SEMESTER 1

Master's Title: Sedimentary Basin Geology
Semester: SEMESTER 1
Title of the UE: UEF1
Course title: Course 1: Regional Geology
Title of the subject: Subject 1: Regional Geology Credits: 4
Credits: 4
Coefficients: 2

Teaching objectives:
Know the geological evolution of the main structures and geological domains of the Mediterranean Alpine chain and the ancient chains (Saharan platform and Hoggar).

Recommended prior knowledge:
Geology and concepts on the geotectonic evolution of the Alpine chain and the Saharan chains.

Course content: REGIONAL GEOLOGY

I- The Alpine Mediterranean Chain
1- The Maghrebis: Spain (Betic), Morocco, Algeria, Tunisia, Calabria
1.1- The Tell-Rif Orogen
1.2- The Saharan Atlas
2 - The Alps,
3 - the Pyrenees
II- Shields and Saharan Platform
1 - The shields: The Hoggar-Reguibet (Pan-African collision and the Pan-African chain)
2 - The Cambrian rifting and the general evolution in the Lower Paleozoic
3- The Upper Paleozoic: sedimentary and structural evolution.

Content of the lab (2h.00)
Geological mapping (reading a geological map - creating a geological map).

Evaluation method
Continuous assessment; Exam

Bibliographic references
- GEOLOGY OF ALGERIA.Contribution from SONATRACH Exploration Division, CRD, and Petroleum Engineering and Development Division.
- Durand-Delga M. (1969).Clarification on the structure of the Northeast of Berberia.Publ. Serv. Géol. Algérie, no. 39, 89-131.
- Villa J.M. (1980).The Alpine chain of eastern Algeria and the Algerian-Tunisian border regions.Doctor of Science Thesis.Paris VI, 3 vols, 663 pp., 199 figs., 40 pls., 7 pls.Wildi W. (1983).The Tell Rif chain (Algeria, Morocco, Tunisia): structure, stratigraphy, and evolution from the Triassic to the Miocene.Rev. Geol. Dyn. Geog. Phys., (24), 3, pp 201-297.
- Rémi Leprêtre, Dominique Frizon de Lamotte, Violaine Combier, Oriol Gimeno-Vives, Geoffroy Mohn, and Rémi Eschard (2018)- .Le système orogénique Tell-Rif (Maroc, Algérie, Tunisie) et l'héritage structural de la marge sud de la Téthys.BSGF - Earth Sciences Bulletin 2018, 189, 10
- Fabre, J. (2005)Introduction to the geology of the Algerian Sahara and neighboring regions: The Phanerozoic cover.Vol. 1, SNED, Algiers, 422 p.

- State doctoral theses.
- MEDITERRANEAN GEOLOGY, volume VI, number 1, 1979, Editions de l'Université de Provence, Annals of the University of Provence, A4 format, paperback, 346 pages, 6 foldouts attached to the back cover.MEDITERRANEAN GEODYNAMICS.Laurent Jolivet, Jean-Pierre Brun.Bertrand MeyerGaëlle Prouteau, Jean-Marie Rouchy & Bruno Scaille.

Master's Title: Geology of Sedimentary Basins
Semester: SEMESTER 1
Title of the UE: UEF1
Course title: Course 2: Geodynamics of Basins
Title of the subject: Subject 2: Basin Geodynamics Credits: 3
Credits: 3
Coefficients: 2

Teaching objectives:
The aim of this course unit is to provide future geologists with an illustration of the basic concepts and specific methods for studying sedimentary basins in their geodynamic context.These receptacles represent the archives of the tectonic and climatic history of the Earth.It is about providing a dynamic view of sedimentary basins and raising students' awareness of predictive modeling for research and the exploitation of natural resources.
It is about providing a dynamic vision of sedimentary basins and raising students' awareness of predictive modeling for the research and exploitation of natural resources. Recommended prior knowledge:
Recommended prior knowledge:
Knowledge in global and internal geodynamics, tectonics, petrology, structural geology, and sedimentology.

Content of the subject
1- The Genesis of Sedimentary Basins
2 - Definitions and classifications of basins.
3- The basins in extensive contexts
3.1- Rifts (East African, Gulf of Suez, Rhine, Atlas basins).
3.2- Intracratonic basins with examples (Paleozoic Saharan basins, Paris basin…)
3.3- Epicratonic aulacogenic basins (Ougarta basin, Bénoué basin, Aquitaine and Pyrenees):
3.4- Crustal fractures and oceanic gulfs (Red Sea, Gulf of Aden, and the Afar).
3.5- Passive margins (Algerian margin, eastern Atlantic margin).
4- Basin on a transform fault (Chélif Basin, Marmara Basin, Californian Basin, Dead Sea, and Gulf of Aqaba)
5- Active margins (examples: Caribbean, Indonesia, offshore Peru and Chile, Tyrrhenian Sea, Black Sea, Caspian Sea, and Pannonian Basin).
5.1- Back-arc basin
5.2- Forearc basins
5.3- accretionary prisms
5.4- Oceanic trenches
6- Residual basins
7- Polyphase basins.
Content of the TD (1h30)
Study of examples of Paleozoic and Alpine basins in Algeria:

- Paleozoic basins (the Ougarta, Saharan eastern syncline, Triassic province, the pre-Béchar Kénadza basin); the Alpine basins, the Tellian basins, the Chélif basin, the southeastern Constantinian basin, the Algerian margin, the Algiers region.).
- Study of subsidence (Role and mechanisms)
Definitions
Mechanisms of subsidence
Analysis of compaction indices.
Types of subsidence (thermal, tectonic).
Modes of calculating subsidence.
Analysis of the subsidence curves.

