ALGERIAN PEOPLE'S DEMOCRATIC REPUBLIC

MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH

Common Core Pedagogical Program

1st Year Domain

Natural and Life Sciences

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I – Semester-wise Teaching Organization Sheets

« Common Core in the "Natural and Life Sciences" Domain »

Semester 1

Units of teaching	Subject		Credits	Coefficients	Weekly Teaching Hours			SHV (15 Weeks)	Other*	Evaluation Method			
	Code	Title			Course	DW	PW			CC*		Exam	
U T Fundamental Code : UTF 1.1 Credits : 18 Coefficients : 9	F 1.1.1	General and Organic Chemistry	6	3	1h30	1h30	1h30	67h30	82h30	x	40%	x	60%
	F 1.1.2	Cellular Biology	8	4	1h30	1h30	3h00	90h00	110h00	x	40%	x	60%
	F 1.1.3	Mathematica Statistics	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
U T Methodology Code : UTM 1.1 Credits : 9 Coefficients: 5	M 1.1.1	Géology	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
	M 1.1.2	Communication and Expression Techniques 1 (in French)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
U T Discovery Code : UTD 1.1 Credits : 2 Coefficients : 2	D 1.1.1	Study Methods and Terminology 1	2	2	1h30	1h30		45h00	5h00	x	40%	x	60%
U TTransversal Code : UET 1.1 Credits : 1 Coefficients : 1	T 1.1.1	Universal History of Biological Sciences	1	1	1h30	-	-	22h30	2h30	-	-	x	100
Total Semestre 1			30	17	10h30	9h00	5h30	375h00	375h00				

Other* = Additional work during semester consultation; CC* = Continuous control.

« Common Core in the "Natural and Life Sciences" Domain »

Semester 2

Units of teaching	Subject		Credits	Coefficients	Weekly Teaching Hours			SHV (15 Weeks)	Other*	Evaluation Method			
	Code	Title			Course	DW	PW			CC		Exam	
U T Fundamental Code : UTF 2.1 Crédits : 18 Coefficients : 9	F 2.1.1	Thermodynamics and Chemistry of Solutions	6	3	1h30	1h30	1h30	67h30	82h30	x	40%	x	60%
	F 2.1.2	Plant Biology	6	3	1h30	-	3h00	67h30	82h30	x	40%	x	60%
	F 2.1.3	Animal Biology	6	3	1h30	-	3h00	67h30	82h30	x	40%	x	60%
U E Méthodology Code : UTM 2.1 Crédits : 9 Coefficients : 5	M 2.1.1	Physics	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
	M 2.1.2	Communication and Expression Techniques 2 (in English)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
U E Discovery Code : UTD 2.1 Crédits : 2 Coefficients : 2	D 2.1.1	Life Sciences and Socio-economic Impacts	2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
U E Transversale Code : UTT 2.1 Crédits : 1 Coefficients : 1	T 2.1.1	Study Methods and Terminology 2	1	1	1h30	-	-	22h30	2h30	-	-	x	100%
Total Semestre 2			30	17	10h30	6h00	8h30	375h00	375h00				

Other* = Additional work during semester consultation; CC* = Continuous control.

II - Detailed Program by Subject

Semester: 1st Semester

UE: Fundamental Teaching Unit

Subject 1: GENERAL AND ORGANIC CHEMISTRY

Teaching Objectives:

This subject aims to provide instruction on the fundamental principles of the organization and chemical structure of matter. It serves as a complement to other subjects by facilitating the understanding of biological phenomena from a chemical perspective.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

Students should have a grasp of the basic concepts of general and organic chemistry, including the structure of the atom, atomic bonding, and redox reactions.

Contenu de la matière

1.General Chemistry

1.1. Generalities

1.1.1. Atom, nucleus, isotopy,

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

1.2. Radioactivity

1.2.1. Definition

1.2.2. Natural radioactivity: main types of radiation

1.2.3. Artificial radioactivity

1.2.4. Law of radioactive decay

1.2.5. Different types of nuclear reactions

1.3. Electronic configuration of atoms

1.3.1. Introduction to quantum numbers

1.3.2. Principles governing the electronic structure of an atom:

1.3.3. Energetic rule (Klechkoweski's rule)

1.3.4. Pauli's exclusion principle

1.3.5. Hund's rule

1.4. Periodic classification

1.4.1. Group (Column), Period (Row)

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

1.5. Chemical bonding

1.5.1. Introduction: strong and weak bonds

1.5.2. Representation of chemical bonding: Lewis diagram

1.5.3. Different types of strong bonds (covalent bond, ionic bond, metallic bond)

1.5.4. Ionic character of a covalent bond

1.5.5. Molecular geometry: VSEPR Theory (Gillespie's Rule)

2. Organic Chemistry

2.1. Organic Compounds, Formulas, Functions, Nomenclature

2.1.1. Formulas of organic compounds

2.1.2. Functions, functional groups

2.1.3. Nomenclature

2.1.4. Study of organic functions - Saturated hydrocarbons, alkenes, alkanes, benzene hydrocarbons - Halogen derivatives, halides - Alcohols, thiols, ethers, phenols, polyfunctional amines, aldehydes - Polyfunctional heterocyclic compounds

2.2. Reaction mechanisms in organic chemistry

2.2.1. Resonance and mesomerism

2.2.2. Conjugation

2.2.3. Stereochemistry

2.2.4. Electronic effects

2.2.5. Nucleophilic substitutions

2.2.6. Eliminations

2.2.7. Radical reactions

2.2.8. Reduction reactions

2.2.9. Oxidation reactions

Directed Work

Practical Work 1: Fundamental concepts of chemistry (atoms, molecules, gram atoms, moles, concentration calculations)

Practical Work 2: Nucleus stability and radioactivity

Practical Work 3: Electronic configuration and periodic classification of elements

Practical Work 4: Chemical bonds

Practical Work 5: Nomenclature and stereochemistry

Practical Work 6: Reaction mechanisms

Laboratory Work

Laboratory Work 1: Principles of experimental chemistry Objective: Evaluate the student's

knowledge of the equipment used in chemistry experiments and the safety rules to be followed in the laboratory.

Laboratory Work 2: Determination of the quantity of matter Objective: Determine the quantity of matter (expressed in moles) contained in a sample and prepare a sample containing a fixed quantity of matter.

Laboratory Work 3: Preparation of solutions by dissolution and dilution Objective: Prepare a sodium chloride (NaCl) solution of normality 0.1N and prepare a hydrochloric acid (HCl) solution of normality 0.1N by diluting a 1N HCl solution.

Laboratory Work 4: Measurement of the density of... Objective: Determine the density of a saturated saltwater solution and determine the density of iron.

Laboratory Work 5: Identification of functional groups Objective: Identify functional groups: Alcohols and carbonyls.

Assessment Method Continuous assessments and semester exams

References (Books and lecture notes, websites, etc.):

Jacques Maddaluno, Véronique Bellosta, Isabelle Chataigner, François Couty, et al., 2013- Organic Chemistry. Ed. Dunod, Paris, 576 p.

Jean-François Lambert, Thomas Georgelin, Maguy Jaber, 2014- Mini Manual of Inorganic Chemistry. Ed. Dunod, Paris, 272 p.

Elisabeth Bardez, 2014- Mini Manual of General Chemistry: Chemistry of Solutions. Ed. Dunod, Paris, 256 p.

Paula Yurkanis Bruice, 2012- Organic Chemistry. Ed. Pearson, 720 p.

Jean-Louis Migot, 2014- Analytical Organic Chemistry. Ed. Hermann, 180 p.

Semester: 1st Semester

UE: Fundamental Teaching Unit

Subject 2: CELLULAR BIOLOGY

Teaching Objectives: The objectives of this course are to introduce students to the living world at the cellular level, to acquire basic concepts of eukaryotic and prokaryotic cells, and to study cellular components. These objectives are reinforced through practical laboratory sessions.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

Students should have knowledge in General Biology.

