living beings

Work Practices :

Session 1 : Algae (Phycophytes) : Morphology and reproduction of some species, such as Ulva lactuca and Cystoseiramediterranea.

Session 2 : Bryophytes : Morphology and reproduction of Silvery-sp.

Session 3 : Pteridophytes : Morphology and reproduction of Polypodiumvulgare and Selaginelladenticulata

Session 4 : Cycadophytes : Morphology and reproduction of Cycas revoluta

Session 5 : Coniférophytes (Gymnosperms sensu stricto) : Morphology and reproduction of Pinushalepensis and Cupressus sempervirens

Session 6 : floral Morphology of Angiosperms Monocot on examples such as Asphodelus (or Allium)

Mode of assessment :

Review + control continuous

Semester 2:

Unit: UEM 12

Subject: Introduction to Geological Mapping

Coefficient: 2 Credits, 4

Lecture: 1.5 hours Practical work: 1.5 hours

Subject Content:

Course:
I. FUNDAMENTAL DEFINITIONS

II. THE GEOLOGICAL MAP

1- Terrain Notation

a) Sedimentary Terrains

b) Magmatic Terrains

c) Metamorphic Terrains

2 - Structural Notation

3 - Other Conventional Symbols

4 - Map Description

III. THE GEOLOGICAL SECTION

- Principle

- Conventional Symbols

IV. GEOMETRIC PROPERTIES OF LAYERS

1- Dip and Strike of a Layer

2 - Actual and Apparent Thickness

V. REPRESENTATION OF GEOLOGICAL LAYERS

VI. GEOLOGICAL STRUCTURES

• Tabular structures

• Monoclinal structures

• Folded structures

• Faulted structures

• Unconformable structures

Practical Activities: Geological Mapping

- Presentation of a geological map

- Creation of geological cross-sections

-

Semester 2:
Unit : UET12
Subject : Computer Science 2
Coeff. 2 Credit. 2
Course : 01: 30 TP : 01: 30

Objectives of education
The purpose of the module is the acquisition of a knowledge of office automation software and on the internet.

Prior knowledge recommended
Learned in the module Computer science 1 (semester 1).

Content of the subject :
Course :

- Office software
  - ✓ Text processing
  - ✓ Excel

- The Net
  - ✓ The network Internet Intranet
  - ✓ The WEB
  - ✓ Internet browsing
  - ✓ Platforms of online courses (e-Learning)

Mode of assessment :
Review + control continuous

Semester 2:
Unit : UET12
Material : Techniques of Expression 2
Coeff. 1 Credit. 1
TD : 01: 30

Objectives of education
This education aims to strengthen the ability of oral and written expression of students in foreign languages, particularly in French which is the language of instruction is most widespread in the sciences in the institutions of higher education algerians.

Prior knowledge recommended
Learned in the module's Technical term 1 (semester 1).

Content of the subject :
Course :

- The Formation of words
Essentially in the form of exercises focusing as examples of words to work with, the terms of the language of the Sciences of the Earth : origin of words (etymology)/ formation of words (root, radical)/ word family (prefix, suffix).

and **The silent letters at the end of words** by learning the search for a word in the same family justifying the silent letter.

- The Meaning of the words.
In the form of exercises will be addressed : the nature of words (nouns, verbs, adjectives, ...) / the meaning of words (own, figuratively speaking, polysemy) / shades of meaning of a word (synonymy) / similarities of words (homonyms, paronymes) / words for the opposite (antonyms).

- The Style of the sentence :
In the form of exercises will be discussed : the elements of the sentence / sentence types/ forms of sentence/ the voice-active, passive, reflexive/ the nominalization.

- An introduction to Bibliographical Research
- objective / concept of plagiarism
- understanding of the subject to be treated (to define the key words, the areas of research, ...)
- identification, location and search tools (library library, files, databases, the different types of documents ...)

- use of information (bibliographic records, taking notes, summary, summary notes, photocopies, ...)
- References : the rules of writing for the different types of documents (monographs, chapter in the document, review articles, memory(s), electronic document, ...)
Application : for a specific topic (without dealing with the subject) the student will have to find x (to be defined) bibliographic references.

The visit of the BU is to arrange with the library. A presentation by the staff of the B. U.) on the role of different services, will introduce the students to the course since the **choice-the acquisition** of a book on its debt by the student through his or her **treatment** (sheets subject and author, catalog,

computerized database), sound **recording** (the odds), her **storage** (store) to its **consultation** (reading room), or **debt**.

This visit will be a year of taking notes during the visit and writing an account of his visit to hand it to the teacher.

- The architecture of a monograph
It will be made the parallel with the memory of the end of the study that the student will have to write. Introduce :

Semester 3:
Unit : UEF 311
Material : Crystallography
Coeff. 3 Credit. 6
Course : 01: 30 TD : 03: 00

Objectives of education
The student is supposed to know all of the systems lens, their geometry, their elements of symmetry and the different modes and classes to which they belong.

Prior knowledge recommended
The student must know the basic elements of crystallography, taught in 1^{era} year of Geology.

Content of the subject :
Course :

I. crystallography geometric

- Definition of the states of the geometry in the matter.
- The fundamental laws of crystallization.
- study geometric point networks.
- Symmetry orientation.
- The 32 classes of symmetry.
- 7 crystalline systems.
- 14 modes of networks of Bravais.
- Definition of a crystalline form (examples).
- Other properties vector

II. The optical crystal

- Reminders of optics.
- Propagation of light in the middle lens.
- Index of refraction.
- Birefringence.
- Indicator.

Work Practices :

1- Definition of the crystalline state. Manipulation of the model in wood : the elements of symmetry.
2- Research the various elements of symmetry on wooden models, and the relationship between the elements of symmetry, write the formula of symmetry.
3- Principle of the projection of the symmetry elements of, application models.
4- The 32 classes of symmetry, which is the projection of the different classes in axis direct.
5- The 32 classes of symmetry (continued), projection of the axes reverse and other classes, highlighting the holoédries and hémiédries.
6- Definition and manipulation of simple forms of systems to lower and middle (dihedral, pyramids, prisms...)
7- Indexing and 3-axis manipulation
8- Cubic system : projection and nomenclature of simple shapes.
9- Indexing 4-axis systems (hexagonal and trigonal).

10-X-Rays : a study of diffractogrammes of minerals.

Mode of assessment :
Review and ongoing monitoring.

References :

Delepine, C. (1971) : Introduction to crystallography', Dunod, Paris.

Flint, E. (1981) : 'Principles of crystallography', Edition MIR, Moscow.

Gay, R. (1959) : 'the Course of crystallography, Book I : Crystallography geometric', Gauthier-Villars.

Hammond, C. (1990): 'Introduction to cristallography', Oxford Univ. Press, New York.

Hladik, J. (1995) : group theory in physics and quantum chemistry – Masson,

International Tables for Crystallography, Volume A, Edited by Theo Hahn, by Kluwer Academic Publishers. 1983

Mooser, E. (1993) : Introduction to the physics of solids', Presses polytechniques et universitaires romandes, Lausanne.

Ouahas, R. (1984) : 'Elements of x-ray crystallography', Ed. Publisud, Paris, OPU.

Roubault, M. (1963) : 'Determination of the minerals of the rocks under the microscope polarizing', Editions Lamarre-Poinat, Paris.

Rousseau, J.-J. (1995) : 'Crystallography and geometric x-ray crystallography with corrected exercises', Edition Masson, Paris.

Schwarzenbach, D. (1993) : 'Crystallography', Presses polytechniques et universitaires romandes.

Sirotine Y. and Chaskolskaia, M. (1984) : 'the Foundations of the physics of crystals', Edition MIR, Moscow.

Sivardière, J. (1995) 'The symmetry in *Mathematics, Physics and Chemistry', PUG, Grenoble, france.

Van Meerssche Mr. and Feneau-Dupont, J. (1984) 'Introduction to crystallography and structural chemistry', Peeters Press, Leuven.

Verbaere, A. (1985) : Symmetry and crystalline state', Current DEA, University of Nantes, France.

Weigel, D. (1971) : 'Crystallography and structure of solids, Vol. 1 : Algebra and geometry crystal and molecular', Edition Masson et Cie.

Semester 3:
Unit : UEF 312
Material : Mineralogy
Coeff. 3 Credit. 6
Course : 01: 30 TP : 03: 00

Objectives of education
The student is supposed to know the different classes of mineral, with their physical and chemical characteristics.

Prior knowledge recommended
The student must know the basic elements of mineralogy, taught in 1^{era} year of Geology.