Mode of evaluation
Continuous assessment; Exam
Bibliographic references
GIDON M. (1987): Tectonic Structures.Manuals & Methods.BRGM ed.
DEBELMAS J. & MASCLES G. (1991): The major geological structures.Masson ed.
TARDY Y. & ROQUIN C. (1998): Continental drift, paleoclimates, and tropical alterations.BRGM ed.
JOLIVET H. & NATAF H.C. (1998): Geodynamics.Dunod ed.
Biju-Duval 1999- Sedimentary geology: Basin, depositional environment, petroleum formation; Technip edition, p.735.
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Master's Title: Sedimentary Basin Geology
Semester: SEMESTER 1
Title of the UE: UEF2
Course title: Course 1: Methods for Studying Sedimentary Sequences
Credits: 4
Coefficients: 2

Teaching objectives:
These works complement the field data and are intended to address the unanswered questions.They allow for the clarification of the origin of the sediments and the mode of transport, the evaluation of the intensity of fragmentation processes, and the understanding of the modalities of alterations.They allow for the clarification of the relationships between the different layers and provide indications on the evolution of sedimentation over time.The final interpretation, resulting from the confrontation of all this data, is then proposed.
The final interpretation, resulting from the confrontation of all this data, is then proposed.
Recommended prior knowledge:
Basics of sedimentology and general geology.
Content of the subject:
1- Unconsolidated sedimentary series (Sample collection, sample treatment: Granulometry, Morphometry, Morphoscopy, exoscopy, calcimetry, washing-sorting techniques).
2- The consolidated sedimentary series (surveying and analysis of geological sections, study methods: cartographic methods: isopaque maps, facies maps, and paleogeographic maps).
3- The detrital series.
4 -The carbonate series.
Lab Session Content (2h.00)
LABORATORY STUDY TECHNIQUES
- Preparation of thin sections

- Washing and sorting techniques
- Fossil extraction methods (chemical and mechanical).
- Analyses and techniques: granulometry, morphometry, morphoscopy, and exoscopy.
- Calcimetry.

Evaluation method

Continuous assessment, Exam

Bibliographic references

- Environmental Geology: Methods, Case Studies, and Glossary by Tarits et al. (2002).
- Sedimentology Manual by Vatan (2000).
- Granulometric methods by Rivière (2007).
- Geology of Clays by Georges (1964).
- Clay Mineralogy by Caillère (1982).

Master's Title: Geology of Sedimentary Basins
Semester: SEMESTER 1
Course Title: UEF2
Course Title: Course 2: Typology of Sedimentary Structures
Credits: 3
Coefficients: 2

Teaching objectives:

The marine sedimentary domain shows a diversity of depositional environments ranging from the unprotected coast influenced by rivers, creating a "mixed" (deltaic) environment, to the oceanic depths.The extent of the action of waves, swells, and storms, as well as the role of deep currents and gravitational flows, are responsible for the formation of sedimentary structures and features that will be described in detail in this content.

Recommended prior knowledge:

Sedimentology and paleontology.

Content of the subject:

1- Definitions of sedimentary structures (figures).
2- The figures of the top, middle, and base of the bed.
3- Genetic classification of sedimentary structures.

Lab content (1h30)

- Projection of examples and study of sedimentary features in current environments.
- Determination of sedimentary structures and reconstruction of paleoenvironments.

Evaluation method

Continuous assessment; Final exam

Bibliographic references

ALLEN J.R.L., (1982) - Sedimentary structures: their character and physical basis.Developments in Sedimentology 30, Elsevier, 2 Vol., 663p.
BOULVAIN, F., (2010) - Sedimentary Petrology.From rocks to processes.Ellipses, Paris, 259 pp.
CHAMLEY H., (1986) - Continental and marine paleoenvironments expressed by the west Pacific

Master's Title: Sedimentary Basin Geology
Semester: SEMESTER 1
Title of the UE: UEF3
Course Title: Course 1: Integrated Stratigraphy and Chronology of Sedimentary Sequences
Credits: 4
Coefficients:2
Teaching objectives
This unit is dedicated to teaching the various methods of stratigraphy, their principles, but also their limits of application.This instruction will allow the student to have a broader scope for better dating of geological formations.Mastering these various methods will allow him to apply high-resolution stratigraphy, which remains the most reliable and widely used currently.
Recommended prior knowledge
Basic concepts of stratigraphy from L2
Content of the subject
- the different stratigraphic scales (Biostratigraphic, chronostratigraphic, magnetostratigraphic, seismostratigraphic, tectonostratigraphic, continental, and marine).
- Correlations
TD Content (1h30)
- Examples of scales and correlations and summaries.
- A series of exercises based on examples of geological sections: lithological subdivision, establishment of a lithostratigraphic column, biozonations and bioevents, lithostratigraphic correlation, calibration using paleomagnetism and relative dating, correlation and paleogeography, and synthesis.
Evaluation method
Continuous assessment; Exam
Bibliographic references
POMEROL Ch. (1987): Methods of Stratigraphy.Doind ed.
AUBOIN J. (1988): A Concise Guide to Geology: Stratigraphy.Dunod ed.
GIDON M. (1987): Tectonic Structures.Manuals & Methods.BRGM ed.
DERCOURT J. (1990): Geology: Objects & Methods.Dunod ed.

Master's Title: Sedimentary Basin Geology
Semester: SEMESTER 1
Course Title: UEF3
Course Title: Course 2: Paleo-Bioenvironments
Credits: 3
Coefficients: 2

Teaching objectives
Allow the student to collect paleontological data to create a paleoenvironmental reconstruction.
Content of the subject
- Continental environment and its characteristic biological component
- Coastal environment and the characteristic biological component
- Infralittoral environment the characteristic biological component
- Barrier environment the characteristic biological component
- Ocean basin environment, the characteristic biological component.

TD Content (1h.30)
Some examples of Paleoenvironment Reconstructions:
in a continental environment.
in a marine environment.
Evaluation method
Continuous assessment; Exam
Bibliographic references
- Doctoral theses
- Paul Saint Martin, 1987 - The Coral Reef Formations of the Upper Miocene of Algeria and Morocco: Paleoecological and Paleogeographical Aspects.
- Chikhi Ouimer Fatoma – The rudists of the Cretaceous of Algeria

Master's Title: Sedimentary Basin Geology
Semester: SEMESTER 1
Title of the UE: UEM1
Course Title: Course 1: Field Trips
Credits: 4
Coefficients: 2

Teaching objectives
Analysis of sedimentary series; sampling and content determination; structural analysis.
Recommended prior knowledge
Internship of the second and third year.
Content of the subject (Program and purpose of the field trips)
Fieldwork on varied sedimentary series.
Evaluation method
Internship report or summary
Bibliographic references
Topographic maps, geological maps, theses, doctoral dissertations…

Master's Degree: Sedimentary Systems
Semester: 1
Course Unit (UE): UEM2
Course Title: Structural Analysis
Credits: 4
Coefficient: 2

Course Objectives :

- Understand the geometry and formation mechanisms of tectonic structures.
- Introduce certain tectonic features while addressing basic mechanical aspects of geological material deformation.