Contenu de la matière

1. **Généralités**
   - 1.1. Classification et importance relative des règnes
   - 1.2. Cellule et théorie cellulaire
   - 1.3. Origine et évolution
   - 1.4. Types cellulaires (Procaryote, Eucaryote, Acaryote)
2. **Méthodes d'étude de la cellule**
   - 2.1. Méthodes de microscopie otique et électronique
   - 2.2. Méthodes histochimiques
   - 2.3. Méthodes immunologiques
   - 2.4. Méthodes enzymologiques
3. **Membrane plasmique: structure et fonction**
4. **Cytosquelette et motilité cellulaire**
5. **Adhésion cellulaire et matrice extracellulaire**
6. **Chromatine, chromosomes et noyau cellulaire**
7. **Ribosome et synthèse des protéines**
8. **Le système réticulum endoplasmique-appareil de Golgi**
9. **Le noyau inter phasique**
10. **Le système endosomal: endocytose**
11. **Mitochondrie**
12. **Chloroplastes**
13. **Peroxysomes**

14. Matrice extracellulaire

15. Paroi végétale

Travaux dirigés / Travaux pratiques

1. **Méthodes d'étude des cellules**
   - 1.1. Séparation des constituants cellulaires
   - 1.2. Observation des constituants cellulaires
   - 1.3. Identification des constituants cellulaires
   - 1.4. Paroi végétale
2. **Cultures cellulaires**
3. **Tests des fonctions physiologiques**
   - 3.1. Reconstitution de la fonction à partir des constituants isolés
   - 3.2. Tests anatomiques: autoradiographie, marquages par fluorescence, protéines vertes fluorescentes
   - 3.3. Tests Physiologiques: contrôle de l'expression d'une protéine, mutation, surexpression

Mode d'évaluation

Contrôle continu et examen semestriel

Références

1. B. Albert, A. Johnson, J. Lewis, M. Raff, K. Roberts et P. Walter, 2011- Biologie moléculaire de la cellule. Ed. Lavoisier, Paris, 1601p.

2. Abraham L. Kierszenbaum, 2006- Histologie et biologie cellulaire: Ed De Boeck, 619p.

3. Thomas Dean Pollard et William C. Earnshaw, 2004- Biologie cellulaire. Ed. Elsevier Masson, Paris, 853p.

4. Marc Maillet, 2006- Biologie cellulaire. Ed. Elsevier Masson, Paris, 618p.

Semestre : 1er Semestre

UE: Unité d'Enseignement Fondamentale

Matière 3: MATHÉMATIQUES, STATISTIQUE, INFORMATIQUE

Objectifs de l'enseignement

Cette matière permet à l'étudiant d'intégrer l'outil statistique et informatique dans le domaine biologique, et d'utiliser l'analyse numérique, la probabilité et le calcul par l'outil informatique.

Connaissances préalables recommandées (*descriptif succinct des connaissances requises pour pouvoir suivre cet enseignement – Maximum 2 lignes).*

L'étudiant doit avoir une connaissance sur les fonctions, les intégrales et les variables aléatoires.

Subject Content

1. Generalities
   - 1.1. Classification and relative importance of kingdoms
   - 1.2. Cell and cell theory
   - 1.3. Origin and evolution
   - 1.4. Cell types (Prokaryote, Eukaryote, Acaryote)
2. Cell study methods
   - 2.1. Optical and electron microscopy methods
   - 2.2. Histochemical methods
   - 2.3. Immunological methods
   - 2.4. Enzymological methods
3. Plasma membrane: structure and function
4. Cytoskeleton and cell motility
5. Cell adhesion and extracellular matrix
6. Chromatin, chromosomes, and cell nucleus
7. Ribosome and protein synthesis
8. Endoplasmic reticulum-Golgi apparatus system
9. Interphase nucleus
10. Endosomal system: endocytosis
11. Mitochondria
12. Chloroplasts
13. Peroxisomes

14. Extracellular matrix
15. Plant cell wall

Directed Work / Practical Work

2. Cell study methods

1.1. Separation of cell components

1.2. Observation of cell components

1.3. Identification of cell components

1.4. Plant cell wall

3. Cell cultures

Tests of physiological functions

3.1. Reconstruction of function from isolated components

3.2. Anatomical tests: autoradiography, fluorescence labeling, green fluorescent proteins

3.3. Physiological tests: control of protein expression, mutation, overexpression

Assessment Method Continuous assessment and semester exam

References

1. B. Albert, A. Johnson, J. Lewis, M. Raff, K. Roberts, and P. Walter, 2011- Molecular Biology of the Cell. Ed. Lavoisier, Paris, 1601p.
2. Abraham L. Kierszenbaum, 2006- Histology and Cell Biology: Ed De Boeck, 619p.
3. Thomas Dean Pollard and William C. Earnshaw, 2004- Cell Biology. Ed. Elsevier Masson, Paris, 853p.
4. Marc Maillet, 2006- Cell Biology. Ed. Elsevier Masson, Paris, 618p.

Semester: 1st Semester

UE: Methodological Teaching Unit 1

Subject: GEOLOGY

Teaching Objectives: The subject enables students to understand the constituents and structure of the Earth, the interactions between these constituents, and external and internal geodynamics. Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines): No prerequisites

Subject Content:

1. General Geology
   1.1. Introduction
   1.2. The Earth
   1.3. The Earth's crust
   1.4. Earth's structure
2. External Geodynamics
   2.1. Erosion
   2.1.1. Action of water
   2.1.2. Action of wind
   2.2. Deposits
   2.2.1. Study methods
   2.2.2. Sedimentary rocks
   2.2.3. Notion of stratigraphy
   2.2.4. Notion of paleontology
3. Internal Geodynamics
   3.1. Seismology
   3.1.1. Study of earthquakes
   3.1.2. Origin and distribution
   3.1.3. Flexible and brittle tectonics (folds and faults)
   3.2. Volcanology
   3.2.1. Volcanoes
   3.2.2. Igneous rocks
   3.2.3. Study of magmas
   3.3. Plate tectonics

Practical Work

- Laboratory Work 1: Topography
- Laboratory Work 2: Geology (Sections)
- Laboratory Work 3: Rocks and Minerals

Assessment Method: Continuous assessment and semester exam

References (Books and lecture notes, websites, etc.):

1. Jean Dercourt, 1999- Geology: courses and exercises. Ed. Dunod, Paris.
2. Denis Sorel and Pierre Vergely, 2010- Introduction to geological maps and sections. Ed. Dunod, Paris, 115p.
3. Jean Tricart, 1965- Principles and Methods of Geomorphology. Ed. Masson, Paris, 496p.

Semester: 1st Semester

UE: Methodological Teaching Unit

Subject 2: COMMUNICATION AND EXPRESSION TECHNIQUES 1 (French)

Teaching Objectives (Describe what the student is expected to have acquired as skills after successfully completing this subject – maximum 3 lines):

This subject aims to develop the understanding and writing of scientific documents in French, as well as the use and translation of scientific terms.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

No prerequisites

Subject Content:

1. Scientific Terminology
2. Study and comprehension of texts
3. Techniques of written and oral expression (report, synthesis, use of modern communication means)
4. Expression and communication in a group. Study of proposed texts (observe, analyze, summarize, written expression)

Directed Work: Proposal of exercises related to the most important language points.

Assessment Method:

Continuous assessment and semester exam

References (Books and lecture notes, websites, etc.): Scientific articles and papers

Semester: 2nd Semester

UE: Discovery Teaching Unit

Subject: Work Method and Terminology 1

Teaching Objectives:

Assist students in designing research and synthesis methods for work according to scientific rules.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

Students are expected to have knowledge of bibliographic research.

Subject Content:

• Introduction to bibliographic research

• Writing a scientific report

• Introduction to reading and understanding a scientific article

Assessment Method:

Continuous assessment and semester exam

References (Books and lecture notes, websites, etc.):

Semester: 1st Semester

UE: Transversal Teaching Unit

Subject: UNIVERSAL HISTORY OF BIOLOGICAL SCIENCES

Teaching Objectives:

This program should emphasize the history of biology and the concept of life across eras and civilizations. It aims to highlight the role of technological progress in the evolution of biology.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

No prerequisites.

Subject Content:

1. Prehistory
2. Antiquity
3. Middle Ages 3.1. In the West 3.2. In the East (Muslim civilization)
4. Sixteenth and seventeenth centuries
5. Eighteenth century: Darwin
6. Nineteenth century: Cellular theory (microscopy), Sexuality Embryology, Molecular Biology (DNA) Genetics
7. Twentieth century: Gene therapy and cloning

Assessment Method:

Semester exam

References:

1. Denis Buican, 2008 - Darwin in the history of biological thought. Ed. Ellipses, 232p.
2. Christophe Ronsin, 2005 - History of molecular biology. Ed. De Boeck, 106p.
3. Jean Théodoridès, 2000 - History of biology. Ed. Puf, 127p.

Semester: 2nd Semester

UE: Fundamental Teaching Unit

Subject 1: THERMODYNAMICS AND CHEMISTRY OF MINERAL SOLUTIONS

Teaching Objectives:

This course aims to provide a certain understanding of the principles governing the transformations and interactions of matter, the principles of thermodynamics, energy equilibrium, and the kinetics of chemical reactions.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

Students should have knowledge of redox reactions.

Subject Content:

1. Chemical Equilibria

    1.1. Acid-base equilibrium

    1.1.1. Definition according to: Arrhenius; Bronsted; Lewis

    1.1.2. Equilibrium constants: water dissociation, acidity, and basicity

    1.2.3. pH: water, strong monoacid, strong monobase, etc.