Content of the subject :
Course :

Chapter I : basics Cristallochimie
Reminders of the structure of the atom and chemical bonds
Reminders of a few definitions (crystal, mineral, etc ...)
Definition of the coordinance, isotypisme, isomorphism and polymorphism

Chapter II : Classification of minerals (nine groups)
1- Class of native components.
2- Class of halides.
3- Class of sulphides and sulfosels.
4- Class of oxides and hydroxides.
5- Classes of carbonates...
6- Classes of sulfates...
7- Class of phosphates...
8- Class of silicates
9- Class of borates

Work Practices :

1- Definition of a mineral, optical and physical properties. (density.....)
2- Class of native components.
3- Class of halides.
4- Class of sulphides and sulfosels.
5- Class of oxides and hydroxides.

6- Classes of carbonates...

7- Classes of sulfates...

8- Class of phosphates...

9- Class of silicates

10- Borates

Mode of assessment :
Review and ongoing monitoring.

References to the relevant literature.

-Claude Guillemin, Guy Aubert, Roland Pierrot. Specific mineralogy**.** Edition Droz 1960. 224 pages.

-Michel Demange. The minerals of the rocks (optical character, chemical composition, deposit). Press of Mines, 2009, 194 pages.

-J. Aubouin, R. Bush, J. P. Lehman, Specific geology. Volume 1 : petrology. Dunod, 1968. 712 pages.

Course Title: Tectonics 1

- **Semester**: 3
- **Code**: F321
- **Credits**: 6 ECTS
- **Coefficient**: 3
- **Weekly Hours**: 1h30 Lecture + 3h00 Practical Work
- **Total Hours**: 67h30
- **Evaluation Method**: Continuous Assessment + Final Exam

Course Objectives:

This course aims to provide students with knowledge of the main tectonic structures and orogenic cycles that affect the lithosphere.

Prerequisites:

Students should have acquired basic knowledge in tectonics from first-year geology courses.

Course Content:

Introduction:

- Basic concepts about the Earth's crust and lithosphere
    - Continental crust
    - Oceanic crust
    - Lithosphere and isostasy

Part I: Continental Structures

Chapter 1: Shields and Platforms
Chapter 2: Sedimentary Basins

- Graben (rift) basins
- True basins
- Mixed-type basins

Chapter 3: Crustal Fractures
Chapter 4: Continental Margins

- Passive margins
- Active margins and island arcs

Chapter 5: Mountain Ranges

- Intracontinental ranges
- Intercontinental ranges

Part II: Oceanic Structures

Chapter 1: Seismically Active Oceanic Relief

- Mid-ocean ridges
- Island arcs

Chapter 2: Seismically Inactive Oceanic Relief

- Volcanic relief
- Non-volcanic relief

Practical Work:

1. Review of basic cartographic concepts
    - Determining elevations of planar surfaces from maps
    - Intersections between topographic surfaces and stratigraphic layers
2. Study of Tabular and Monoclinal Structures
3. Exercises and geological map analysis with written reports

Bibliographic References:

- *Plate Tectonics Twenty Years Later*, Universalia, 1990
- Aubouin, J. (1980). *From Plate Tectonics to Mountain Building*
- Condie, C.K. (1988). *Plate Tectonics and Crustal Evolution*, Pergamon
- Yves Missenard, Jacques Mercier, Pierre Vergely. *Tectonique*, Dunod, 2011
- J. Aubouin, R. Brousse, J.P. Lehman. *Précis de géologie – Tome 3: Tectonics*, Dunod, 1979

Semester 3

Unit: UEM 311

Subject: Stratigraphy

Coeff. 2 Credit. 4

Course: 01H30 - supervised work: 01h30

Teaching objectives: The student is expected to be able to give a chronological order to the various geological events at the scale of sedimentary and other basins. They will therefore be able to order them within a chronostratigraphic and paleogeographic framework.

Recommended prior knowledge: The student is expected to have acquired basic knowledge of stratigraphy in the Geology course in 1st year.

Content:

Course:

1. Time in geology

1.1. Relative dating

1.1.1. Chronological and geometrical order

1.1.2. Principles of stratigraphy

1.1.3 Biostratigraphic zonation

1.2. Absolute dating

1.2.1. Radiochronology

1.2.2. Geochemical geochronology

2. Stratigraphic units

2.1 Introduction: Major geological periods

2.2. Stratotypes

2.3. Lithostratigraphy

2.4. Biostratigraphy

2.5. Chronostratigraphy

2.6. Relationship between litho-, bio- and chronostratigraphy

3. Rythmostratigraphy

3.2. Sequence analysis

3.3. Eustatism and eustatic cycles

4. Subsidence, transgressions and regressions

4.2. Isostasy

4.3. Tectonic subsidence

4.4. Transgressions and regressions

5. Paleogeography

5.2. Facies variations

5.3. Isopacies and isobaths

5.4. Physical and chemical factors of paleoenvironments

5.5. Paleoecology

6. Paleogeographic and geodynamic evolution

Supervised work:

- Exercises on the principles of stratigraphy (relative dating)
- Typical cross-section and formation subdivision, followed by cross-section description
- Cross-section correlation and lithostratigraphic log at different scales,
- Isopaque and isobate maps,

Assessment methods: Examination and continuous assessment.

References:

Aubouin J.,Brousse R. et Lehman L.P. (1978) : Précis de Géologie tome 2 Paléontologie et Stratigraphie, Edition Dunod Paris.

Boulin J. – 1977 : Méthodes de la stratigraphie et géologie historique. Masson Ed.

Harland W.B. – 1978 : Biostratigraphic scales. In « The geologic Time Scale », A.A.P.G. Studies in Geology, n°6.

Hedberg H. – 1979 : Guide stratigraphique international. Classification, terminologie, et règles de procédures, Doin Ed.

Perrondon A.- 1972 : Méthodes et tendances de la stratigraphie. Conclusions et essai de synthèse. B.R.G.M., Mémoir 77.

Pomerol C., Babin C., Lancelot Y., Le Pichon X. et Rat P. -1980 : Stratigraphie et paléogéographie. Principes et méthodes. Doin Ed.

Pomerol Ch. et Babin C., (1977) : Précambrien, ère paléozoïque. Stratigraphie et paléogéographie, Paris, Doin édit., 430 p.

Termier H. et G., (1960) : Paléontologie stratigraphique, Paris, Masson édit., 516 p.

Semester 3:

Unit: UEM 312

Subject: Paleontology

Coefficient: 3 Credits, 5

Course: 1.5 hours, Practical work: 2.5 hours

Course objectives: This course provides students with an understanding of the different fossil groups, their systematics, their evolution, as well as their stratigraphic and paleoecological significance.

Recommended prior knowledge: Students are expected to have acquired basic knowledge of paleontology in the Geology course in 1st year.

Contents:

Course:

I. Introduction: Definition and General Information on Paleontology

II. Fossilization processes

III. Systematics

IV. Study of Some fossil groups

- Collection and Study Techniques
- Study of Some Vertebrates Groups
- Study of Some Groups of Protists and Invertebrates
- Study of Some Plants Groups

V. Relationships between the Study of Fossils in Stratigraphy and Paleontology

VI. Concept of Evolution, Taxonomy, Examples of Some Evolutionary Groups

VII. Concepts of Ecology

Practical Work: Study of Fossil Groups

- Arthropods
- Brachiopods
- Mollusks
- Cephalopods
- Echinoderms
- Fossil Plants

Assessment methods: Examination and continuous assessment in practical work.

References :

Auboin J.,Brousse R. et Lehman L.P. ,1978 , Précis de Géologie tome 2 Paléontologie et Stratigraphie, Edition Dunod Paris

Aubouin J., Brousse R. et Lehman J.-P., (1975) : Précis de géologie, Paris, Dunod édit, 3e éd., 3 vol., 718 p., 480 p., 720 p.

Babin C, (1971) : Eléments de paléontologie, Paris, Armand Colin édit., 408 p.
Beaumont G. (1973) : Guide des Vertébrés fossiles, Neuchâtel, Delà-chaux & Niestlé édit., 476 p.