Recommended Prerequisites:

Students should preferably have a basic understanding of:

- Tectonics

- Geometry
- Geomorphology

Course Content :

I. Experimental Deformation

- Principles and descriptive elements of the method
- Applications and limitations
- Example experiments:
    - Horizontal movements
    - Convergence
    - Diapirism

II. Discontinuous Deformation and Brittle Tectonics

- Shear theory and stress concepts
- Material strength and rupture laws (Mohr's theory)

III. Natural Fracturing

- Types of fractures: fracture models in the Aurès, Tellian, and Saharan Platform regions
- Associated microscopic structures
- Fracture study methods: Arthaud's and Angelier's methods

IV. Ductile Deformation

- Descriptive analysis of folds
- Kinematic models of folding
- Foliation and lineation in deformed rocks
- Formation processes of foliation and lineation
- Kinematic markers

V. Continuous (Ductile) Deformation

- Concept of structural levels
- Shearing in ductile environments:
    - Deep thrusting
    - Detachment faults
    - Deep continental extension

Practical Work (Lab sessions):

- Stereographic projection of linear and planar elements with interpretation
- Structural sketch analysis and commentary
- Structural analysis
- Analysis and interpretation of Atlas Mountains fracturing

- Creation of geological cross-sections
- Photogeological interpretation

Assessment Method:

- Continuous assessment and final exam

References (Books, Handouts, Websites, etc.):

- *Tectonique* by Mercier, Vergely, and Aubouin (2004)
- *Précis de géologie, vol. 3: Tectonique, Tectonophysique* by Aubouin (2007)
- *Dictionary of Plate Tectonics and Geodynamics* by Vila (2000)
- *Rock and Mineral Deformation: Introduction to Tectonics* by Nougier (2000)
- *Plate Tectonics* by Whestphal, Whitechurch, and Munschy (2002)

Master's Title: Sedimentary Basin Geology
Semester: SEMESTER 1
Title of the UE: UED1
Credits: 1
Coefficients: 1
Teaching Objectives
Students are introduced to the interpretation of satellite and aerial imagery with the aim of mapping different terrains and geological structures.
Recommended prior knowledge
Geological mapping and computer handling

Content of the subject
First Part: Reminders on Basic Concepts in Cartography
1. Definition of cartography
2. The geodetic tool
3. Terrestrial reference system
4. The cartographic projection
♣ Conformal projections
Equivalent projections
♣ aphylactic projections
Second Part: Fundamental Concepts of Remote Sensing
1. Definitions
1.1. Geomatics
1.2. Remote sensing
1.3. Aerial photography
2. Physical principles of remote sensing
2.1. Electromagnetic radiation and its interactions with matter:
2.2. Spectral signatures
2.3. Color in remote sensing
3. Remote sensing platforms and sensors

Third Part: Image Processing in Remote Sensing
1. Image preprocessing
1.1. Radiometric corrections
1.2. Geometric correction
2. Image processing
2.1 Enhancement
2.2 Filtering
2.3 Thresholding
2.4 ACP
2.5 The indices (ratios and others)
2.6 Image Classification

Mode of evaluation

Exam

Bibliographic references

Bonn, F. and Rochon, G., 1992: Remote Sensing Handbook, Vol. No. 1: Principles and Methods,Quebec, PUQ/AUPELF, 477 p.
Bonn (F., under the direction of), 1996: Remote Sensing Handbook, Vol. No. 2: Thematic Applications.Quebec, PUQ/AUPELF, 642 p.
- Girard M-C. and Girard C., 2004: Remote Sensing Data Processing.Paris, DUNOD, 529p.
– Robin M., 2002, Remote Sensing – From Satellites to GIS. 2nd edition, Paris, NATHAN, 318p.

Master's Title: Geology of Sedimentary Basins
Semester: SEMESTER 1
Course Title: UET1
Course Title: Course 1: Scientific English
Credits: 1
Coefficients: 1

Teaching objectives

Allow the student to improve their knowledge of the English language and to get acquainted with the practice of oral communication through various presentations in English.

Recommended prior knowledge

Content of the subject

Work on various scientific documents in English related to geology.

Mode of evaluation

Exam

Bibliographic references

SEMESTER 2

Master's Title: Sedimentary Basin Geology
Semester 2
Title of the course: UEF1: Biomarkers and Bio-events
Course Title: Course 1: Paleontological Markers
Credits: 4
Coefficients: 3

Objectives of the teaching
The teaching aims at the inventory and analysis of fossil taxa that are markers of paleontological, stratigraphic events...
Recommended prior knowledge
Basic concepts of Biostratigraphy from L2 and L3.
Content of the subject
1- Introduction
2- Notion of stratigraphic fossils
3- Examples of stratigraphic macrofossils from:
- The Paleozoic Era.
- The Mesozoic Era.
- The Cenozoic Era.
4- Examples of stratigraphic microfossils from:
- The Paleozoic Era.
- The Mesozoic Era.
- The Cenozoic Era.
5- Other groups of stratigraphic interest
6- Correlation of biozones from different fossil groups (examples: The establishment of biostratigraphic scales based on the appearance, disappearance, and association of microfossils and macrofossils as events to serve a biochronological division).
Lab content (2h.00)
Examples: study of some stratigraphic successions of some marker fossils: ammonoids, foraminifera, fossil vertebrates: equids, others.
Evaluation method
Continuous assessment; Exam
Bibliographic references
Berggren; W. A, Hilgen; F. J., Langereis; C. G., Kent; D. V., Obradovich; J. D., Isabella Raffi; Raymo; M. E., Shackleton, N. J.1995- Late Neogene chronology: New perspectives in high-resolution stratigraphy.GSA Bulletin (1995) 107 (11): 1272–1287.
Goldshtein et al.
W. A. Berggren, D. V. Kent, C. C. Swisher, III, M-P. Aubry (1995).Una geocronología y cronoestratigrafía cenozoica revisada en: Geocronología, escalas de tiempo y correlación estratigráfica global, Publicación Especial SEPM No. 54 (Sociedad de Geología Sedimentaria): 129-2012.ISBN 1-56576-024-7.
W. A. Berggren and P. N. Pearson (2005).Una zonación revisada de foraminíferos planctónicos del Paleógeno tropical a subtropical.Journal of Foraminiferal Research, vol. 35, no. 4, pp. 279-298.
It seems that your message is empty. Could you please provide the text you'd like me to translate?3. Claude Babin (2005).Stratigraphy and biomarkers.Cahiers François Viète, 9-10, 2005, 175-187.
Cahiers François Viète, 9-10, 2005, 175-187. Y. Gourinard, J. Magné, M. Ringeade, M.-J. Fondecave-Wallez (1999).Y. Gourinard, J. Magné, M. Ringeade, M.-J. Fondecave-Wallez (1999).Comparison of 87Sr/86Sr ages and grade-datings of some classic sites of the Lower