    1.2. Redox equilibrium

    1.2.1. Redox reactions: electron transfer

    1.2.2. Oxidation number

    1.2.3. Writing redox reactions

    1.2.4. Electrochemical cells

    1.2.5. Redox potential

    1.3. Precipitation equilibrium: Solubility and solubility product

    1.3.1. Definition

    1.3.2. Effect of adding an ion on solubility

    1.3.3. pH effect

2. Chemical Kinetics

2.1. Definition

2.2. Reaction rate

2.3. Expression of the rate law and reaction order

2.4. Factors influencing the reaction rate

3. Thermodynamics

3.1. Systems and thermodynamic quantities: Functions and thermodynamic transformations

3.2. First law of thermodynamics

3.2.1. Expression of work and heat

3.2.2. Expression of internal energy and enthalpy

3.3. Second law of thermodynamics

3.3.1. Expression of entropy

3.3.2. Expression of free energy and Gibbs free energy

3.4. Thermochemistry

3.4.1. Heat of reactions

3.4.2. Enthalpy of reactions

3.4.3. Calculation of internal energy of a reaction

3.4.5. Kirchhoff's law

3.4.6. Hess's law

3.5. Prediction of reaction direction

3.5.1. Isolated systems

3.5.2. Calculation of reaction entropies

3.5.3. Reactions at constant temperature

3.5.4. Calculation of free enthalpy and free energy of a system.

4. Inorganic Chemistry

Directed Works: TD No. 1: Chemical Kinetics

TD No. 2: Acid-base equilibria and precipitation equilibria

TD No. 3: Redox equilibria

TD No. 4: Thermodynamics and thermochemistry

TD No. 5: Organic Chemistry (Reaction mechanisms)

Practical Work:

TP No. 1: Chemical Kinetics Part 1: Experimental determination of the reaction order with respect to sodium thiosulfate (Na2S2O3) using the initial rates method. Part 2: Temperature influence on the reaction rate for the same reactant concentrations.

TP No. 2: Titration by the redox method. Manganometric titration of Fe2+ Determination of the normality of a given solution of KMnO4 Determination of the Fe2+ concentration in a solution of FeSO4.

TP No. 3: Identification of ions and separation of precipitates by centrifugation Identify ions present in a solution Write chemical formulas of an ionic compound in solution Write precipitation reactions Express the relationship between equilibrium constant and solubility.

Assessment Method:

Continuous assessment and Semester exam

References:

1. John C. Kotz and Paul M. Treichel, 2006 - Chemistry of solutions. Ed. De Boeck, 376p.
2. René Gaborriaud et al., Applied thermodynamics to the chemistry of solutions. Ed. Ellipses, 335p.

Semester: 2nd Semester

UE: Fundamental Teaching Unit

Subject 2: GENERAL PLANT BIOLOGY

Teaching Objectives:

The objective of this subject is to instill in students the fundamental principles of the tissue organization of plants and their development.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

Students should have some knowledge of the different parts of a plant.

Subject Content:

1. Introduction to plant biology

   Different types of tissues

   2.1. Primary meristem (root and cellular)

   2.1.1. Primary tissues 2.1.2. Protective tissues (epidermis)

   2.1.3. Filling tissues (parenchyma)

   2.1.4. Support tissues (collenchyma and sclerenchyma)

   2.1.5. Conducting tissues (primary xylem, primary phloem)

   2.1.6. Secretory tissues

   2.2. Secondary (lateral) meristems (cambium and phellogen)

   2.2.1. Secondary tissues

   2.2.2. Conducting tissues (secondary xylem and secondary phloem)

   2.2.3. Protective tissues (cork or bark, phelloderm)

2. Anatomy of higher plants

   2.1. Study of the root

   2.2. Study of the stem

   2.3. Study of the leaf

2.4. Comparative anatomy between mono- and dicotyledons

3. Morphology of higher plants and adaptation
   3.1. Roots
   3.2. Leaves
   3.3. Stems
   3.4. Flowers
   3.5. Seeds
   3.6. Fruits
4. Gametogenesis
   4.1. Pollen grain
   4.2. Ovule and embryo sac
5. Fertilization
   5.1. Egg and embryo
   5.2. Notion of development cycle

Practical Work:

TP No. 1: Morphological study of Angiosperms (roots-stems-leaves-flowers)

TP No. 2: Morphological study of Gymnosperms (roots-stems-leaves-flowers)

TP No. 3: Primary meristems (root and shoot)

TP No. 4: Covering tissues: epidermis – piliferous layer – suberous layer - suberoid

TP No. 5: Parenchyma (chlorophyllous-reserve-aeriferous-aquiferous)

TP No. 6: Support tissues (collenchyma-sclerenchyma)

TP No. 7: Secretory tissues (hairs-glands-tannin cells-laticifers)

TP No. 8: Primary conducting tissues (phloem-xylem)

Assessment Method:

Continuous assessment and Semester exam

References:

1. Alain Raveneau et al., 2014 - Plant Biology. Ed. De Boeck, 733p.
2. Jean François Morot-Gaudry et al., 2012 - Plant Biology. Ed. Dunod, Paris, 213p.

Semester: 2nd Semester

UE: Fundamental Teaching Unit

Subject 3: ANIMAL BIOLOGY

Teaching Objectives:

This module aims to introduce students to the peculiarities of the developmental biology of certain animal species.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

No prerequisites.

Subject Content:

First Part: Embryology

1. Introduction
2. Gametogenesis
3. Fertilization
4. Segmentation
5. Gastrulation
6. Neurulation: fate of the layers
7. Delimitation: bird annexes
8. Peculiarities of human embryology (Cycle, implantation, evolution of annexes, placenta)

Second Part: Histology

1. Covering epithelia
2. Glandular epithelia
3. Connective tissues
4. Blood tissues
5. Cartilaginous tissues
6. Osseous tissues

7. Muscular tissues
8. Nervous tissues

Titles of TD-TP:

No. 1: Gametogenesis

No. 2: Fertilization, segmentation in sea urchin

No. 3: Gastrulation in amphibians and birds

No. 4: Exercises on gastrulation and neurulation

No. 5: Neurulation in bird annexes

No. 6: Human embryology

Assessment Method:

Continuous assessment and Semester exam

References: Paul Richard W. FUNCTIONAL HISTOLOGY

Semester: 2nd Semester

UE: Methodological Teaching Unit

Subject 1: PHYSICS

Teaching Objectives:

The objective of this course is to enable students to acquire knowledge related to the basic principles of physics that can be applied in the field of life and natural sciences.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

Students must have basic knowledge in mathematics and mechanics.

Subject Content:

1. Mathematical Review

    1.1. Physical quantities and dimensional analysis

    1.2. Error calculation (Different types of errors, uncertainty calculation, and significant figures).

2. Optics

    2.1. Introduction (objective of optics)

    2.2. Nature of light (electromagnetic wave spectrum, photons, waves...)

    2.3. Geometric optics

    2.3.1. Principles of geometric optics and light propagation.

    2.3.2. Refraction (Snell's law, critical angle, and total reflection)

    2.3.2.1. Plane diopters, conjugation formula, Parallel-sided plate, and Prism.

    2.3.2.2. Spherical diopters (convergent, divergent), conjugation formula, and geometric construction (image construction).

    2.3.2.3. Thin lenses (convergent, divergent), conjugation formula, magnification, combination of two thin lenses, and geometric construction (image construction).

    2.3.3. Reflection

    2.3.3.1. Plane mirror (image construction)

2.3.3.2. Spherical mirror (image construction, conjugation formula)

2.3.4. Optical instruments

2.3.4.1. The Eye

2.3.4.2. Magnifying glass and optical microscope

3. Fluid Mechanics

3.1. Definition and characteristics of a fluid.

3.2. Hydrostatics (Fundamental hydrostatic relationship, Archimedes' buoyancy, floater)

3.3. Hydrodynamics (dedite, continuity equation, Bernoulli's theorem)

4. Notion of Crystallography
5. Notions of Spectral Analysis

Directed Works:

TD No. 1. Exercises on dimensional analysis and error calculation.

TD No. 2. Exercises on light propagation, plane diopters, and prism

TD No. 3. Exercises on spherical diopters and thin lenses.

TD No. 4. Exercises on plane and spherical mirrors and the reduced eye.

TD No. 5. Exercises on Pascal's law and Archimedes' buoyancy. (Hydrostatics)

TD No. 6. Exercises on Bernoulli's law (hydrodynamics)

Assessment Method:

Continuous assessments (presentation + test) and Semester exam.

References:

1. Christophe Texier, 2015 - Quantum Mechanics. Ed. Dunod, Paris.
2. Eugene Hecht, 1998 - Physics. Ed. De Boeck, 1304p.
3. Michel Blay, 2015 - Optics. Ed. Dunod, Paris, 452p.