Claude Babin (1971) : Eléments de Paléontologie, Édition Armand Colin Collection U Sciences
Claude Babin (1971) : Eléments de Paléontologie, Édition Armand Colin Collection U Sciences

Denandre G., (1967) : La vie créatrice de roches, Paris, Presses Universitaires de France édit., coll. « Que sais-je? », 7e éd., 128 p.
Furon R., (1943) : La paléontologie. La science des fossiles, son histoire, ses enseignements, ses curiosités, Paris, Payot édit., 216 p.
Moret L., (1966) : Manuel de paléontologie animale, Paris, Masson édit., 5e éd., 782 p.
Pomerol Ch. et Babin C., (1977) : Précambrien, ère paléozoïque. Stratigraphie et paléogéographie, Paris, Doin édit., 430 p.
Pomerol Ch., (1973) : Ere cénozoïque (Tertiaire et Quaternaire). Stratigraphie et paléogéographie, Paris, Doin édit., 384 p.
Pomerol Ch., (1975) : Ere mésozoïque. Stratigraphie et paléogéographie, Paris, Doin édit., 384 p.
Pomerol Ch., Babin C., Lancelot Y., Le Pichon X. et Rat P., (1980) : Stratigraphie et paléogéographie, principes et méthodes, Paris, Doin édit., 212 p.
Raymond En (1990) : Paléontologie des invertébrés, Édition Dunod Collection Géosciences
Roger J. Paléontologie générale, 1974, Édition Masson

Termier H. et G., (1960) : Paléontologie stratigraphique, Paris, Masson édit., 516 p.
Traité de paléobotanique, publié sous la direction de E. Boureau, Paris, Masson édit., 1964-1970.
Traité de paléontologie, publié sous la direction de J. Piveteau, 7 t., Paris,Masson édit., 1952-1969.

Semester 3:
Unit : UET 311
Subject : database Management and GIS.
Coeff. 2 Credit. 2
Course : 01: 30 TP : 01: 30

Objectives of education
This course enables students to capture, process and model geographic data, spatially localized, by software**.**

Prior knowledge recommended
Learn to master the tool and the basic concepts of geography.

Content of the subject :
Course :

Chapter 1:

1 - Concept of databases
1-1- Definition, role of a DBMS.

2 - The principles of the relational
2-1 Definition of the table, the definition of the entities :
- Concept of primary key
- Relationships and their cardinality
2-2 - Concept of data models :
- Conceptual models of data (MCD), logical Models (MLD), physical models (MPD).
2-3 - Concept of joins

3 - establishment of a database
3-1 - an Illustration of the interest of a database
3-2 - Structuring and implementation of an Access database from Excel data.

4 - Design of a database
4-1 - considerations, needs analysis, creating data models

5 - Creation of the database in Access
5-1 - Creation of tables, keys, relations, and queries.

6 - The links between S. I. G. and databases
6-1 - establishment of procedures for the link O. D. B. C. (Object Data Base Connectivity).
6-2 - Principle theoretical and practical demonstration :
- links between Access and GIS software.

7 - The language, S. Q. L
7-1 - Language for querying and creation of relational database
7-2 - key commands to query :
- selections, joins, sub-queries.....
7-3 - Practice of the language :
- Access mode S. Q. L on a simple database
- The SQL queries in a software S. I. G

8 - Specificity of GIS :
- Spatial queries
-Illustration on a GIS software

Chapter 2 :

1 - The basic concepts of the S. I. G.
1-1 - Definition of the S. I. G. :
- Geographic Information
- History.
1-2 - The functions of a S. I. G. :
- Acquisition
- Management
- Data processing
- Restitution.
- Hardware and software
- The organizations involved in the S. I. G.

2 - georeferencing
2-1 - Concept of projection systems :
Lambert NTF/Lambert93.
2-2 - Principle of the georeferencing :
- Points of connections
- RMS error

3 - representation and structuring of the data
3-1 - The modes of representation of the data :
- Vector/Raster.
3-2 - structuring of The data graphs :
- Mode topological and non-topological.
3-3 - structuring of The data attribute :
- Joins
- Thematic analysis

4 - The digital data available
4-1 - data references :
- Repository-Scale (EGR IGN)
- INSEE data
- Cadastre.
4-2 - thematic data

WORK DIRECTED :

- Application of the concepts discussed
- Design, create, and update a database, and then link with a S. I. G
- Practical example of the common use of the S. I. G and DBMS

Mode of assessment :

Review and ongoing monitoring.

Semester 3:
Unit : UET 312
Subject : English Language
Coeff. 1 Credit. 1
TD : 01: 30

Objectives of education
The student is expected to learn the basics of the English language (grammar, conjugation), and the terminology.

Prior knowledge recommended
The English acquired in high School.

Content of the subject :
Courses focus on the technical English and the practice of the conversation.

Mode of assessment :
Review

References :

1. Jean-Pierre Michel, Michael S. N. Carpenter, Rhodes W. Fairbridge. Bilingual dictionary of Earth sciences : English/French-French/English. Collection: Sciences Sup, Dunod, 2013 - 5th edition - 512 pages.

2. Philippe Laruelle. Write better in English. PUF, 2012, 192 pages.

3. Jean-Michel Fournier. User manual Oral English. OPHRYS, 2010, 251 pages.

Semester 4:
Unit : UEF411
Material : Petrology of Igneous
Coeff. 3 Credit. 5
Course : 01: 30 TP : 03: 00

Objectives of education
He is aware of the different minerals and classification of igneous, as well as the phenomena at the origin of their formation.

Prior knowledge recommended
Master the party petrography of the module of the geology of the L1.

Content of the subject :
Course :

1- Introduction, recalls L1

2- Methods for the study of magmatic rock

3- The minerals of igneous and their order of appearance

4- Origin of igneous and their mode of deposits

5- The crystallization and evolution of magmas

6- Classification of igneous

Classification mineralogical

Chemical Classification

7- The main groups of igneous

The plutonic rocks

The rocks intermediate

The volcanic rocks

8- The alterations of minerals from igneous

TP (12 sessions)

Part I

-Introduction to the microscope

-Concepts of indices, crystallographic

-Study in natural light and polarized

-Study in polarized light-analyzed

Part ii : minerals

-Minerals cardinals : Quartz ; feldspar ; feldspathoïds

-The essential minerals : peridots ; pyroxene ; amphibole ; micas ; chlorites.

-The accessory minerals : zircon, apatite, sphene, garnet ; épidotes; tourmaline ; spinels ; calcite.

-Textures of igneous

-Nomenclature of igneous from their mineralogy.

Mode of assessment :
Review + continuous control.

References :

1. J. Aubouin, R. Bush, J. P. Lehman, Specific geology. Volume 1 : petrology. Dunod, 1968. 712 pages.
2. Bernard Bonin, Jean-François Way. Magmatisme and magmatic rock. Dunod, 3th edition, 2011, 313 pages.
3. Jean-Claude Pons. The petro without penalty 1 : minerals and igneous. CRDP académie de Grenoble, 2000, 257 pages.
4. William S. MacKenzie, Anthony E. Adams. Introduction to the Petrography. Dunod, 2005, 192 pages.
5. Jean-François Beautiful, Bernard Platevoet, Jean-François Fogelgesang. Atlas of Petrology. Dunod, 2012, 144 pages.

Semester 4:

Unit: UEF412

Subject: Petrology of Sedimentary Rocks

Coefficient: 2 Credits, 5

Course: 1.5 hours, Practical work: 3 hours

Course Objectives: Students must learn to recognize and classify different sedimentary rocks.

Recommended Prior Knowledge: Mastery of the petrography part of the geology module in L1.

Content:

Course:

1. Introduction

1.1. Definitions

1.2. Genesis of sedimentary rocks

1.3. Sedimentation media

1.4. Classification of sedimentary rocks

1.5. Minerals in sedimentary rocks

2. Detrital rocks

2.1. Conglomerates

2.2. Sandstones

2.3. Clays

3. Carbonate rocks

3.1 Introduction

3.2 Limestone

3.3. Dolomites

4. Evaporites

4.1. Different evaporite salts

5. Phosphates

5.1. Continental phosphates

5.2. Marine phosphates

6. Siliceous rocks

6.1. Flints and cherts

6.2. Radiolarites

6.3. Diatomites

7. Ferruginous rocks

7.1. Oxide ores

7.2. Iron carbonates

8. Carbonaceous rocks

8.1. Coals

8.2. Petroleum

Practical work:

- Rock determination methods
- Minerals in sedimentary rocks
- Loose rocks : pebbles, gravels, sands, etc.
- Silicoclastic rocks: textures, classification, morphoscopy of grains and cements, classifications
- Carbonate rocks under the microscope: elements, binding phase, classifications: Dunham and Folk
- Other rocks: examples of siliceous, evaporite, phosphate and ferruginous rocks, etc.

Assessment methods: Examination and continuous assessment in practical work.

References:

- Frédéric BOULVAIN. Pétrologie sédimentaire. Des roches aux processus. Ellipses, 2010, 259 pages.
- A-E. Adams, William Mackenzie, C Guilford. Atlas des roches sédimentaires. Masson, 1994, 104 pages.