Miocene in Bordeaux (France).C. R. Acad. Sci., Paris, 329: 61-64.
Y. Gourinard 1983.Some observed rates of evolution in Neogene foraminiferal lineages.Chronological uses,C. R. Acad. Sci. Paris, 297, series II, 269-272.
F. Lirer, L. M. Foresi, S. M. Iaccarino, G. Salvatorini, E. Turco, C. Cosentino, F. J. Sierro, A. Caruso.(2019).Mediterranean Neogene planktonic foraminifer biozonation and biochronology.Earth-Science Reviews, 196, 102869: 1-36.
F. M. Gradstein, J. G. Ogg, M. D. Schmitz, G.M. Ogg (2012).La Escala de Tiempo Geológico.Elvevier Edition, 1127 p.

Master's Title: Sedimentary Basin Geology
Semester: SEMESTER 2
Title of the UE: UEF1: Biomarkers and Bio-events
Title of the subject: subject 2: bio-events
Credits: 4
Coefficients: 2

Teaching objectives
Materialize the major divisions of geological eras.
Recommended prior knowledge
The concepts of paleontology, micropaleontology, stratigraphy, and paleobiogeography.

Content of the subject
1- Definition of biological crises
-The major crises
-Intermediate crises
The types of crises (cosmic, paleobiogeographic, climatic, tectonic)
The biological characteristics
-In a marine environment
-In continental environments
The causes
The associated geological events
TD Content (1h.30)
In the form of several presentations dealing with fossil groups that disappeared over geological timescales.
In the form of several presentations dealing with fossil groups that disappeared over geological time. Evaluation method
Evaluation method
Continuous assessment; Exam
Bibliographic references
W. A. Berggren, D. V. Kent, C. C. Swisher, III, M-P. Aubry (1995).Una cronología y cronoestratigrafía cenozoica revisada en: Geocronología, escalas de tiempo y correlación estratigráfica global, Publicación Especial SEPM No. 54 (Sociedad de Geología Sedimentaria): 129-2012. ISBN 1-56576-024-7.
W. A. Berggren and P. N. Pearson (2005).Una zonación revisada de foraminíferos planctónicos del Paleógeno tropical a subtropical.Journal of Foraminiferal Research, vol. 35, no. 4, pp. 279-298.
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Cahiers François Viète, 9-10, 2005, 175-187. Y. Gourinard, J. Magné, M. Ringeade, M.-J. Fondecave-Wallez (1999).Y. Gourinard, J. Magné, M. Ringeade, M.-J. Fondecave-Wallez (1999).Comparison of 87Sr/86Sr ages and grade-datings of some classic sites from the Lower Miocene of Bordeaux (France).C. R. Acad. Sci., Paris, 329: 61-64.
Y. Gourinard 1983.Some rates of evolution observed in Neogene foraminiferal lineages.Chronological uses,C. R. Acad. Sci. Paris, 297, series II, 269-272.
F. Lirer, L. M. Foresi, S. M. Iaccarino, G. Salvatorini, E. Turco, C. Cosentino, F. J. Sierro, A. Caruso. (2019).Biozonación y biocronología de foraminíferos planctónicos del Neógeno mediterráneo.Earth-Science Reviews, 196, 102869: 1-36.
F. M. Gradstein, J. G. Ogg, M. D. Schmitz, G. M. Ogg (2012).La Escala de Tiempo Geológico.Elvevier Edition, 1127 p.
Elvevier Edition, 1127 p.

Master's Program Title: Sedimentary Basin Geology
Semester 2
Title of the UE: UEF2: Sedimentary Environments
Title of the subject: subject 1: Continental domain
Credits: 4
Coefficients: 2

Teaching objectives
The student is introduced to the specifics of continental deposits and terrains based on paleontological and lithological content.

Recommended prior knowledge
Basic knowledge in sedimentology, stratigraphy, and paleontology.

Content of the subject
Program
1- Continental environments - presentation
2- Pedogenetic concepts (Soil and paleosols)
3- Glacial environment
4- Wind environment
5- River environment
6- The alluvial fans
7- Environment of alluvial cones and fans
8- Lacustrine, palustrine environments.
9- Other environments (karsts, travertines).
10- Laterites and laterites
11- Major "ancient" continental complexes in Algeria (Triassic, Eocene) and in Europe (red sandstone,).
Lab content (1h.30)
I- Reminders on the study of continental detrital and carbonate rocks in microscopy.
II- Study of examples of continental faunas and floras from some Algerian continental outcrops:El Kohol (Brézina); Méridja-Dermchane (West of Béchar); Glib Zegdou (Southwest Algeria); Tafna, Bouhanifia, others....
Evaluation method
Continuous assessment; Exam
Bibliographic references

Doctoral theses on Algerian continental terrains
Mahboubi M. 1995.Geological and paleontological study of Paleocene and Eocene continental formations in Algeria, University of Oran, Institute of Earth Sciences.
Mebrouk F. 2011.The charophytes of the Maghreb, systematics, biostratigraphy, and Cretaceous-Paleogene environments.State doctoral thesis, University of Oran, Department of Earth Sciences. 136 p.
Adaci M., 2012-The continental Paleogene of southwestern Algeria (Lithostratigraphy, paleontology, and sedimentology).PhD thesis in Science, University of Tlemcen, 192
ChikhM. 2018- Dinosaur footprints from the Saharan Atlas (Rhaetian to Cenomanian): ichnosystematics and paleobiogeography
Chamley H., 1988.The Sedimentary Environments, Orléans: Ed. du BRGM; Paris: Tec et Doc, 173 pp.
Cojan I. & Renard M., 2006.Sedimentology (2nd edition).Dunod, 444 pp.
Prothero & F. Schwab D., 1998. Sedimentary geology (an introduction to sedimentary rocks and stratigraphy).Freeman & Co, 422 pp.
Reading H.G., 1996.Sedimentary environments: processes, facies, and stratigraphy.Blackwell, 688 pp.Tucker M., 2001.Sedimentary petrology (3rd edition).Blackwell, 262 pp.