Semester: 2nd Semester

UE: Methodological Teaching Unit

Subject 2: COMMUNICATION AND EXPRESSION TECHNIQUES 2 (English)

Teaching Objectives:

To complement the learning of understanding and writing scientific documents in English.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

No prerequisites.

Subject Content:

1. Scientific Terminology
2. Study and understanding of texts
3. Written and oral expression techniques (report, synthesis, use of modern communication means)
4. Expression and communication in a group. Study of proposed texts (observe, analyze, take stock, written expression)

Directed Works: Proposed exercises related to the most important language points.

Assessment Method:

Continuous assessment and Semester exam

References: Scientific articles

Semester: 2nd Semester

UE: Discovery Teaching Unit

Subject: Life Sciences and Socio-Economic Impacts

Teaching Objectives:

To help students conceive jobs directly or indirectly related to different specialties in the natural and life sciences.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

No prerequisites.

Subject Content:

I. Animal and plant production (breeding, processing, production...) II. Toxicology and environmental health (effect of pollutants on plant and animal life and human health) III. Biology and health (discussing the importance of biology in the diagnosis of animal and plant diseases) IV. Biotechnology and molecules of interest (Pharmaceutical and agri-food industry) V. Biology and forensics VI. Terrestrial and marine ecosystems (park management...) VII. Technical-commercial biology (e.g., commercial representative)

Assessment Method:

Continuous assessment and Semester exam

References:

Semester: 2nd Semester

UE: Transversal Teaching Unit

Subject: Work Method and Terminology 2

Teaching Objectives:

To help students conceive research and synthesis methods for work following scientific rules.

Recommended Prior Knowledge (brief description of the required knowledge to follow this course – Maximum 2 lines):

Students are supposed to have notions in bibliographic research.

Subject Content:

- Terminology
- Writing a scientific report
- Introduction to reading and understanding a scientific article

Assessment Method:

Semester exam

References: Scientific articles

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

MINISTRY OF HIGHER DIDACTICISMAND SCIENTIFIC RESEARCH

PEDAGOGICS PROGRAM

COMMON GROUND
2ND YEAR

DOMAIN
NATURAL AND LIFE SCIENCES

Biological Sciences sector

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I

I – Semester-wise Teaching Organization Sheets

Appendix to the curriculum of the second-year Bachelor's degree in the Field of Natural Sciences and Life Sciences, Major in "Biological Sciences."

Semester 3

Units of teaching	Subject	Credits	Coefficients	Weekly eaching hours			SHV (15 semaines)	Other*	Evaluation Method			
	Title			Course	DW	PW			CC*		Exam	
U T Fondamental Code : UTF 2.1.1 Crédits : 6 Coefficients : 3	Zoology	6	3	3h00	-	1h30	67h30	82h30	x	40%	x	60%
U T Fondamental Code : UTF 2.1.2 Crédits : 12 Coefficients : 6	Biochemistry	6	3	3h00	1h30	-	67h30	82h30	x	40%	x	60%
	Genetics	6	3	3h00	1h30	-	67h30	82h30	x	40%	x	60%
U T Méthodology Code : UTM 2.1.1 Crédits : 4 Coefficients: 2	Communication and Expression Techniques (in English)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
U T Méthodology Code : UTM 2.1.2 Crédits : 5 Coefficients: 3	Biophysics	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
U T Discovery Code : UTD 2.1.1 Crédits : 2 Coefficients : 2	Environment and Sustainable Development	2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
U t Transversal Code : UTT 2.1.1 Crédits : 1 Coefficients : 1	Ethics and Academic Deontology	1	1	1h30	-	-	22h30	2h30	-	-	x	100%
Total Semester 3		30	17	15h00	7h30	2h30	375h00	375h00				

Other* = Additional work during semester consultation; CC* = Continuous control.

Appendix to the curriculum of the second-year Bachelor's degree in the Field of Natural Sciences and Life Sciences, Major in "Biological Sciences."

Semester 4

Units of teaching	Subject	Credits	Coefficients	Weekly eaching hours			SHV (15 semaines)	Other*	Evaluation Method			
	Title			Course	DW	PW			CC*		Exam	
U T Fondamental Code : UTF 2.2.1 Crédits : 6 Coefficients : 3	Botany	6	3	3h00	-	1h30	67h30	82h30	x	40%	x	60%
U T Fondamental Code : UTF 2.2.2 Crédits : 12 Coefficients : 6	Microbiology	8	4	3h00	1h30	1h30	90h00	110h00	x	40%	x	60%
	Immunology	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
U T Méthodologiy Code : UTM 2.2.1 Crédits : 4 Coefficients: 2		4	2	1h30	-	1h30	45h00	55h00	x	40%	x	60%
U E Méthodology Code : UEM 2.2.2 Crédits : 5 Coefficients: 3	Scientific Methodology and Techniques for Studying Living Organisms	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
U T Discovery Code : UTD 2.2.1 Crédits : 2 Coefficients : 2		2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
U T Transversal Code : UTT 2.2.1 Crédits : 1 Coefficients : 1	Biostatistics	1	1	1h30	-	-	22h30	2h30	-	-	x	100%
Total Semester 4		30	17	13h30	6h00	5h30	375h00	375h00				

Other* = Additional work during semester consultation; CC* = Continuous control.

II - Detailed Program by Subject

Semester: 3rd

TU: Fundamental Teaching Unit 1

Subject : Zoology

Teaching objectives

Understand the main groups of living organisms in terms of: General architecture, Characteristics (Systematics, Morphology, Anatomy, Reproduction, Ecology), constraints, adaptations and evolution. Particular emphasis will be placed on updated classification and zoological groups of agricultural, medical, veterinary medical, veterinary, fisheries or environmental interest.

Recommended prerequisites (brief description of the knowledge required required to follow this course - Maximum 2 lines).

The student should have an idea of the different classes of the animal kingdom

Contents

1. Introduction to the animal kingdom

1.1. Basics of classification

1.2. Zoological nomenclature

1.3. Evolution and phylogeny

1.4. Numerical importance of the animal kingdom

2. Sub-kingdom of protozoa

2.1. General information on protozoa.

2.2. Classification

2.2.1. Phylum Sarcomastigophora

2.2.2. Phylum Ciliophora

2.2.3. Phylum Apicomplexa

2.2.4. Phylum Cnidosproridia

3. Sub-kingdom Metazoa

3.1 EmbranchmentSponges

3.2. phylumCnidaria

3.3 Phylum Ctenaria

3.4. Phylum Plathelminthes :

3.5. Phylum Nemathelminthes.

3.6. Phylum Annelidae

3.7. Phylum Mollusca

3.8. Phylum Arthropoda

3.9. Phylum Echinoderms

3.10. Phylum Chordates

Practical work

TP N°1: Study of some typical Protozoan species: *Trypanosomarhodesiense*, *Leishmania major*, *Leishmaniainfantum*, *Trypanosomagambiense*, *Entamoebahistolytica*, *Paramecium* sp.

TP N°2: Study of some typical Plathelminthes species: *Monieziaexpansa*, *Taeniahydatigena*, *Taeniapisiformis*, *Fasciola hepatica*.

TP N° 3: Study of some Annelid species: *Lumbricusterrestris*, *Hirudoofficinalis*.

TP N° 4: Study of some typical Arthropod species: Crustaceans (king shrimp, Squilla, morphology and biramed appendages), Chelicerae (Scorpion), Insects (Cricket, Bee).

TP N° 5: Study of insect mouthparts: The different mouthparts and adaptation to diets, crusher-type mouthparts (Orthoptera, Cricket).

TP N° 6: Study of some typical Echinoderm species: Echinids (sea urchin), Asteroids (Starfish).

TP N° 7: Study of some typical vertebrate species: Fish (Carp), Birds (Pigeon), Mammals. (Pigeon), Mammals (Rat, Mouse)

Film screenings

-Turtles.

-Birds

-Amphibians.

Evaluation

Continuous assessment and semester exam

References

1. ARAB A., CHERBI M., KHERBOUCHE-ABROUS O., Amine F., BIDI AKLI S., HADDOU SANOUN G., 2013: Zoologie Tome 1. Polycopié, Œuvres et Publications Universitaires. Algérie. 152 p.

2. ARAB A., CHERBI M., KHERBOUCHE-ABROUS O., Amine F., BIDI AKLI S., HADDOU SANOUN G., 2013 : Zoologie Tome 2 : Travaux Pratiques .Polycopié, Œuvreset Publications Universitaires. Algérie.224 p.

Semester: 3rd

TU: Fundamental Teaching Unit 1

Subject : Biochemistry

Teaching objectives

This subject aims to provide instruction on the fundamental basics of biochemistry, including concepts of enzymology, and to familiarize students with biochemical techniques.

Recommended Prerequisites (brief description of the required knowledge to undertake this course – Maximum 2 lines).