Semester 4

Unit: UEF421
Subject: **Tectonics 2**
Credits: 5
Coefficient: 3
Weekly Hours: Lecture – 1h30, Practical – 3h00

Course Objectives

The student is expected to learn the fundamentals of structural analysis.

Recommended Prior Knowledge

Basic concepts from the "Tectonics 1" module covered in Semester 3.

Course Content

Lectures

Chapter 1: Concepts of Stress and Strain

1. Concepts of force and stress
2. Concepts of deformation
3. Origin of stresses

Chapter 2 : Non-Tectonic Deformations
2.1 Creep (reptation)
2.2 Landslides

Chapter 3 : Tectonic Deformation
3.1 Continuous deformation: **Folds**

- Monoclinal structures
- Folds
    - Fold elements
    - Fold classifications

3.2 Discontinuous deformation: **Faults**

- Fault elements
- Fault nomenclature
- Shear joints, tension fractures, and joints (diaclases)

3.3 **Thrust sheets (Nappes de charriage)**
3.4 **Introduction to Microtectonics**

Practical Sessions

- Fault-related structures
- Unconformities
- Interpretation and commentary of geological cross-sections and maps with complex structures

Assessment Method

- **Continuous assessment** + **Final exam**

Bibliographic References

- Arthaud F., 1969. *Graphical determination method for directions of shortening, extension, and intermediate stress from fault populations*, Bull. Soc. Géol. France.
- Arthaud F., 1970. *Comparative tectonic and microtectonic study of two Hercynian areas: Montagne Noire (France) and the Iglesiente anticline (Sardinia)*, Doctoral Thesis, Univ. Montpellier.
- Nicolas A., 1989. *Principles of Tectonics*, Masson, 2nd ed.
- Choukroune P., 1971. *Study of deformation mechanisms using synkinematic crystallizations*, Bull. Soc. Géol. France.
- Gruneisen P. et al., 1973. *Fracture analysis in folded limestone structures*, Sci. Géol. Bull., Strasbourg.
- Mattauer M., 1973. *Deformation of Earth's crustal materials*, Hermann Ed., Paris.
- Nicolas A., Bouchez J.L., Boudier F., 1972. *Kinematic interpretation of plastic deformation in the Lanzo massif (Western Alps)*, Tectonophysics.
- Price N.J., 1966. *Fault and Joint Development in Brittle and Semi-Brittle Rock*, Pergamon Press.
- Ragan D.M., 1973. *Structural Geology: An Introduction to Geometrical Techniques*, Wiley.
- Ruhland M., 1973. *Study methods of natural fracturing in rocks*, Sci. Géol. Bull., Strasbourg.
- Vialon P., Ruhland M., Grolier J., 1976. *Elements of Analytical Tectonics*, Masson Ed., Paris.

Semester 4:

Unit: UEF 422

Subject: Micropalaeontology

Coeff. 3 Credit. 5

Class: 01h30 Practical work: 03H00

Course Objectives: Knowledge of micropalaeontology: age, sedimentation environments, study methods.

Recommended prior knowledge: Completion of the first two years' courses.

Content:

Courses:

Part I:

1.1. Introduction

- Definitions and general information on micropalaeontology, microfossils, etc.

- Its purpose: what is the purpose of micropalaeontology and its study and relationship with other disciplines of geology and other sciences,

- History of micropalaeontology: give a brief overview of the science.

1.2. Techniques or methods for studying microfossils: give an overview of the field: how to do it

- Collecting material

- Material preparation

- Observation of microfossils

- Determination of microfossils

Part Two: Interest and use of micropaleontology

2.1. Paleobiological and geological use

2.2. Microfossils in their fossilizing environment

- Living microfossils

- Deposit emplacement

- The fate of microfossils in deposits

2.3. Microfossils, the key to biological problems

- From ecology to paleoecology

- Species and speciation

- Modes of evolution

- Microfossils and the origin of life

2.4. Microfossils as a source of sediments

- Lithogenesis by biclastic accumulation
- Lithogenesis by concentration of amorphous substances from organisms
- Lithogenesis linked to microbiotic activity

2.5. Microfossils, the Phanerozoic timekeeper

- Microfacies
- Biozones and biozonations
- Biostratigraphy, chronostratigraphy, magnetic inversions and radiometric dating

2.6. Microfossils, witnesses of environments and geographies

- From paleoecology to the reconstruction of paleoenvironments
- Mmicrofossils: evidence of oceanic expansion
- From paleobiogeography to global paleogeography

Practical work: Study of different groups of microfossils

- Foraminifera
- Calcareous nannofossils
- Ostracods
- Charophytes
- Diatoms
- Radiolaria

Assessment methods: Examination and continuous assessment in practical work.

References:

Allen J.R.L. (1970) : Physical processus of sedimentation. Amer. Elsevier Pub. Co. Inc. New York, 248p.

Allen J.R.L. (1977): Physical processes of sedimentation, Allen and Unwin, London, 248p.

Allen J.R.L. (1982): Sedimentary structures: their character and physical basis. Developments in sedimentologie 30, Elsevier, 2 Vol., 663p.

Chamley H. (1986) : Continental and marine paleoenvironments expressed by the west Pacific clay sedimentation. Geol. Rundschan, 75, 1, 271-285

Chamley H. (1987) : Sédimentologie. Collection géosciences. Dunod. 174p.

Collinson J.D. and Lewin J. :1984: Modern and ancient fluvial systems. Inter. Assoc. Sediment., Special publications 6, 575p.

Collinson J.D. and Yhompson D.B. (1982) : Sedimentary structures. George Allen and Unwin, Boston, 194p.

Fernandez J., Bluck B.J. and Viseras C. (1993) : The effect of fluctuating base level on the structure of alluvial fan and associated fan delta deposits : an example from the Tertiary of the Betic Cordllera Spain. Sedimentology,40, 879-813.

Galloway W.E. and Hobday D.K. (1983) : Terrigenous clastic depositional systems. Springer-Verlag, New York, 423p.

Miall A.D. (1978) : Fluvial sedimentology. Can. Soc. Petrol. Geol., Mem. 5, 859p.

Miall A.D. (1983) : Basin analysis of fluvial sediments. Inc: Modern and ancient fluvial systems; Collinson J.D. and Lewis J. (eds) Int. Assoc. Sedimentol. Spec. Publ. 6, 279-286

Miall A.D. (1984) : Principles of sedimentary analysis. Spring-Vrlag, Berlin, 490p.
Potter P.E. and Pettijohn F.J. (1977) : Paleocourents and basin analysis, Springer-Verlag, Berlin, 425p.

Reineck H.E. and Singh I.B. (1980): Depositional sedimentary environments. Spring-Verlag, Berlin, 439p.

Scholle P.A. and Spearing D. (1982) : Sandstone depositional environments. Amer. Ass. Petr. Geol ; mem. 31, 401p.

Vatan A. (1967) : Manuel de sédimentologie. Ed. Technip, Paris, 397p.

Semester 4:
Unit : EMU 411
Material : Geochemistry Fundamental
Coeff. 3 Credit. 5
Course : 01: 30 TP : 02H30

Description :
Introduce the student to the concepts of general chemistry and the various techniques of analyses physico-chemical solutions.

Content of the subject :
Course :

Chapter I Introduction

- definitions and general
- reminders about the different types of connections chemical
- periodic classification of elements
- concept of cristallochimie
    - Isomorphism and polymorphism
    - Substitution rules diadochiques
    - Formulas structural minerals

Chapter II Laws of distribution of the elements

- major elements and elements in traces :
- Concepts of elements that are compatible and incompatible items
- Notions of partition coefficient

Chapter III : Laws and types of radioactivity

Chapter IV Geochemistry isotope

-Stable Isotopes
-Unstable Isotopes
-

Work Practices :

Element geochemistry (stable isotopes and unstable)

Geochemistry of solutions (Carbonates....)

Geochemistry of the solid

- TP Techniques of sample preparation for isotopic analysis
- Application exercises : absolute Dating, the recovery of the temperature, salinity, etc

Semester 4:
Unit : EMU 412
Material : Internship
Coeff. 2 Credit. 4

Objectives of education
This module has the goal of learning methods survey of cuts stratigraphic and mapping in field sediments.

Prior knowledge recommended
Petrography of sedimentary rocks, stratigraphy, and tectonics.

Content of the subject :
Course :

- Initiation to the location, topographic map, using the compass. Introduction to geological mapping.
-Raised cutting lithological : outfit of the field book, description of the facies, the measurement of thicknesses, log stratigraphy and cup with dipping layers
- Recognition of structures and geological formations
-Preparing a geological report

Mode of assessment :
Note of the internship report.

References :

Frédéric Boulvain, Jacqueline Vander Auwera. Geology in the field. Of the outcrop to the concept. Ellipse, 160 pages.