Master's Title: Sedimentary Basin Geology
Semester 2
Title of the course: UEF2: Sedimentary Environments
Subject title: Subject 2: Mixed domain
Credits: 4
Coefficients: 2

Teaching objectives
Teaching students to describe the different types of mixed deposits through examples (deltaic sedimentation...) the particular characteristics of sedimentation in coastal environments.
Recommended prior knowledge
Basics of Sedimentology: Erosive phenomena, transport processes, and diagenetic processes.

Content of the subject
I- Deltas.
II- Estuaries.
III- Coastal environments

Lab content (1h.30)
Petrographic study of the different facies of deltaic environments.
Examples: Delta of the Ksour…
Examples: Delta des Ksour… Evaluation method
Evaluation method
Continuous assessment+ Exam
Bibliographic reference.
Bernard Biju-Dival, 2002: Sedimentary Geology.
DELFAUD J. (1974):Scalar typology of sedimentary sequences based on the depositional environment.B.S.G. F, (7), XVI, no. 6, 643-649.
Gary Nichols, 1999: Sedimentology and Stratigraphy.
GeanFrançois Deconineck, 2016: Paleogeography and Sedimentary Environments.Corrected exercises and lessons.

Gilles Merzeraud, 2017: Sedimentology.
Harold G. Reading, 2016: Sedimentary Environments: Processes, Facies, and Stratigraphy.
Herket.M: Compiled course notes intended for L3 undergraduate students.
Hervey Chamley, 2011: Fundamentals of Sedimentology, 3rd edition.
Isabelle Cojan, 2003: Sedimentology: Course.
Purser, B.H. 1980a.Sedimentation and diagenesis of recent neritic carbonates (Volume 1).Publications of the French Institute of Petroleum,
Purser, B.H. 1980b. Sedimentation and diagenesis of recent neritic carbonates (Volume 2).Publications of the French Institute of Petroleum.
SEDIMENTOLOGY, 2nd edition,Isabelle Cojan and Maurice Renard, Dunod, 2006.
Doctoral theses by Abed, Harket, Aït Ouali.

Master's Title: Geology of Sedimentary Basins
Semester 2
Title of the course: UEF2: Sedimentary Environments
Subject title: subject 3: Marine domain
Credits: 4
Coefficients: 2

Teaching objectives
This course should enable a good mastery of sequential analysis, sequential stratigraphy, correlations, and the interpretation of depositional environments, as well as the geometry of sedimentary fills.
Recommended prior knowledge
Basic knowledge of sedimentology; on rocks and sedimentary suites

Content of the subject
- Introduction and reminders:present the marine environment in general:
- Carbonate platforms
- Intertidal environments
- The infra tidal.
- Internal platform (Lagoons)
- Barrier environments (the Australian barrier reef, reef and oolitic)
- External platform.

TP Content (1h.30)
Petrography (microscopic) of carbonate rocks (supratidal environment: stromatolites, intertidal, infratidal, inner platform, barrier, outer platform).
Evaluation method
Continuous assessment+ Exam
Bibliographic references
Elf Aquitaine Works 1980.
Purser, B.H. 1980a.Sedimentation and diagenesis of recent neritic carbonates (Volume 1).Publications of the French Institute of Petroleum,
Purser, B.H. 1980b. Sedimentation and diagenesis of recent neritic carbonates (Volume 2).Publications of the French Institute of Petroleum.Theses conducted on the Atlas
Saint Martin 1990.The reefs of Algeria and Morocco.
BASICS OF SEDIMENTOLOGY.Jean-François Deconinck, Hervé Chamley Collection: Sciences Sup, Dunod, 2011 - 3rd edition - 224 pages.
SEDIMENTOLOGY, 2nd edition,Isabelle Cojan and Maurice Renard, Dunod, 2006.

SEDIMENTARY BASINS.EVOLUTION AND SEDIMENT BUDGET.Springer – Verlag, Berlin, 628 P.
PRINCIPLES OF SEDIMENTARY BASIN ANALYSIS.Springer-Verlag, Heidelberg, 667 p.
GEOLOGY OF SURFACE FORMATIONS.Campy M. and Macaire J.J. Masson (1989).
SEDIMENTOLOGY.Cojean I. and Renard M. Dunod (1999).
ELEMENTS OF GEOLOGY.Pomerol C., Renard M. and Lagabrielle Y. Dunod (2000).
ENVIRONNEMENTS SÉDIMENTAIRES : PROCESSUS, FACIES ET STRATIGRAPHIE.Reading H., Blackwell (1996).

Master's Title: Sedimentary Basin Geology
Semester 2
Title of the UE: UEM1:
Course Title: Course 1: Fieldwork
Credits: 4
Coefficients: 2

Teaching objectives
Study of sedimentary series and mapping of sedimentary bodies.
Recommended prior knowledge
Bachelor's and Master's 1 internships
Content of the subject
Studies of sedimentary series (Paleozoic or Mesozoic or Cenozoic).
Evaluation method
Grading of the internship report
Bibliographic references
Geological maps, theses, dissertations

Master's Program Title: Sedimentary Basin Geology
Semester 2
Title of the UE: UEM2:
Course Title: Course 1: Geophysical Survey Methods
Credits: 4
Coefficients: 2

Teaching objectives
Introduce students to the geophysical methods used in the exploration of subsurface geological structures.
Recommended prior knowledge
General knowledge in geophysics and geological structures
Geophysics, geological structures, physics, mathematics.

Content of the subject
1. General introduction.
2. Gravimetric methods.
3. Magnetic methods.
4. Seismic methods.
5. Electrical methods.

6. Electromagnetic methods.
7. Diagraphies.

TD Content (1h.30)

Study of recording examples for each method.