Students should have a basic understanding of chemical bonds (weak and strong) and the physicochemical properties of organic molecules.

module Content

1. Chemical Bonds

1.1. Strong Bonds

1.2. Weak Bonds

2. Structure and Physicochemical Properties of Carbohydrates

2.1. Simple Sugars

2.2. Oligosaccharides

2.3. Polyholosides, Heterosides

3. Structure and Physicochemical Properties of Lipids

3.1. Simple Lipids

3.2. Complex Lipids

4. Structure and Physicochemical Properties of Amino Acids, Peptides, and Proteins

4.1. Amino Acids, Peptides, Proteins

4.2. Structure (Primary and Secondary, Tertiary and Quaternary)

4.3. Properties and Effects of Treatments (solubility, electrophoretic behavior, denaturation)

4.4. Protein Separation

5. Basics of Enzymology

5.1. Definition, Classification

5.2. Mechanisms of Action

5.3. Active Site

5.4. Enzymatic Kinetics and Types of Representation

5.5. Enzymatic Inhibition

5.6. Allosteric Phenomenon

6. Basics of Bioenergetics

6.1. Types of Chemical Reactions

6.2. The Respiratory Chain and Energy Production

6.3. Phosphorylation and Redox Reactions

7. Carbohydrate Metabolism

7.1. Catabolism (Glycolysis, Glycogenolysis, Pentose Phosphate Pathway, Krebs Cycle, Energetic Balance)

7.2. Anabolism (Gluconeogenesis and Glycogenesis)

7.3. Regulation

8. Lipid Metabolism

8.1. Fatty Acid Catabolism (Beta-Oxidation)

8.2. Sterol Catabolism

8.3. Synthesis of Fatty Acids and Triglycerides

8.4. Sterol Biosynthesis

8.5. Regulation

9. Peptide and Protein Metabolism

9.1. Catabolism of Amino Groups

9.2. Catabolism of Carboxylic Groups

9.3. Catabolism of Side Chains

9.4. Glucoformative and Ketogenic Amino Acids

9.5. Biosynthesis of Essential Amino Acids

9.6. Nitrogen Elimination, Urea Cycle

9.7. Example of Peptide Biosynthesis (case of biologically active peptides)

9.8. Example of Protein Biosynthesis

9.9. Regulation

10. Structure and metabolism of other compounds of biological interest

10.1. Vitamins

10.2. Hormones

Mode of Evaluation

Continuous assessment and semester examination

References (Books and course notes, websites, etc.):

1. CathérineBaratti-Elbaz et Pierre Le Maréchal, 2015- Biochimie. Ed. Dunod, Paris, 160p. 2. Norbert Latruffe, Françoise Bleicher-Bardelett, Bertrand DucloS et Joseph Vamecq, 2014- Biochimie. Ed. Dunod, Paris. 3. Serge Weinman et Pierre Méhul, Toute la biochimie. Ed. Dunod, Paris, 464p. 4. Françoise Lafont et Christian Plas, 2013- Exercices de biochimie. Ed. Doin, Paris, 410p.

Semester: 3rd

TU : Fundamental Teaching Unit 2

Subject : Genetic

Teaching objectives

This subject allows the student to acquire the notions and terminology of genetics, the transmission of characters, the structure of DNA, replication, transcription, alterations and mechanisms of regulation of gene expression.

Prerequisite knowledge recommended
(brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
The student must have knowledge of nucleic acids and geneticsMendelian.

Content of the module

1. Genetic material
1.1. Chemical nature of genetic material
1.2. Structure of nucleic acids (DNA-RNA)
1.3. DNA replication: in prokaryotes and eukaryotes
1.4. Chromosome organization
2. Transmission of genetic characters in eukaryotes
3. Haploid genetics
3.1. Independent genes
3.2. Related genes
3.3. Establishment of genetic maps
4. Genetics of diploids
4.1. Independent genes
4.2. Related genes
4.3. Establishment of genetic maps
5. Bacterial and viral genetics
5.1. Conjugation
5.2. Transformation
5.3. Transduction

Mode of Evaluation

Continuous assessment and semester examination

References (Books and course notes, websites, etc.)

Semester: 3rd

TU: methodological Teaching Unit

Subject: Techniques of communication

Teaching objectives (Describe what the student is supposed to have acquired asskills after passing this subject – maximum 3 lines).Learn and apply research methods and the collection of useful and essential information for the synthesis and written format (report, oral, defense). Application of English grammar in a scientific context.

Prerequisite knowledge recommended

(brief description of the knowledge required to be able to follow this course – Maximum 2 lines). Some notions of terminology and research methodology acquired in L1.

Course content :

Chapter 1

Study of proposed texts (observing, analyzing, etc..)

Chapter 2

Terminology

Chapter 3

Bibliographical research methodology

Chapter 4

Methods of scientific reports writing

Evaluation mode

Continuous monitoring and final exam

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

Semester: 3rd

TU : methodological Teaching Unit

Subject: biophysics

Teaching objectives:
The general objective of teaching the biophysics course is to enable SNV students to acquire the basics of physics.

Prerequisite knowledge recommended:
(a brief description of knowledge required to take this course – 2 lines maximum).

Content of the module
I. States of the matter
I.1. Gases: elements of kinetic theory, equation of state of ideal or real gases, state changes
I.2. Liquids: water structure, dissolution
I.3. Solids: different structures
I.4. Intermediate states: glasses, liquid crystals, granular states, polymers deformable

II. General information on aqueous solutions
II.1. Study of solutions: classification of solutions
II.2. Concentrations: mole fraction, molarity, molality, weight concentration, osmolarity, equivalent concentration.
II.3. Solubility
II.4. Electrolyte solutions: electrical conductivity, physical and chemical properties of electrolytes

III. Surface phenomenon
III.1. Surface tension: definition, measurements, and biological applications
III.2. Capillary action: definition, measurements, and biological applications
III.3. Adsorption

IV. Diffusion phenomenon
IV.1. Diffusion
IV.2. Osmosis phenomenon and osmotic pressure: definition, measurements, and biological applications
IV.3. Permeability: definition, measurements, and biological applications

V. Study of viscosity
V.1 Laminar and turbulent flow
V.2. Viscous resistance and viscosity measurements
V.3 Sedimentation

VI. Sound and ultrasonic waves
VI.1. The sound wave and its properties: production, nature, and classification of sound waves

VI.2. The Doppler effect: definition, measurements, and biological applications.
VI.3. Ultrasound: definition, measurements, and biological applications.

Practical work: (do 3 practical work at least)
TP No. 1: Surface tension
TP No. 2: Conductometric titration
TP No. 3: Titration by PH meter
TP No. 4: Viscosity measurement
TP No. 5: Spectrophotometer
TP No. 6: Refractometer

Evaluation method
Continuous assessments (presentation + test) and half-yearly examination.

References (Books and handouts, websites, etc.)

- F.GrémyetJ.Perin.ElémentsdeBiophysique.Tome1et2.Flammarion. Paris.
- C.BénézechetJ.Llory.PhysiqueetBiophysique. MassonetCie.Paris,1973.
- Y.THOMAS,2000,Biophysiqueàl'usagedesétudiantsensciencesbiologique,Bréal,

Paris.
- A.Bertrand, D.Ducassou et JC. Healy. Biophysique. Utilisation médicaledes rayonnements

–Vision – Audition

Semester: 3rd

TU: Discovery Teaching Unit

Subject: Environment and sustainable development

Teaching objectives:

This teaching aims to raise students' awareness of the issues, content and actions of sustainable development. It is about making them aware that it is possible to act to preserve the environment, through their training, as well as on their scale, on their consumption, their daily activities and their society. During their university education, whatever their specialty and their ambition for their future professional orientations, the student will have the opportunity to learn and experiment with their knowledge of sustainable development.

Sustainable Development is currently one of the responses emerging throughout the world to address the current conjunction of the world's major ecological, economic and societal challenges.

Recommended prior knowledge (brief description of the knowledge required to be able to follow this course – Maximum 2 lines). Without prerequisites

Content of the subject

1. Definitions: Environment, components of an environment, Sustainable development.
2. Meaning of development?

2.1. The main dimensions of the environmental crisis: human demography, global warming, fossil fuels (non-renewable), depletion of natural resources, drinking water, biodiversity and agriculture

2.2. Sustainable development, why?

2.3. The Concept of Sustainable Development

2.4. Areas of sustainable development

2.5. The principles of SD and their origins: precaution, prevention, responsibility, solidarity, equity, pollute countries

2.6. Some indicators of sustainable development: ecological footprint and biocapacity, impact on the environment, environmental performance index, human development index, GDP: gross lower product (economic) and boys/girls schooling rate (societal), accessibility to care (societal).