Denis Edwin Beeching Bates, John Francis Kirkaldy. The geology of the ground. Guide Nathan, Edition : F. Nathan, 1977, 248 pages.

Semester 4
Unit: UED 411
Subject: Geophysics
Coefficient: 2 **Credits:** 2
Lectures: 1h30 **Tutorials:** 1h30

Teaching Objectives:

- Familiarize students with the physics of the Earth.
- Introduce non-destructive prospecting methods.

Prerequisites:

- Strong foundation in Mathematics and Physics.
- General Geology.
- Basic concepts of Tectonics.

Course Content

Lectures:

1. **Basic Concepts:**
   1.1. Introduction.
   1.2. What is Geophysics?
   1.3. Objectives of Geophysics.
   1.4. Physical Properties of Rocks.
2. **Geophysical Prospecting Methods:**
   - Principles, objectives, and method selection.
     2.1. Seismic Methods (Refraction and Reflection).
     2.2. Gravimetric Prospecting.
     2.3. Electrical Methods.
     2.4. Electromagnetic Prospecting.

Tutorials:

- Exercises and applications related to the course content.

Assessment Method:

Exam + Continuous Assessment

Bibliography:

- Dubois J. & Diament M. (2005). *Geophysics: Course and Corrected Exercises*. Dunod, 227 pp.
- Mari J. L., Arens G., Chapellier D. (1998). *Geophysics of Deposits and Civil Engineering*. Technip, 467 pp.

Semester 5:
Unit : UEF 511
Material : Petrology of the Metamorphic Rocks.
Coeff. 3 Credit. 5
Course : 01: 30 TP : 03: 00

Objectives of education
This is to give the student the elements allowing to study the metamorphic rocks (definitions, phase rule, graphical representation, facies metamorphic .....).

Prior knowledge recommended
Master the party petrography of the module of the geology of the L1 as well as the course of crystallography and mineralogy.

Content of the subject :
Course :

- Definition of the metamorphism
- The factors of metamorphism
- Context geodynamics of the metamorphism
- The different types of metamorphism
    - metamorphism local
    - metamorphism-general or regional
- The facies metamorphic
    - in the contact metamorphism
    - in the metamorphic general
- Classification and nomenclature of metamorphic rocks.

Work Practices

- Recognition of the structures of metamorphic rocks (schistosity, foliation).
- Recognition and description of the facies of metamorphic rocks.

Mode of assessment :
Review + control continuous

References :

J. Aubouin, R. Bush, J. P. Lehman, Specific geology. Volume 1 : petrology. Dunod, 1968. 712 pages.

Jean-Claude Pons. The petro without penalty 2 : minerals and metamorphic rocks. CRDP académie de Grenoble, 2002, 240 pages.

William S. MacKenzie, Anthony E. Adams. Introduction to the Petrography. Dunod, 2005, 192 pages.

Jean-François Beautiful, Bernard Platevoet, Jean-François Fogelgesang. Atlas of Petrology. Dunod, 2012, 144 pages.

Semester 5:
Unit : UEF 512
Material : Sedimentology
Coeff. 4 Credit. 7
Course : 03: 00 TP : 03: 00

Objectives of education
The goal is to describe the different environments of sedimentary deposits, continental, mixed and sailors, with their characteristics and their sequences accordingly.

Prior knowledge recommended
Knowledge petrography of sedimentary rocks.

Content of the subject :
Course :

I. Introduction
1. Sedimentary Rocks
2. Sedimentary Basins

II. The Circles silicoclastiques
1. Introduction
2. The Environments of deposition of the rocks detrital
   2.1 Deposit cones scree
   2. 2Dépôts wind
   2.3. Fluvial deposits : the dynamic Phenomena fluvial and sedimentation fluviatile
   2.4. Deposits coastlines
      - Morphology of the sub-marine and coastal
      - The dynamic phenomena of current and sedimentation, marine
      - Dynamic areas of the mouth and sedimentation in the vicinity of river mouths
   2.5. Deposits of the continental shelf
   2.6. Basin deposits and turbidites

III. The carbonate Environments
1. General
2. The Environments of deposition of carbonates
   - 2.1. Lacustrine Carbonates
   - 2.2. Carbonate platforms, temperate
   - 2.3. Carbonate platforms, tropical
   - 2.4. The margins reef
   - 2.5. The slope
   - 2.6. The basin

IV. The Circles evaporite
1. Introduction
2. Evaporites Continental
3. Evaporites Shallow Marine
4. Evaporites Deep

Work Practices :

-Introduction to the analysis of soft-sediment : particle size of the sand.
- Graphic representations and calculation of parameters sedimentology.
- Method study of the sediments of Rudites : (morphometry, graphical representation and calculation of the parameters sedimentological)
-A method of study of the fine sediment
-Grain-size analysis of lutites by the pipette method of Andersen
-Trend Indices of sediment (indices of River) and interpretation of results
-Introduction to the study of clay minerals, preparation and analysis RX samples
-Skinning and processing of diffractogrammes.
-Mapping of facies : sand and lutites

Mode of assessment :

Review + continuous control.

References :

Allen, J. R. L. (1970) : the Physical process of sedimentation. Amer. Elsevier Pub. Co. Inc. New York, 248p.

Allen, J. R. L. (1977): Physical processes of sedimentation, Allen and Unwin, London, 248p.

Allen, J. R. L. (1982): Sedimentary structures: their character and physical basis. Developments in sedimentologie 30, Elsevier, 2 Vol., 663p.

Chamley, H. (1986) : Continental and marine paleoenvironments expressed by the west Pacific clay sedimentation. Geol. Rundschan, 75, 1, 271-285

Chamley, H. (1987) : Sedimentology. Collection geosciences. Dunod. 174p.

Collinson, J. D. and Lewin, J. :1984: Modern and ancient fluvial systems. Inter. Assoc. Sediment., Special publications, 6, 575p.

Collinson, J. D. and Yhompson D. B. (1982) : Sedimentary structures. George Allen and Unwin, Boston, 194p.

Fernandez J., Bluck, B. J. and Viseras, C. (1993) : The effect of fluctuating base level on the structure of alluvial fan and associated fan delta deposits : an example from the Tertiary of the Betic Cordllera Spain. Sedimentology,40, 879-813.

Galloway, W. E. and Hobday, D. K. (1983) : Terrigenous clastic depositional systems. Springer-Verlag, New York, 423p.

Miall A. D. (1978) : Fluvial sedimentology. Can. Soc. Petrol. Geol., Mem. 5, 859p.

Miall A. D. (1983) : Basin analysis of river sediments. Inc: Modern and ancient fluvial systems; Collinson, J. D. and Lewis, J. (eds) Int. Assoc. Sedimentol. Spec. Publ. 6, 279-286

Miall A. D. (1984) : Principles of sedimentary analysis. Spring-Vrlag, Berlin,490.

Potter, P. E., and Pettijohn, F. J. (1977) : Paleocourents and basin analysis, Springer-Verlag, Berlin, 425p.

Reineck, H. E. and Singh, I. B. (1980): Depositional sedimentary environments. Spring-Verlag, Berlin, 439p.

Semester 5:
Unit : UEF 521
Material : Geology History
Coeff. 2 Credit. 4
Course : 03: 00

Objectives of education
The aim of this teaching is to know the main events stratigraphic, paléogéographiques and tectonic who have marked the history of the Earth with reference especially to Algeria.

Prior knowledge recommended
the teaching of the common trunk of the L2 is sufficient to follow this teaching

Content of the subject :
Course :

First part : the Proterozoic and paleozoic era

CHAPTER 1 : PROTEROZOIQUE

I - the Origins of Earth and life

II - general Characteristics of the Precambrian
III - The Precambrian in Algeria

CHAPTER 2 : PALEOZOIQUE

I. GENERAL information
A. the LIMITS OF THE'ERE PALEOZOIQUE
B - The big crises bilologiques
II. PALEOGEOGRAPHIE THE GLOBE

Second part : The Mesozoic

CHARACTERS-GENERAL OF The ERE MESOZOÏQUE

I. GENERAL information
A. the LIMITS OF THE'ERE MESOZOÏQUE
B - The big crises bilologiques
II. PALEOGEOGRAPHIE THE GLOBE

Part three : The era cenozoic and quaternary

GENERAL CHARACTERISTICS OF THE CENOZOÏQUE , BIOLOGICAL CRISIS, OROGENESE AND PALEOGEOGRAPHIE THE GLOBE

Mode of assessment :
Review

Bibliographic references :

AUBOIN J, BUSH R LEHMAN, JP-1967. Specific Geology II, Paleontology-Stratigraphy - Paris, Dunod

POMEROL, C. (1980).- Stratigraphy and paléogéographie : Palaeozoic Era.. DOIN Edit. Paris.