Evaluation method

Continuous assessment+Exam

Bibliographic references

DUBOIS, J. et al., 2016.Geophysics – Course with solved exercises.5th edition.Dunod.
KEAREY, Ph. & al., 2002.Una introducción a la exploración geofísica.3rd edition.Blackwell.
REYNOLDS, J. M., 2011.An introduction to applied and environmental geophysics. 2nd edition.Wiley - Blackwell.
TELFORD, W. M. et al., 1991.Geofísica aplicada. 2ª edición.Cambridge University Press.
Oberto Serra –

Master's Degree Title: Geology of Sedimentary Basins
Semester 2
Title of the EU: UED1:
Subject title: subject 1: Stratotypes
Credits: 1
Coefficients: 1

Teaching Objectives

This program aims to acquire the principles, techniques, and methods of learning stratigraphy in the field.How to approach stratigraphic units and establish their relationships with chronology.
It is supposed to trace the stratigrapher's approach from local observation to synthetic series, to more general value stratigraphy, and up to the universal stratigraphic scale.
Some reminders are necessary, such as the geometry of sedimentary bodies and the techniques of relative dating.The evaluation and measurement of the duration of events, their speed are also addressed.
The stratigraphic units are discussed (lithostratigraphy) by addressing the reference units (stratotypes).The achievement of biostratigraphic units (biozones and their reliability), chronostratigraphic units (chronozones) will be the main objective.

Recommended prior knowledge

Fundamental concepts of stratigraphy.

Content of the subject

A. TIME IN GEOLOGY, THE STRATIGRAPHIC APPROACH
I. The fundamental concepts of time
1. Succession: chronology and time dimension of stratigraphy
2. Duration: a quantitative aspect (time span, time interval,...)
3. Simultaneity: synchronism and correlation
II. The stratigraphic approach to time
1. The document and its significance
2. The representation of time
a) Scales and stratigraphic grids: representation based on a chronological succession
b) Second mode of representation: a variable as a function of time.
3. Situating an event in time: dating.
III. The stratigraphic approach: from local observation to the universal stratigraphic scale,

principles and methodology.
1. Relative dating of two or more geological entities
a) Superposition
b) Recoupment
c) Inclusion
2. Establishment of a local stratigraphic series,
3. Establishment of synthetic series
a) correlation by continuity,
b) Remote correlation
c) synthetic series
4. Transition to stratigraphic units of more general value
a) Difficulty in establishing a succession valid for all geological times and for all places on the globe.
b) Necessity of groupings: chronostratigraphic units
5. Universal stratigraphic scale.
IV. Duration.
1. Duration and speed
2. How to evaluate duration
3. Measurement of duration
4. Finesse in the evaluation of duration
B. THE STRATIGRAPHIC UNITS
1. Stratotipos
*Holostratotype
*Parastratotype
*Lectostratotype
*Néostratotype
*Hypostratotype (or reference section)
2. Lithostratigraphy
2. Lithostratigraphy
3. Biostratigraphy
A. Association zones = cenozones
B. Extension zones = acrozone
a) Range of a taxon
b) Zones of concomitant extension (zones of concomitance, zones of coexistence, zones of overlap).
C. Abundance zones or apogee zones
D. Interval zones.
4. Chronostratigraphy
* Chronozone
* Stage (tectonic stage, mammalian stages)
* Series and epochs
* Systems and periods
* Erathemes and eras
* Eonothems and eons
* Chronostratigraphic scale and geochronological scale
5. Relationships between lithostratigraphy, biostratigraphy, and chronostratigraphy
II. Precision and reliability of biozones
• Sample preparation
• Species identification
• Influence of climatic factors

• Simultaneous influence of geographical, ecological, and climatic factors
• Influence of the environment
• Heterochronism of the footprints compared to the skeletal remains belonging to the same species
• Reworking
• Influence of sedimentation and diagenesis

Mode of evaluation

Exam

Bibliographic references

Allen PA, Homewood P. Evolution and mechanics of a Miocene tidal sandware; Sedimentology, 31, 1984, 63-81.
Bonhomme M. The concept of time in geology: a physicochemical approach.Mem. hors-série, Soc. Géol. de France, Jubilee Book, no. 10, 1980, 119-123.
Chaline J. et al.Problems of Quaternary Stratigraphy in France and Neighboring Countries.Bull. of the AFEQ, no. 1, 1980, 369 p.
Chevalier C.Pomerol Ch. Stratigraphy of the Paleogene.Bull Soc Géol France, 1986; 2: 255-265.
French Stratigraphy Committee.Principles of stratigraphic classification and nomenclature.Soc. Géol. France, 1962.
Pomerol Ch. Stratigraphy: principles, methods, applications,Doin éd., Paris, 3rd edition, 1987.
Doin éd., Paris, 3rd edition, 1987.

Master's Title: Sedimentary Basin Geology
Semester 2
Title of the EU: UET1:
Course Title: Course 1: Scientific English
Credits: 1
Coefficients: 1

Teaching objectives

The objective is to familiarize the student with scientific English.

Recommended prior knowledge

It seems there is no text provided for translation.

Content of the subject

Studies of scientific articles related to the geology specialty.Translations of articles and synthesis.

Mode of evaluation

Exam

Bibliographic references

SEMESTER 3

Master's Title: Sedimentary Basin Geology
Semester 3
Title of the UE: UEF1: Sequential Organization of Sedimentary Bodies
Course Title: Course 1: Sequential Analyses
Credits: 4
Coefficients: 2

Teaching objectives
Introduction to the study of sedimentary successions using an analytical method based on the collection of real data in the geological field and their interpretation.Decipher the vertical and lateral evolution of sedimentary body successions and concepts of stratigraphy.

Recommended prior knowledge:
Subjects of sedimentary petrography, sedimentology, and paleontology.Sedimentary structures and environments

Content of the subject
1- Introduction
- Definition of sedimentary successions:
- Definition of sequential analysis:
2- The contribution of sequential analysis.
- Factor controlling sedimentation
- Chemistry.Depth, dynamics
- Eustasy. tectonics. sedimentary inputs. climate.
3- Lombard virtual series
- Definition.
- Training.
- Limit.
4- rhythmic cycles
- Concept of cycles in geology
- Sedimentary cycles
- Main mechanisms
5- Facies and facies association
- Definition of facies.
- Lithofacies and biofacies
- Association of facies and depositional environments.
6- Stratonomy and granulometry
7- The sequences
- General definition
- The Delfaud sequence;
- The composite sequence Basset and Walton;
- The typical sequences
8- The limits of sequences and discontinuities
- Definition
- Classification.
9- Reduced series (condensed).
10- Sequential orders (variable scale sequences).
11- Work methodology through sequential analysis.
12- Sequential correlation.
13- Deposit models.

14-Limits of sequential analysis.

Content of the tutorial (1h.30)

- Application exercises in a detrital context.
- Application exercises in a carbonate context.
- Exercises for correlations.
- Synthesis exercises with other methods of analyzing sedimentary series.