2.7. Environmental education, nature awareness and animation, environmental communication.

Program for personal work

1- Identify examples in the press (international and national) illustrating the principles of sustainable development (precaution, responsibility for example). Presentation and debate.

2- Test ecological reflexes

3- Comparison of the life cycle of a biodegradable product and a non-biodegradable product biodegradable

4- Illustrate the polluter pays principle by taking an example of a polluting company in Algeria taking into account national legislation.

5- Give examples of implementing preservation, conservation or restoration of environments

Evaluation method

Continuous monitoring and half-yearly review

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

Semester : 3rd

U.T: Transversal Teaching Unit

Subject: Ethics and Academic Deontology

Teaching objectives

The general objective of this teaching is to enable SNV students to acquire the resources of deontology and professional ethics.

Recommended Prerequisites
(brief description of the knowledge required to be able to follow this course – Maximum 2 lines).

Module Content
1. Introduction: Contexts of the Algerian university
2. CONCEPTS
2.1 Morale
2.2 Ethics
2.3 Deontology
2.4 Law
2.5 Professional values
2.6 Learning and teaching
2.7 Didactics and pedagogy

3. The charter of deontology and university ethics
3.1 Fundamentals
3.2 Rights
3.3 Obligations and duties
4. APPS
4.1 Teaching: courses, assessment of knowledge and behavior…..
4.2 Scientific research: research methodology, plagiarism, copyright, scientific writing…….

Evaluation mode: 100% exam

Reference

- Bergadaà, M., Dell'Ambrogio, P., Falquet, G., Mc Adam, D., Peraya, D., &Scariati, R. (2008). La relation éthique-plagiat dans la réalisation des travaux personnels par les étudiants.
- Chartedel'éthique etdeladéontologieuniversitaires,Alger,mai2010www.mesrs.dz
- GilbertTsafak,Ethiqueetdéontologiedel'éducation*CollectionSciencesdel'éducation*

Pressesuniversitairesd'Afrique,1998

- Gohier,C.,&Jeffrey,D.(2005).*Enseigneretformeràl'éthique*.PressesUniversitéLaval.
- Jaunait,A.(2010).Éthique,moraleetdéontologie. *Poche-Espaceéthique*, 107-120.

Semester: 4th

TU: Fundamental teaching unit1

Subject: Botanic

Educational objectives of the course
This subject aims to provide an introduction to the classification and anatomical characterization of the major groups of the plant kingdom. The teaching provided also attempts to provide students with the methods of reproduction.

Prerequisite knowledge recommended
The student must have knowledge of plant biology (morphology, anatomy, physiology).

Content of the module
Introduction to botany
- Definitions, notions and classification criteria. Systematics of the major groups of the "plant" kingdom

PART ONE: Algae and Fungi
1. Algae
1.1. Prokaryotic Algae (Cyanophytes / Cyanobacteria)
1.2. Eukaryotic algae
1.2.1. Morphology
1.2.2. Cytology
1.2.3. Reproduction (concept of range, development cycle)
1.3. Systematics and particularities of the main groups
1.3.1. Glaucophyta
1.3.2. Rhodophyta
1.3.3. Chlorophya and Streptophyta
1.3.4. Haptophyta, Ochrophyta, Dinophyta, Euglenozoa, Crytophyta, Cercozoa
2. Mushrooms and lichens
2.1. Problems in classifying fungi
2.2. Structure of thalli (mycelia, stroma, sclerotium)

2.3. Reproduction
2.4. Systematics and particularities of the main groups of mushrooms
2.4.1. Myxomycota
2.4.2. The Oomycota
2.4.3. Eumycota (Chrytridiomycota, Zygomycota, Glomeromycota, Ascomycota, Basidiomycota)
2.5. A particular algae-fungus association: lichens
2.5.1. Morphology
2.5.2. Anatomy
2.5.3. Reproduction

PART TWO: Embryophytes
1. Bryophytes: Morphology and reproduction of the different branches
1.1. Marchantiophytes
1.2. Anthocerotophytes
1.3. Bryophytes s. str.
2. Pteridophytes: Morphology and reproduction of the different phyla

2.1. Lycophytes
2.2. Sphenophytes (= Equisetines)
2.3. Filicophytes
3. Gymnosperms sensulato
3.1. Cycadophytes: concept of ovule
3.2. Ginkgophytes
3.3. Coniferophytes: concept of flower, inflorescence and seed
3.4. Gnetophytes: pivotal group
4. Angiosperms
4.1. Vegetative system and concept of morphogenesis: growth of stems, leaves and roots
4.2. Floral morphology (organization of the flower, inflorescences)
4.3. Floral biology: microsporogenesis and macrosporogenesis
4.4. Seeds and fruits
4.5. Concept of modern systematics, cladogenesis and main taxa. Presentation of classifications (Engler 1924, APG II)

Practical work (3 weeks):
TP No. 1. Algae (Phycophytes)
Morphology and reproduction of some species such as *Ulvalactuca* and *Cystoseirameditерranea*.
TP No. 2. Mushrooms (Fungi)
Morphology and reproduction of *Rhizopusnigricans* (Zygomycetes), **Agaricuscampestris** (Basidiomycetes)
TP No. 3. Lichens
Morphology of different types of lichens and study of *Xanthoriaparietina*
TP No. 4. Bryophytes
Morphology and reproduction of Bryum sp.
TP No. 5. Pteridophytes
Morphology and reproduction of *Polypodiumvulgare* and *Selaginelladenticulata*
TP No. 6. Cycadophytes
Morphology and reproduction of *Cycasrevoluta*
TP No. 7. Coniferophytes (Gymnospermessensustricto)
Morphology and reproduction of *Pinushalepensis* and *Cupressussempervirens*
TP N°8 and 9: Monocotyledonous and Eudicotyledonal Angiosperms.
Illustration of the concept of trimery and pentamery, of the concept of actinomorphy and zygomorphy; dialypetaly, gamopetaly, hypogynous flower, epigynous flower... .
TP No. 8. Floral morphology of Monocot Angiosperms on examples such as Asphodelus (or Allium)
TP No. 9. Floral morphology of Angiosperms Eudicotyledons on examples such as Lathyrus or Vicia
TP No. 10. Sexual reproduction in angiosperms
Pollen grain, pollination and fertilization in angiosperms Fruit types and seed types.

Evaluation mode
Continuous monitoring and final exam

References

1. APGII.2003.AnupdateoftheAngiospermPhylogenyGroupclassificationforthe orders and families of flowering plants: APG II. *Bot.J.LinneanSociety* 141:399–436.

2. APGIII.2009.AnupdateoftheAngiospermPhylogenyGroupclassificationforthe orders and families of flowering plants: APG II. *Bot.J.LinneanSociety* 161:105–121.

3. LecointreG.etLeGuyaderH.2001.Classificationphylogénétiqueduvivant.Ed.Belin.
4. ReviersdeB.2002**.**BiologieetPhylogéniedesalgues. Tome1et 2.Ed.Belin.
5. Meyer S., Reeb C. et Bosdeveix R. 2004**.** Botanique: Biologie et Physiologie végétales. Ed. Maloine.
6. DupontF.,GuignardJ.L.2012.BotaniqueLesfamillesdeplantes.Ed.Elsevier-Masson

Semester: 4th

TU: Fundamental teaching unit 1

Subject: General microbiology

Teaching objective

The student must acquire notions of the microbial world, the techniques used to observe microorganisms, bacterial growth and classification.

The student must have a general understanding of pathogens.

Content of the material

Chapter 01 :The Microbial World

1.1. History

1.2. Place of microorganisms in the living world

1.3. General characteristics of the prokaryotic cell

Chapter 02 : The bacterial cell

2.1. Bacterial cell observation techniques

2.2. Cellular morphology

2.3. The wall

2.3.1. Chemical composition

2.3.2. Molecular structure

2.3.3. Functions

2.3.4. Gram stain

2.4. The plasma membrane

2.4.1. Chemical composition

2.4.2. Structure

2.4.3. Functions

2.5. The cytoplasm

2.5.1. Ribosomes

2.5.2. Reserve substances

2.6. Chromosome

2.6.1. Morphology

2.6.2. Composition

2.6.3. Chemical replication

2.6.4. Structure

2.7. Plasmids

2.7.1. Structure

2.7.2. Replication

2.7.3. Properties

2.8. Pilli

2.8.1. Structure

2.8.2. Function

2.9. The capsule

2.9.1. Morphology

2.9.2. Chemical composition

2.9.3. Functions

2.10. Cilia and flagella

2.10.1. Highlighting

2.10.2. Structure

2.10.3. Functions

2.11. The spore

2.11.1. Morphology

2.11.2. Structure

2.11.3. Sporulation phenomena

2.11.4. Properties

2.11.5. Germination

Chapter 03 : Bacterial classification

3.1. Phenetic classification

3.2. Phylogenetic classification

3.3. Bergey classification

Chapter 04 : Bacterial nutrition

4.1. Basic needs

4.2. Growth factors

4.3. Trophic types

4.4. Physico-chemical parameters (temperature, pH, O2 and aW)

Chapter 05 : Bacterial growth

5.1. Measuring growth

5.2. Growth parameters

5.3. Growth curve (batch culture)

5.4. Bacterial culture

5.5. Antimicrobial agents.

Chapter 06 : Concepts of mycology and virology

6.1. Mycology (yeast and mold)

6.1.1. Taxonomy

6.1.2. Morphology

6.1.3. Reproduction

6.2. Virology

6.2.1. Morphology (capsid and envelope)

6.2.2. Different types of viruses

Practical work

TP No. 1: Introduction to the microbiology laboratory

TP No. 2: Method of studying microorganisms and the different sterilization processes