POMEROL, C. (1977).- Stratigraphy and paléogéographie : Mesozoic Era.. DOIN Edit. Paris.

Semester 5:
Unit : UEF 522
Subject : Regional Geology (Algerian)
Coeff. 3 Credit. 5
Course : 03: 00 pm

Objective of education :
The aim of this teaching is to know the main events stratigraphic, paléogéographiques and tectonic who have marked the history of the Earth with reference especially to Algeria.

Prerequisites: recommended :
the teaching of the common trunk of the L2 is sufficient to follow and education

Content of the subject :
Course :

The major features of the geology of algeria

- The geology of the Sahara (Precambrian and Paleozoic):
    - The craton of west africa (The Backbone of Reguibat)
    - The orogeny pan-african and the birth of the Shield Targui (The Hoggar)
    - The great cycles of sedimentary basins paleozoic folds of the Sahara.
- The phase hercynienne
- The platform saharan africa (Secondary - Tertiary).
- The phase orogenic finished-eocene (phase atlasique)
- The period of relaxation Oligocene – Miocene lower : the birth of the basin Numidien.
- The phase orogenic Miocene lower phase (alpine) : The chain of Maghrébides
    - the internal zones
    - domaine des flyschs
    - the external areas (area of the table cloth)
    - the front-country para-aboriginal

- The tectonic post-nappes and the birth of relief today.

Mode of assessment :
Review

Bibliographic references

- **Bouillin, J. P., 1986.** The "basin maghreb": an ancient boundary between Europe and Africa to the West of the Alps. Bulletin de la Société Géologique de France, 8, 547-558.
- **Chouabbi A. 1987.** Study geology of the region of the Steam room Does not bails (of Guelma, Constantinois, Algérie) a sector of the areas outside of the chain of Maghrébides, Thèse de 3ème Cycle. Univ. Paul Sabatier (Toulouse III), 123 p., card h. t. unpublished, Toulouse.
- **David L. 1956.** Study of geological Mountains of the upper Medjerda. Thesis cs. Paris. Service Publication of the geological map, Algeria, NS, Bull. n° 11, 289 p., 88 fig, 8 seats, 6 seats photo 9 Pl. h. t., 1 map, Algiers, algeria.
- **Durand Delga (1980) :** The western mediterranean, and its genesis and structural problems related to it. Mem. Soc. Geol.Fr n°10.
- **Durand-Delga, M., Fontboté, J. M., 1980.** The structural framework of the western Mediterranean. In: XXVIèCong. p.geo. Int., Colloque C5: Geology of the alps from the Tethys. Memory of the Bureau of Geological and Mining Research, Paris, vol. 115, pp. 65-85.
- **Frisian Lamotte, D., Saint Bezar, B., Bracene R., 2000.** The two main steps of the Atlas building and geodynamics of the western Mediterranean. Tectonics 19(4), 740-761.
- **Frisian Lamotte D., Michard, A., Saddiqi O. 2006.** Some recent developments on the geodynamics of the Maghréb. C. R. Geoscience 338 1-10.
- **Frizon de Lamotte, D., Leturmy, P., Missenard, Y., Khomsi, S., Ruiz, G., Saddiqi, O., Guillocheau, F., Michard, A., 2009.** Mesozoic and Cenozoic vertical movements in the Atlas system (Algeria, Morocco, Tunisia): an overview. Tectonophysics 475, 9-28.
- **Jolivet L., Fraccenna, 2000.** Mediterranean extension and the Africa-Eurasia collision, Tectonics 19. 1095-1106.
- **Laffitte R. (1939).** Study the geology of the Aurès mountains, Bull. Serv. Card P.geo. Algeria, 1°series, n°11, 484p.
- **Lahondere J.-C. 1987.** Series ultra is a common phenomena in Algeria's north - eastern and the formations surrounding in their structural framework. Thesis cs. 242 p. University Paul Sabatier Toulouse.
- **Perthuisot, V., 1978.** Dynamic and petrogenesis of the extrusions triassic in Tunisia, north. Phd in Science, Ecole Normale Supérieure, ERA, pp. 604-610.
- **Rosenbaum, G., Lister, G. S., Duboz, C., 2002.** Reconstruction of the tectonic evolution of the western Mediterranean since the Oligocene.J. Virt. Expl. 8, 107-126.
- **Rouvier, H. 1977.** Geology of the Extreme North of tunisia : tectonic and paléogéographie superimposed on the eastern end of the chain north, north african, Thesis, university of Paris VI, 1977, 898 p.
- **Thomas M. F. H, Bodin, S., Redfern, J., Irving, D. H. B. 2010.** A constrained African craton source for the Cenozoic NumidianFlysch: Implcations for the palaeogeography of the western Mediterranean basin. Earth-Science Reviews 101 1-23.
- **Vila, J.-M. 1980.** The alpine chain of Algeria's eastern and the far reaches algerian-tunisian. Thesis Cs. Paris, 3 t. 665 p., 199 fig, 40 pl
- **Wildi, W., 1983.** The chain tello-rifaine (Algeria, Morocco, Tunisia): Structure, stratigraphy and evolution of the Triassic to the Miocene. Journal of Geology and physical Geography. Paris, 24 (3), 201-297.
- **Guiraud, R., Bellion, Y., Benkhelil, J. and Moreau, C. (1987) :** Post-Hercynian tectonics in Northern year in Western Africa. In: BOWDEN, P. and KINNAIRD, J. (eds) African Geology Reviews. Geological Journal, 22, 433-466.

Semester 5:
Unit : UEM531
Material : Geophysics
Coeff. 2 Credit. 4
Course : 01: 30 TD : 1h30

Objectives of education
The objective of this course is to master the methods of prospecting geophysics.

Prerequisites: recommended:
the teaching of the common trunk of the S5 is sufficient to follow this teaching

Content of the subject :
Course :

Chapter 1 : electrical Methods

I. GENERAL ON THE PROSPECTION ELECTRIQUE
II. BASIC PRINCIPLES OF PE HAS CONTINUOUS CURRENT : EQUATIONS FUNDAMENTAL
III. CALCULATION OF THE ELECTRICAL POTENTIAL
IV. Methods of resistivities dc
IV.1. Survey vertical electric
IV.2. Dragged electric
IV. 3. The imaging power

Chapter 2 : Gravimetric

Relationship between density and mass density (lectures on the physics of rocks)
I. gravity Field and gravity field
II. Measurements of the gravity field
III. Corrections gravimetric anomaly of Move
IV. Theory of isostasy Airy
V. Field created by geometric structures

Chapter 3 : methods of prospecting seismic

Chapter 4 : Geomagnetism

Mode of assessment :
Review + continuous control

Bibliographic references :

-KELLER, G. V., and FRISCHKNECHT, F. C. Electrical Methods in Geophysical Prospecting, Pergamon Press, 1966.

-Mechler.P : The methods of geophysics. Ed Dunod university (1982).

-Seguin, M. K : Geophysics, and the physical properties of the rocks. Ed : university press, Laval - Québec (1971).

-Telford, W. M : geophysical prospecting (4 volumes).1982 ERG editions France.

Semester 5:
Unit : UEM532
Material : Geostatistics
Coeff. 2 Credit. 4
Course : 01: 30 TD : 1h30

Objective of education :
The aim of this teaching is d4nitier the étudinant qux statistics applied to geosciences.

Prerequisites: recommended :
the teaching of common core's L1 and L2 are sufficient to monitor and education

Content of the subject :
Course :

1. Reminder on the statistical linear (mono-and bivariate)
- Distribution parameter
- Position settings

2. Methods of spatial interpolation
- Methods Barycentric
- Method Triangulation
- Interpolation methods for the allocation of space
- Methods of estimation, geostatistical

3. Variable regionalized
- Defining moments
- Stationarity of the 2^{nd} order
- The hypothesis of intrinsic

4. Variogram
- Characteristic of the variogram
- Calculation of the variogram
- Isotropy and Anisotropy
- Structure trundle
- Patterns of the variogram theoretical
- Adjustment of the variogram experimental

5. Variance estimation
- Development of an estimator
- Estimating an average by another medium
- Estimating an average by a weighted average

6. Kriging
- Procedure geostatistical kriging
- Properties of the kriging
- Scripture hardware kriging
- Kriging universal
- Cokrigeage

Tutorials
Exercises on some methods of calculation views in the course

Mode of assessment :
Review + control continuous
Semester 5:

Unit : UET511
Subject : technical English
Coeff. 1 Credit. 1
Course : 01: 30

Objectives of education
To allow students the learning of the English language, for they can read and consult the bibliography in the English language.