Evaluation method

Continuous assessment + Exam

Bibliographic references

LOMBARD A. (1956): Sedimentary geology: marine series.Dunod.
DELFAD J. (1974): Scalar typology of sedimentary sequences based on the depositional environment.B.S.G. F, (7), XVI, no. 6, 643-649.
KAZI-TANI N. (1986): Doctoral Thesis.
CHAMELEY H. (1988): Sedimentary Environments.BRGM ed.
READING H.G. (1996): Sedimentary environments.Blackwell Science ed.
COJAN I & RENARD M. (1999): Sedimentology.Dunod ed.

Master's Program Title: Sedimentary Basin Geology
Semester 3
Title of the course: UEF1: Sequential Organization of Sedimentary Bodies
Title of the subject: Subject 2: Sequence and Genetic Stratigraphy
Credits: 4
Coefficients: 2

Teaching objectives

Sequential and genetic stratigraphy, this teaching is based on the concept of sea level variation either due to climatic causes (THF and HF sequences) or tectonics (tectono-eustasy) resulting in low-frequency sequences.How to decipher sedimentary series in order to establish the eustatic signal?This is the objective of this course, through the models of genetic stratigraphy "stacking-pattern" and the models of sequential stratigraphy.Then, relate the results of sequential analysis and sequential stratigraphy at the regional scale.

Recommended prior knowledge

Subjects of sedimentary petrography, sedimentology, and sequence analysis.

Content of the subject

Chapter I: Generalities: Sequential Stratigraphy Language.
I.1. Definition.
I.2. Indicators of sea level variation.
I.3. The sedimentary record of sea level variations.
Chapter II: From seismic stratigraphy to sequence stratigraphy.
II.1. Introduction.
II.1.2. Reflection seismics.
II.1.3.Geometric definition of a depositional sequence.
II.1.4. The terminology of seismic stratigraphy according to EXXON.
II.1.5.From seismic variation to sea level changes.
Chapter III: Modeling Deposit Sequences.

IIL.1. Introduction.
IIL.2. Objective of the modeling.
IIL.3.Stages of sedimentary assemblage formation and their relationships with sea level variations.
Chapter IV Sequential Stratigraphy of Carbonate Deposits
Chapter V. The sequences at outcrop or in drilling:The genetic sequences
V.1. Introduction
V.2.Sequential stratigraphy without the sea level
V.3.Recognition of sea level changes based on fluvial facies
V.4. The stages of recognizing a genetic sequence.
It seems there is no text provided for translation. Please share the text you'd like me to

Content of the tutorial (1h.30)

Application to the analysis of Meso-Cenozoic series in various geological domains of Algeria. Delimitation and recognition of depositional sequences.

Evaluation method

Continuous assessment +Exam

Bibliographic references

ANDREW D. 2013: Sequence stratigraphy and geologic time. University of Toronto.
Gilles Merzeraud, 2009: Sequence Stratigraphy.
J.C. VAN WAGONER, H. W. POSAMENTIER, R. M. MITCHUM, P. R. VALL, J. F. SARG.T.S. LOUTTT. AND J. HARDENBOI., 2011: An Overview Of The Fundamentals Of Sequence Stratigraphy And Key Definitions.Exxon Production Research Company.
VAIL et al. (1987): Interpretación de estratigrafía sísmica utilizando estratigrafía secuencial.Am. Ass. Petrol. Stud. Geol., 27, p. 1-10.
VAIL et al. (1987): sequence stratigraphy and its application to chronostratigraphic correlations in the Jurassic of the Paris Basin.B.S.G.F, 8, III, 1301-1321.
VAN WAGONNER et al. (1990): Siliciclastic sequence stratigraphy in well logs, cores, and outcrops: concept for high-resolution correlation of time and facies.A.A.P.G. Methods in exploration, 7, 55 p.
CROSS T.A. (1988): Controls on coal distribution in transgressive-regressive cycles, Upper Cretaceous, Western Interior, SEPM Special Pub. No. 42, 371-380.
JACQUIN T. et al. (1992): Deposition sequences and regressive/transgressive cycles in a carbonate marine environment.C.R. ac. Sc., 315, 353-362.

Master's Title: Sedimentary Basin Geology
Semester 3
Course Title: UEF2: Paleoecology and Paleobiodiversity
Course title: Course 1: Paleoecology
Credits: 4
Coefficients: 2

Teaching objectives

Introduce students to the reconstruction of environments and depositional settings through the study of fossils.

Recommended prior knowledge

General paleontology and stratigraphy.

Content of the subject

Chapter 1
I- History
II- Ecology and ecosystems
III- Subdivisions of ecology
IV- Quantitative aspects of ecology
V- Ecological factors
Chapter 2: Paleoecology
I-Definitions
II-Symmigie
III- Genesis of fossil deposits
A - Accumulation of organisms
B-Burial of organisms
C-Diagenesis
D-Classification of fossil deposits
IV- The associations of fossils
-paleo-synecology
-Paleo-biocenoses
-Characteristics of symmigees
V-Exploitation of fossil deposits.
Chapter 3: Lifestyles (Introduction to Auto-Ecology)
I- Mobility
- Aquatic organisms
- Terrestrial organisms
II- Nutrition
- Autotrophic organisms
- Microphagous organisms
- The macrophage organisms
III- Reproduction
IV- growth
V-Behavior
Chapter 4: Conditions of Existence (Auto-ecology and Environment)
I- The quality of the substrate
- Hardened substrates
- The soft substrates
II- Salinity
- Marine organisms;
- The organisms of brackish waters
- The freshwater organisms
III- The turbulence of the waters
IV- The oxygenation of the waters
V- The turbidity of the waters
VI- Bathymetry
VII- Temperature and Climate
- The organisms of warm waters
- The organisms of cold waters
- Measurements of paleotemperatures
- Rhythm of the seasons.

VIII- Taphonomy

TP Content (1h.30)

Examples of paleoecological reconstructions.

Evaluation method

Continuous assessment +Exam

Bibliographic references

- Adnet, S et al. 2013- Principles of Paleontology, Dunod Edition, Paris.
- De Wever, P., David B., and Néraudeau D. 2010- Paleobiosphere, Edit. Vuibert 787 p
- Lethiers, F. 1998- Evolution of the biosphere and geological events, Edit G. and B. Sci. Pub. 321 p.
- Tortosa, T., 2013- Principles of Paleontology, Ed. Dunod 329 p.