TP No. 3: Seeding methods;

TP N°4: Microscopic study of bacteria, simple staining

TP N°5: Morphological study of the different bacterial colonies on culture medium

TP N°6: Gram staining

TP N°7: Culture media

TP N°8: Study bacterial growth

TP N°9: Criteria for biochemical identification of bacteria

TP N°10: Yeasts and cyanobacteria

TP N°11: Growth inhibitors, antibiogram

TP N°12: Isolation of total and specific flora of certain products (water, milk, etc.).

Evaluation method : Continuous assessment and half-yearly examination.

References

1. HenriLeclerc,Jean-LouisGaillardetMichelSimonet,1999-Microbiologiegénérale. Ed. Doin, Paris, 535p.

2. Jerome Perry,JamesStaley etStephen Lory,2004- Microbiologie-Cours etquestions de révision. Ed. Dunod, Paris, 889p.

3. Jean-Pierre Dedet, 2007- La microbiologie, de ses origines aux maladies émergentes.Ed. Dunod, Paris, 262p.

Semester: 4th

U.T: Fundamental Teaching Unit 2

Subject: Immunology

Teaching Objectives
The objective of this teaching is to introduce students to the role of immunity, immune defense systems, types of immune response and dysfunctions of the immune system.

Prerequisite knowledge recommended

(brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
The student must have basic knowledge of the immune system.

Content of module
1. Introduction to immunology.
1.1. Role of immunity
1.2. Relationship with everyday life and great discovery
2. Ontogenesis of the immune system
2.1. B cells and lymphoid organs
2.2. T cells
2.3. Education of B cells inside the marrow
2.4. Education of T cells inside the thymus
2.5. Other cells (Myeloid cells)
3. CMH
4. The non-specific immune response
• Intervening cells and complement
5. The specific immune response
5.1. Cellular
5.2. Humorous
6. Cellular and humoral cooperation
6.1. Cooperation between different cells
6.2. Cytokines
7. Immune system dysfunction
8. The main immunology tests
8.1. Agglutination

8.2. Immunoprecipitation
8.3. Immunoelectrophoresis
8.4. Immunofluorescence
8.5. Elisa Techniques

Directed work
TD N°1: Ag-Ac reaction (precipitation: immunodiffusion, ELISA, RIA, etc.) TD N°2: Preparation of monocyte lymphocytes from whole blood TD N°3: Separation of T and B lymphocytes
TD No. 4: Lymphomicrocytotoxicity test

Evaluation mode
Continuous monitoring and final exam

References

1. Marie-ChristineBené,YvonLebranchu,FrançoisLemoineetEstelleSeillès,2013-Immunologie fondamentale et immunopathologie. Ed. Elsevier Masson, Paris, 260p.
2. JudyOwen,JenniPuntetSharonStranford,2014-Immunologie.Ed.Sciencesdela vie, 832p.
3. Abul-KAbbasetAndrew-HLichtman,2013-Lesbasesdel'immunologie fondamentale etclinique.Ed.ElsevierMasson,Paris,284p.

Semester: 4th
U.T: Methodological teaching Unit 1
Subject: Scientific methodology and techniques for studying life

Teaching objectives

Different scientific practices on observation (descriptive methods), manipulation (analytical methods) and exploration (synthetic methods) of animal and plant life.This module allows students to have notions of the methods applied to the study of living things: Cytological methods, methods of studying the biochemical composition of cells and techniques for approaching living things.

Prerequisite knowledge recommended

(brief description of the knowledge required to be able to follow this course – Maximum 2 lines).

Content of the module

General Introduction.
PART ONE: METHODS FOR STUDYING CELL MORPHOLOGY
I. Cytological Methods
1. Microscopy
1.1. Light microscopes or photonic microscopes
1.1.1. Transmission microscopes
1.1.2. Other light microscopes
* The phase contrast microscope
* The dark field microscope
* The polarized light microscope
* The UV ray microscope (= fluorescence microscope)
* The scanning microscope

1.2. Electron microscopes
1.2.2. The transmission electron microscope
1.2.3. The scanning electron microscope

II. Methods for studying the biochemical composition of cells
1. Cellular materials
1.1. Whole cells or sections of cells
1.2. Cellular homogenates = cellular homogenates (Different techniques can be used)
1.3. Cell fractions
* Principle of separation of cellular organelles
* Differential ultracentrifugation
* Ultracentrifugation on density gradient

2. methods
2.1. electrophoresis
2.2. biochemical analysis and dosage methods

2.2. cytochemical methods.
2.3. immune cytology / immunology technique.
iii. genetic engineering techniques (dna sequencing)

PART TWO: Methods and techniques for approaching life.
i. the herbar: collection of dry plants, an essential basis for research.
ii. techniques for approaching living things.
1. breeding.
2. crops.
3. collections.
4. dissections.

III. Access to demographic parameters of animal and plant populations.

Evaluation method

Continuous monitoring and final exam

References (Books and handouts, websites, etc.)

Semester: 4th
U.T: Methodological teaching Unit 2
Subject: Biostatistics

Teaching objective
The objective of this teaching is to provide certain methodological tools classically used to describe and test biological phenomena.

Prerequisite knowledge recommended

(brief description of the knowledge required to be able to follow this course – Maximum 2 lines).
The student must have knowledge of probability and numerical analysis already seen
In first year.

Content of the module
1. Reminders
1.1. Reminders on descriptive statistics
1.1.1. Position parameters
1.1.2. Dispersion parameters
1.1.3. Shape settings
2. Reminders on the main distribution laws: laws: normal and log normal, Student, Pearson, Fischer-Snedecor…
3. Statistical inference: Hypothesis testing
3.1. Compliance testing
3.2. Comparison test
3.3. Independence test
4. Correlation study and Regression
4.1. Correlation coefficient
4.2. Testing significance of correlation
4.3. Simple linear regression
4.3.1. Regression line (least squares method)
4.3.2. Confidence interval of regression estimate
4.3.3. Significance Test of Regression Coefficients
5. One-way and two-way analysis of variance

The use of software such as Statistica or SAS as practical work for each chapter which will be covered in detail in the third year.

Directedwork :
Series of exercises on each chapter of the course

Evaluation mode
Continuous monitoring and final exam

References

1. BENZEONJ.P.,1984-L'analysedesdonnées.Ed.Bordas,TomesIetII.
2. HUET S., JOLIVET E. et MESSEON A., 1992- La régression non linéaire : méthodes et applications en biologie. Ed. INRA.

3. TROUDEC.,LENOURR.etPASSOUANTM.,1993-MéthodesstatistiquessousLisa
-statistiquesmultivariées.CIRAD-SAR,Paris,PP:69-160.

Semester: 4th
T.U: Discoveryteaching Unit 1
Subject: General ecology

Objective of teaching
The objective of the subject is to help students understand the notion of ecosystem, the abiotic and biotic factors and the interactions between these factors, the components of the ecosystem and its functioning.
Recommended prior knowledge (brief description of knowledge required to be able to follow this course – Maximum 2 lines).
No prerequisites

Content of module
Chapter I
1.1. Definition of the ecosystem and its constituents (Notions of biocenosis and factor ecological.)
1.2. Areas of intervention
Chapter II: Environmental factors
2.1. Abiotic factors
2.1. Climate
2.2. Edaphic
2.3. Water
2.2. Biotic factors
2.2.1. Competitions
2.2.2. Pests and predators
2.2.3. Interaction of cooperation and symbiosis
2.2.4. Parasite
2.3. Interaction of environments and living beings
2.3.1. Role of ecological factors in population regulation
2.3.2. Concept of ecological optimum
2.3.3. Ecological Valencia
2.3.4. Ecological niche.
Chapter III: Structure of ecosystems
3.1. Structure of food chains; relationships between producers (autotrophs) and their dependence on nutrients and light or chemical energy.
3.2. Consumers (Heterotrophs) who are linked to producers and finally the decomposers which ensure the recycling and mineralization of matter organic.
Chapter IV: Functioning of ecosystems
4.1. Energy flow in the biosphere:
4.2. Concepts of ecological pyramids, production, productivity and yield bioenergetics
4.3. Circulation of matter in ecosystems and main biological cycles geochemical
4.4. Influence of human activities on biological balances and particularly on the disruption of bio-geochemical cycles (consequences of pollution of aquatic environments and atmospheric pollution (eutrophication, greenhouse effect, ozone, acid rain.)
Chapter V: Summary description of the main ecosystems
5.1. Forest, meadow, surface water, ocean
5.2. Evolution of ecosystems and notion of climax

Directed work :

The supervised work concerns the methods applied to study the environment.