Prior knowledge recommended
Having followed the teachings of the first and second year of bachelor of Geology

Content of the subject:
Course :

Introduction: Why learning English
Grammar: a quick review: tenses, model verbs, conditional, etc
Reading geology texts: the universe, the earth, rocks, fossils, energy, water
Writing skills: writing essays about different geological subjects. I. e. mineral resources, sedimentary rocks, hydrogeology, etc.
Listening and taking notes: attending a reading gold-listening to a recorded conference gold conversation and taking notes.

Mode of assessment :
Continuous control, and mid-year review

Bibliographic references :

-Murphy Raymond 2004, English Grammar in Use Cambridge University Press.

-Michael McCarthy, Felicity O'dell 2008, Academic vocabulary in use. Cambridge University Press 2008

-Yates, C. St. 1988, English for academic purposes series: Earth Sciences, Cassell

Web Sites

Program Semester 6
Geology Fundamental

L3 : Semester 6
Unit : UEF611
Material : Sedimentology
Coeff. 2 Credit. 4
Course : 01: 30 TP : 01: 30

Objective of education :
The objective of this course is to strengthen the knowledge of students in stratigraphy, sedimentology, or other material that might help in the acquisition of sedimentary geology at the global scale or regional

Prerequisites: recommended :
the teaching of the common trunk of the L2 is sufficient to follow and education

Content of the material
Course :

Chapter 1 : Methods of study of series of sedimentary

- Direct methods : facies and sequences
- Method of subsurface : drilling and geophysical methods (Logs and seismic)

Chapter 2 : Characterization of the major environments of sedimentary

- Backgrounds continental
- Deltas and estuaries
- Platform carbonate

This characterization focuses on the hydrodynamic parameters, biological, structures, sedimentary facies and sequences.

Chapter 3 : Criteria for the reconstruction of paleoenvironments
-Structures and figures sedimentary
-Content paleontological and reconstitution paléoécologique
-Geochemistry (isotopic.....)

WORK PRACTICES :
- Cards isopaques
-Maps of facies
-Sequential analysis of a series of carbonate
-Sequential analysis of a series detrital
-Correlations and sequential reconstruction of the variations of facies. Interpretations
Sedimentological series carbonatéees and detrital

Mode of assessment :
Reviews + continuous control

References :
-Boulvain F. 2011: Elements of sedimentology and sedimentary petrology. Online courses univ. Cork.

-Cojan I. and Fox, M. 2006: Sedimentology. Dunod 2° edition

-Reyneck H. E. and Singh, I. B. 1978: Deposionnal environments. Springer-Verlag.

-Reading, H. G. 1996: Sedimentology environments: processes, facies and stratigraphy. Blackwell

-Chamley H. 1990 Sedimentology. Springer-Verlag.

L3 : Semester 6
Unit : UEF612
Subject : Palaeontology
Coeff. 2 Credit. 4
Course : 01: 30 TP : 01: 30

Prerequisites: recommended :
the teaching of the course of L2 is necessary to monitor and education

Content of the subject :
Course :

I- Definition of the species and taxonomy
II- Taxonomy general
III- The evolutionary trends of some animals and plants (equidae, ammonites, charophytes.....)
IV- The exploitation of paleontology data in stratigraphy

Work Practices :
- Studies of a few examples of evolutionary
- Incurred in connection with the course

Mode of assessment :
Reviews + continuous control

References :

- Bellier, J. P et *al*., (2010). Short treaty of Foraminiférologie (mainly on the foraminifera, recent and fossil). book of geology (book 2 - book 2). 104p.
- Duchier. R., (2013) Chapter 1 : The living beings in the course of geological time
- Guillaume Lecointre, Hervé Le Guyader, and Dominique Visset, Belin Ed (2006). Phylogenetic Classification of the living", 3rd edition. (559 pages).
- -Lethiers, F., 2001-Evolution of the biosphere, and geological events
- Hartenbergerj.l. (2001). A brief history of mammals. Breviary of mammalogy. Editions Belin/For Science, Paris.
- McGowran B. (2005). Biostratigraphy. Microfossils and geological time.-Cambridge UniversityPress, 480 p.
- Khasirikani. M., (2009). Note general ecology. University of nature conservation and development.
- Robert Chenorkian et *al*., (2010). White paper / 'Manual' of Taphonomy assessment of the activities, status and Proposals. *Aix-en-Provence, Feb.-Dec.87p.*
- SpichigerR.E et al, (2000). Botanical systematics of flowering plants. Lausanne : presses polytechniques et universitaires romandes, 2000. Chapter 1, History of the botanical classification.
- Pomerol, Ch., 1973,1975, 1977 - Stratigraphy and paléogéographie :- Precambrian, Paleozoic era, Mesozoic era, and Cenozoic era
- Tortosa, T., et al., (2013). Principle of paleontology. Dunod. Licence 3 Master CAPES aggregation.

L3 : Semester 6
Unit : UEF621

Unit: UEF621
Subject: **Microtectonics**
Credits: 4
Coefficient: 2
Weekly Hours: Lecture – 1h30, Tutorial – 1h30

Course Objectives

After reviewing the core concepts and theories to reinforce tectonics knowledge, students will be equipped to follow more advanced lectures on this subject in Semester 6.

Recommended Prior Knowledge

Mastery of essential tectonics concepts taught in the second year (L2).

Course Content

Lectures:

1. Review and Definitions:

- Forces and stresses, stress ellipsoids
- Concept of deformation, strain ellipsoid
- Continuous and discontinuous deformation: rock behavior under stress fields, the role of physical factors (pressure, temperature, deformation rate), etc.

2. Microtectonics Methods

3. Microtectonic Analysis of Fractures:

- Determining the direction of movement
- Determining the shortening direction and stylolites
- Determining the extension direction and tension gashes
- Overall interpretation of discontinuous deformation
- Study of joints
- Analysis of fractures in isopach folds

4. Microtectonics in Schistosity Zones:

- Schistosity, lineations, microfolds, foliations...
- Relationships between schistosity, lineations, and folding
- Guidelines for using schistosity, lineations, and microfolds
- Contribution of microtectonics to understanding the broader regional context

Practical Work – Geological Mapping

- Structural plotting exercises using projection diagrams: WULF, SCHMIDT

- Interpretation of structures

Evaluation Method

- **Continuous assessment + Final examination**

References

- Goguel J., 1965 – *Traité de Tectonique*, Masson
- Ramsay J.G., 1967 – *Folding and Fracturing of Rocks*, McGraw Hill
- Mattauer M., 1973 – *Les Déformations de l'Écorce Terrestre*
- Vialon P. et al., 1976 – *Eléments de Tectonique Analytique*, Masson
- Merle O., 1994 – *Les Nappes et Chevauchements*, Masson
- Choukroune P., 1995 – *Déformations et Déplacements dans la Croûte Terrestre*, Masson
- Nicolas A., 1988 – *Principes de Tectonique*, Masson
- Debelmas J. & Mascle G., 1991 – *Les Grandes Structures Géologiques*, Masson
- Bles J.L. & Feuga B., 1978 – *La Fracturation des Roches*, BRGM, Orléans
- Boillot G. et al., 1984 – *Les Marges Continentales Actuelles et Fossiles autour de la France*, Masson
- Gidons M., 1987 – *Les Structures Tectoniques*, BRGM, Orléans

L3 : Semester 6
Unit : UEF622
Material : Petrology/Geochemistry
Coeff. 2 Credit. 4
Course : 01: 30 TD : 01: 30

Objectives of education :
After reminders of the concepts and theories basic to consolidate knowledge of the Geochemistry especially to the behavior of major and trace element of the crust

Prerequisites: recommended :
Mastery of the essential elements of tectonics provided in the L2

Content of the subject :
Course :

1. Definitions
-Geochemistry
-Geochronology
-The dating relative
-The absolute dating

2. Classifications geochemical

2. Behavior of the elements and tanks geochemical

3. Fractionation and equilibrium geochemical

4. Use of the fractionation elemental geochemistry

Tutorials
- Setting exercises and interprétions charts geochemical. And reconstructions of chemical formulas

Mode of assessment :
Reviews + continuous control

Semester 6:
Unit : UEM611
Material : Geology of Algeria
Coeff. 4 Credit. 8
Course : 03: 00

Objective of education :
The aim of this teaching is to know the main events stratigraphic, paléogéographiques and tectonic who have marked the history of the Earth with reference especially to Algeria and the maghreb countries.