Master's Title: Sedimentary Basin Geology
Semester 3
Title of the UE: UEF2:
Course Title: Course 2: Paleo-biodiversity and Paleo-biogeography
Credits: 4
Coefficients: 2

Teaching objectives

Know the processes that have influenced biodiversity over geological timescales as well as the major biological events in the history of life on Earth.

Recommended prior knowledge

Having completed the courses offered in S3 and S4, namely the courses on paleontology and global biogeography.

Content of the subject

I. Concept of biodiversity
II. Estimation of paleobiodiversity
1. Problem of fossilization and taphonomy
2. Sampling
3 Taxonomic effect
III. Factors of biodiversity
1. External
- Climate
- Paleogeography and eustasy
- Volcanism
2. Internals
-Natural selection
IV. The greatest stages of the evolution of the biosphere through geological times
V. Bio events
1. Definition of a biological crisis
2. Some major extinctions
- Late Ordovician Extinction
- Late Devonian Extinction
- Crisis of the boundaryPermo-Triassic
- Late Triassic Crisis
- Cretaceous-Paleogene Extinction

3. Extinction and evolution

Content of the tutorial (1h.30)

Presentation on biodiversity and paleobiodiversity.

Evaluation method

Continuous assessment + Exam

Bibliographic references

PALEOBIOSPHERE.Patrick de Wever, Bruno David, Didier Néradeau.Vuibert, 2010
ELEMENTS OF PALEONTOLOGY.Claude Babin, ARMAND COLIN, 1971.
POPULATIONS, SPECIES, AND EVOLUTION.Ernest Mayr, HERMAN, 1974.

Teaching Unit: Methodology

Subject: Mineral and Energy Resources

Credits: 4

Coefficients: 2

Teaching objectives

Useful substances (in sedimentary geology) are varied (composition and economic interests). The student must have a general idea of the different useful substances from the point of view of composition, uses, prospecting methods adapted to each substance and the general conditions of their occurrence.

Course content

1- Concepts of natural resources (Resources, reserves,recovery factor and discovery)
2- Petroleum compounds and hydrocarbon classification
3- Formation of hydrocarbons
4- Hydrocarbon migration and trapping.
5- Petroleum system
6- Major oil provinces in the world
7- Algerian hydrocarbon field
8- Notions of deposit. Province. play. field. district. perimeter. units of measurement and hydrocarbon exploration and production technics.
9- Non-conventional hydrocarbon resources
10- Coal ressources
11- Mineralization associated with sedimentary basins
12- Water resources
13- Renewable energies

TD/TP content (1h.30)

in the form of presentations

Determination of the different types of ore of sedimentary origin and presentations.

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

Evaluation method

Continuous assessment + Exam

Bibliographic references

Arndt et al, 2015, Ressources minérales - 2e édition Sciences Sup, Dunod, pp 224.

Berton Y & Le Berre P. (1990) : Guide de prospection des matériaux de carrière. BRGM éd. & OPU.

Biteau J.J et Baudin F.. 2017. Géologie du pétrole: Historique. genèse, exploration, ressources, Sciences Sup. Dunod pp 361.

Chaussier J.B. & Morer J. (1981) : Manuel du prospecteur minier. BRGM éd.

Perrodon A. (1987) : Profession : Géologue pétrolier. Elf Aquitaine éd.

Selley Riclhard C.. Sonnenberg Stephen A., 2014, Elements of Petroleum Geology

Wec. 2007 (Document Sonatrach et Schlumberger), pp 536.

Master's Program Title: Sedimentary Basin Geology
Semester 3
Title of the UE: UEM1:
Course Title: Course 1: Biometrics and Biostatistics
Credits: 4
Coefficients: 2

Teaching objectives

Teach students to perform a minimum of rigorous statistical analyses of data.
This subject allows students to integrate statistical and computational tools in the field of paleontology, and to use numerical analysis, probability, and computation through computer tools.
The practical sessions will mainly cover statistical calculations and the learning of some specialized software.

Recommended prior knowledge

The student must have knowledge of functions, integrals, and random variables (Mathematics, statistics, computer science).

Content of the subject

PART 1. BIOSTATISTICS
Chapter I: Descriptive Statistics
1 – Nature of statistical variables
2 – Calculation of position parameters
3 – Graphical representation of distribution series
4 – Calculation of distribution parameters
Chapter II: Inferential Statistics
1 – Introduction to distribution laws: normal distribution
2 – Principle of tests: conformity test

3 – Comparison of several means: one-way ANOVA
4 – Two-way analysis of variance:ANOVA2
5 - Two-way repeated measures ANOVA
Chapter III: Correlation of Two Variables
1 – Regression with one explanatory variable
2 – Determination of the correlation coefficient
3 – Determination of the slope of the line
Chapter IV Non-parametric Tests
1 – Case of two independent samples
1.1– Mann-Whitney Test
1.2 - Median test
2 – Case of paired samples
2.1 – Wilcoxon Test
2.2 – Sign test
3 – Case of multiple samples
3.1 – Kruskal-Wallis Test
3.2 – Kolmogorov-Smirnov Test
3.3 – Fisher's Test
3.4 – Spearman correlation test
3.4 – Spearman correlation test Chapter V: Multivariable data analysis
Chapter V: Multivariate Data Analysis
1 – Principal Component Analysis (PCA)
2 – Multiple correspondence analysis (MCA)
3 – Multiple linear regression
4 – Discriminant analysis
5 – Hierarchical classification
PART II. BIOMETRICS
Chapter 1. The devices
1 – Student's "couple" device
2 – The "blocks" device
3 – The "Latin square" design
4 – Other devices
4.1 – "factorial"
4.2 – "split-plot"
4.3 – "confounding"
5 – The series of tests
6 – The "incomplete block" designs
Chapter 2. Comparison of several means pairwise
1 – Duncan's Method
2 – Method of multiplied rows

Content of the tutorial (1h.30)

- Application of statistical calculations
- Principal Component Analysis (PCA)
- Factorial Correspondence Analysis (FCA)
- Use of some specialized software

Mode of evaluation

Continuous assessment + Exam

Bibliographic references

P. [2008].The experimental design is evolving...Rev. Modulad 38 (forthcoming), and Preece D.A. [1990].R.A. Fisher and experimental design: a review.Biometrics 4 6 (4), 925-935.

(Books and photocopies, websites, etc.):