Prerequisites: recommended :
the teaching of the common trunk of the L2 is sufficient to follow and education

Content of the subject :
Course :

I Recall on the major features of the geology of algeria

II - Algeria in the framework of the western Mediterranean.

III - the geology of The countries of the maghreb (synthesis).

Mode of assessment :
Reviews + continuous control

Bibliographic references

- **Bouillin, J. P., 1986.** The "basin maghreb": an ancient boundary between Europe and Africa to the West of the Alps. Bulletin de la Société Géologique de France, 8, 547-558.
- **Chouabbi A. 1987.** Study geology of the region of the Steam room Does not bails (of Guelma, Constantinois, Algérie) a sector of the areas outside of the chain of Maghrébides, Thèse de 3ème Cycle. Univ. Paul Sabatier (Toulouse III), 123 p., card h. t. unpublished, Toulouse.
- **David L. 1956.** Study of geological Mountains of the upper Medjerda. Thesis cs. Paris. Service Publication of the geological map, Algeria, NS, Bull. n° 11, 289 p., 88 fig, 8 seats, 6 seats photo 9 Pl. h. t., 1 map, Algiers, algeria.
- **Durand Delga (1980) :** The western mediterranean, and its genesis and structural problems related to it. Mem. Soc. Geol.Fr n°10.
- **Durand-Delga, M., Fontboté, J. M., 1980.** The structural framework of the western Mediterranean. In: XXVIèCong. p.geo. Int., Colloque C5: Geology of the alps from the Tethys. Memory of the Bureau of Geological and Mining Research, Paris, vol. 115, pp. 65-85.
- **Frisian Lamotte, D., Saint Bezar, B., Bracene R., 2000.** The two main steps of the Atlas building and geodynamics of the western Mediterranean. Tectonics 19(4), 740-761.
- **Frisian Lamotte D., Michard, A., Saddiqi O. 2006.** Some recent developments on the geodynamics of the Maghréb. C. R. Geoscience 338 1-10.
- **Frizon de Lamotte, D., Leturmy, P., Missenard, Y., Khomsi, S., Ruiz, G., Saddiqi, O., Guillocheau, F., Michard, A., 2009.** Mesozoic and Cenozoic vertical movements in the Atlas system (Algeria, Morocco, Tunisia): an overview. Tectonophysics 475, 9-28.
- **Jolivet L., Fraccenna, 2000.** Mediterranean extension and the Africa-Eurasia collision, Tectonics 19. 1095-1106.
- **Laffitte R. (1939).** Study the geology of the Aurès mountains, Bull. Serv. Card P.geo. Algeria, 1°series, n°11, 484p.

- **Lahondere J.-C. 1987.** Series ultra is a common phenomena in Algeria's north - eastern and the formations surrounding in their structural framework. Thesis cs. 242 p. University Paul Sabatier Toulouse.
- **Perthuisot, V., 1978.** Dynamic and petrogenesis of the extrusions triassic in Tunisia, north. Phd in Science, Ecole Normale Supérieure, ERA, pp. 604-610.
- **Rosenbaum, G., Lister, G. S., Duboz, C., 2002.** Reconstruction of the tectonic evolution of the western Mediterranean since the Oligocene.J. Virt. Expl. 8, 107-126.
- **Rouvier, H. 1977.** Geology of the Extreme North of tunisia : tectonic and paléogéographie superimposed on the eastern end of the chain north, north african, Thesis, university of Paris VI, 1977, 898 p.
- **Thomas M. F. H, Bodin, S., Redfern, J., Irving, D. H. B. 2010.** A constrained African craton source for the Cenozoic NumidianFlysch: Implcations for the palaeogeography of the western Mediterranean basin. Earth-Science Reviews 101 1-23.
- **Vila, J.-M. 1980.** The alpine chain of Algeria's eastern and the far reaches algerian-tunisian. Thesis Cs. Paris, 3 t. 665 p., 199 fig, 40 pl
- **Wildi, W., 1983.** The chain tello-rifaine (Algeria, Morocco, Tunisia): Structure, stratigraphy and evolution of the Triassic to the Miocene. Journal of Geology and physical Geography. Paris, 24 (3), 201-297.
- **Guiraud, R., Bellion, Y., Benkhelil, J. and Moreau, C. (1987) :** Post-Hercynian tectonics in Northern anWestern Africa. In: BOWDEN, P. and KINNAIRD, J. (eds) African Geology Reviews. Geological Journal, 22, 433-466.
- **lil J. and Moreau, C. (1987) :** Post-Hercynian tectonics in Northern anWestern Africa. In: BOWDEN, P. and KINNAIRD, J. (eds) African Geology Reviews. Geological Journal, 22, 433-466.

Semester 6:
Unit : UEM612
Material : Internship
Coeff. 2 Credit. 4

Objectives of education
The field trips and allow you to illustrate and better understand a few geological phenomena developed in the various core subjects (sedimentary, cristallophylliennes, magmatic, metamorphic...). They are an important part of the training of undergraduates of Geology.

Prior knowledge recommended
It is necessary to have followed the various teachings of the S5, and a large part of the program of the S6 in order to consider the outputs in each of the areas of applied Geology.

Content of the subject :

The themes of these outputs 6 to 8 days are varied. They concern both the Geology fundamental, such as the observation of large-scale structures and facies sedimentary, magmatic and metamorphic Algeria that the different subjects taught in optional units.

Mode of assessment :
Rating of the reports of the different outputs on the ground.

Semester 6:
Unit : UET611
Material : Ethics and professional conduct
Coeff. 1 Credit.1
Course : 01: 30

Objectives of education
Raise awareness and inform the student of the risk of corruption and encourage them to contribute in the fight against corruption.

Prior knowledge recommended
No

Content of the subject :
Course :

1* concept of corruption :
- Definition of corruption.
- Religion and corruption.
-

2* types of correction :
- Financial Corruption.
- Bureaucratic Corruption.
- Moral Corruption.
- Political Corruption.....etc
-

3* the manifestations of corruption in the administrative and financial :
- Nepotism
- Favoritism
  Mediation
- Extortion and fraud.
- The looting of public money and expenditure illegal.
- The slowdown in the completion of transactions (implementation of the projects .....etc).
- Differences administrative, functional, or organizational employee and the manager.
- Violations issued by the employee in performing his duties in the course of the year.
- Lack of respect for the hours of work, take the time to read the newspaper, to receive visitors and to refrain from making of the work and the lack of responsibility.
-

4* the reasons for the corruption in the administrative and financial :

4.1* the Causes of corruption from the point of view of the theorists :

Theorists and researchers in the science of management and organisational behaviour, have highlighted the presence of three categories identified these reasons , which are :
- According to the first category :
  - The causes of civilizational.
  - For political reasons.
- According to the second category :
  - structural Reasons.
  - The causes of value judgments.
  - Economic reasons.
- According to the third category :

- Reasons for the biological and physiological
- social Causes.
- The reasons are complex.

4.2* causes and conditions of corruption :

Weak Institutions, conflicts of interest, the research quickly in earnings and profits, low awareness of the role of institutions and the media and the non-enforcement of the law .... etc

5* the effects of corruption in the administrative and financial :
- The impact of corruption in the administrative and financial on social aspects
- The impact of corruption on financial and administrative matters on economic development
- The impact of corruption in the administrative and financial on the political system and the stability.

6* The fight against corruption by the agencies and local and international organizations

- Organization Transparency International :
- United Nations Convention on the fight against administrative corruption.
- Program of the world Bank to help developing countries in the fight against administrative corruption.
- International monetary fund.
- Algeria's Efforts against corruption : anti-corruption law 06-01, the role of the judicial police in the fight against corruption, etc.).

7* treatment Methods and ways to combat the phenomenon of corruption

The religious side, the educational side, the political side, economic side, the side of the legislative, legal, administrative, human side....

8* Models of the experience of some countries in the fight against corruption:

- The Indian experience , the experience of Singapore , the experience of the United States , the experience of Hong Kong and the Malaysian experience and the experience of Turkey

Mode of assessment :
Review.

Semester 6:
Unit : UET612
Subject : project Management
Coeff. 1 Credit.1
Course : 01: 30

Objectives of education
The Object is the initiation of students in the research by showing them how to best use and develop their theoretical notions and practices they have acquired throughout their academic careers

Prior knowledge recommended
No

Content of the subject :
Course :

Field methods (Card, Facies, Sampling,...) ;
Laboratory Analyses appropriate to each type of problem to be studied) ;
Operating Data;
Report writing
Translation of articles geological;
Methods of bibliographic research ;
How to write an article, a dissertation or a thesis

Mode of assessment :
Review + control continuous

References :
(Books and handouts, websites, etc).