Evaluation method
Continuous monitoring and half-yearly review

References (Books and handouts, websites, etc.):
1. DAJET P. et GORDAN M., 1982- Analyse fréquentielle de l'écologie de l'espèce dans les communautés. Ed. Masson.
2. RAMADE F., 1984- Eléments d'écologie : Ecologie fondamentale. Ed. McGraw-Hill.

Semester: 4th

Teaching unit Transversal unit

Subject: Informatics tools

Teaching Objectives

Getting started with basic resource operating system definitions computers. At the end of this teaching, the student will be able to design documents and tables in Word and Excel.

Prerequisite knowledge recommended:

(brief description of knowledge required to be able to follow this course – Maximum 2 lines). .

content of module:

Discovery of the operating system

- Definition of an OS
- Different existing OS: Windows, Linux and Mac OS.

II. Discovery of the office suite

- Design documents on WORD.
- Design tables with EXCEL.
- Designing a presentation with Power point.
- Introduction to Latex. III. Software and algorithms
- Definition of software.
- Definition of algorithmics.
- Use of algorithms in biology.

Evaluation method:

100% exam

References (Books and handouts, websites, etc.)

Establishment	Faculty	Department
Mohamed Khider University, Biskra	*Faculty of Exact Sciences and Natural Sciences and Life*	*Natural Sciences and Life*
Domain	**Section**	**Specialty**
Naturel Science and Life	*Biological sciences*	*Biochemistry*

Semester 5

Course leader : HEBAL Hakim	
Cycle : *Licence thirdyear*	
Course title: DeepEnzymology (TUF1.5.1)	
Course content :	
Chapter I	**Generalities**
ChapterII	**Structure and properties of enzymes** - Monomeric enzymes (chymotrypsin) - Oligomeric enzymes - Isoenzymes (LDH) - Multienzyme complexes (FAS)
ChapterIII	**Protein-ligand interactions** - Association on a site. - Association on n equivalent and independent sites. - Association of a ligand on two different sites.
ChapterIV	**Enzymatic Kinetics** - Michaelian kinetics with a substrate (reminder) - Two-substrate kinetics - Multi-substrate kinetics
ChapterV	**Functioning and regulation of allosteric enzymes** - Structural properties - Functional properties - Determination of kinetic constants from graphical representation (Hill…)
ChapterVI	**Mechanism of catalysis.** - Topology and identification of active centers. - Functioning of coenzymes. - Activation of zymogens. - Specific markers of catalytic centers. - Mechanisms of action of serine proteases. - Mechanism of action of pyridoxal transferases.
Chapter VII	**Enzyme isolation and purification** - Origin - Study methods
Chapter VIII	**Enzyme engineering** - Nature and origin of enzymes

	1 - Methods for immobilizing enzymes - Physical method: immobilization by adsorption - Chemical method: immobilization by covalent fixation on a support. - Immobilization of enzymes and use in bioreactors 2 – Application of enzymes in biotechnology - Industrial preparations of enzymes - Production on an industrial scale - Applications in industrial fields (pharmaceuticals, cosmetics, agronomics) - Enzymatic biosensors - Artificial enzymes
Chapter IX	**Directed works** - The objective is to develop the ability to reason about enzymology problems and to learn to apply the concepts seen in class to interpret data experimental. The directed work will be in the form of: - Exercises illustrating each chapter - Analyzes of articles on the different points covered in class
Chapter X	**Practical works** - Enzyme purification protocol: - Extraction, - Splitting - Purification - Homogeneity criteria - Study of the activities of enzymes and the influence of certain physicochemical parameters.

Course leader : *ATHAMENA Ahmed*	
Cycle : *Licence Thirdyear*	
Course title: *Cellular and FunctionalBiochemistry (TUF1.5.2)*	
Course content :	
Chapter I	**Functionalcompartmentalization of the cell (overview)**
ChapterII	**Biomembranes** - Composition of membranes : isolation, composition. - Biomolecular architecture of membranes. - Membrane exchanges : passive transport, active transport, vesicular transport - Celladhesion and recognition proteins (receptorproteins, translocons, etc.) - Expression of antigens, virulence markers and cellular receptors - Receptors, desensitization and regulation of cellular response
ChapterIII	**Cell structure-function relationship** - Biosynthesis of lipids, membrane proteins and secretory proteins

	- The cytoskeleton: Response of the cytoskeleton to biochemical and mechanical stimuli and its role in focal adhesion (stress fibers). Examples of the cytoskeleton's involvement in various cell signaling pathways. - The fiber and muscle contraction: structure and function of actin and myosin microfilaments. - Mitochondria and the oxidative phosphorylation chain: structure, function, coupling sites, fractionnement of the oxido-phosphorylating system - Ribosome: protein synthesis, ripening and addressing. - The ubiquitin/proteasome system: structure and function - Lysosomal system: structure and function - The nucleus and exchanges with the cytoskeleton
ChapterIV	**Glycosylation of macromolecules and its biological role** - Glycoproteins: type of glycosylation bond (O- glycosylation and N-glycosylation) interest of glycosylation (protein stability, recognition...), molecular study of some glycoproteins (serum glycoproteins, blood group glycoproteins), various human glycoproteins (lectins, cell membrane glycoproteins, GAGs...) - Glycolipids: glycerolipids, glycosphingolipids (structure and function)
ChapterV	**Signal transduction and regulation of cell function** 1. Receptors and ligands: - Examples: adrenalin, insulin, PAF, growth factors, mitogens. 2. Transducers and coupling factors: activation cycle of trimeric G proteins and monomeric G proteins (oncogenic RAS); Grb2/Sos adapters (SH2, SH3 domains), scaffold proteins. 3. Signal amplification via second messengers 3.1. Phospholipases C and D/DAG/IP_3/Ca^{+2} cascade (e.g. cardiac cell) 3.2. Phospholipase A2/ Eicosanoides cascade 3.3. cAMP/PKA/CREB cascade (e.g. liver cell, muscle cell) 3.4. NO/GMPc cascade (e.g. neuron, endothelial cell) 4. Signal amplification via MAPkinasecascades : - Protein kinases (A, B/Akt, C, CAM, MAP) - Protein phosphatases (2A, calcineurin), tyrosine phosphatases, PTEN (e.g. cancer). 4.1. Tyrosine kinase receptors (e.g. insulin signaling) 4.2. PI3kinase, AKt/PKB (PH domains, PIP_3) 4.3. MAP Kinases / Transcription factors (e.g. cancer)
Chapter VI	**Signaling anomalies and pathologies** 1. Abnormality in protein expression and pathology (e.g. EGF-R, p21ras and oncogenesis) 2. Protein sorting abnormalities and hereditary pathologies (mitochondria, lysosomes, nucleus)

Course leader : Derradji yacine	
Cycle : *Licence thirdyear*	
Course title: Cellular and molecularimmunology (TUF2.5.1)	
Course content :	
Chapter I	General information on immune responses
ChapterII	Hematopoiesis
ChapterIII	Lymphocytes activation (T and B)
ChapterIV	Synthesis of antibodies and theirdiversity
ChapterV	Cellular immunity
ChapterVI	T-B interaction
Chapter VII	Memory acquisition; specificity of acquiredimmunity; vaccination
Chapter VIII	Hybridomas and monoclonal antibodies
Chapter IX	Control of the immune response
Chapter X	Development of the immune system
Chapter XI	Anti-infectiousimmunity
Chapter XII	Immunopathology and immunotherapy
Chapter XIII	Molecular aspects of transplantation and graft rejection

Course leader: Zekriwissame	
Cycle : *Licence thirdyear*	
Course title: Metabolic regulation (TUF2.5.2)	
Course content :	
Chapter I	**Interrelationships between different metabolisms.**
ChapterII	**Non endocrine regulation**
ChapterIII	**endocrine regulation**
ChapterIV	**Basic concepts in endocrinology** • Endocrine glands • Functional relationship between nervous system, endocrine system and immune system
ChapterV	**Hormonal regulation of glucose metabolism** • Reminders on carbohydrate metabolism • Hormonal regulation: role of: insulin, glucagon, catecholamines, thyroid hormones, glucocorticoids, digestive hormones, hormones derived from amino acids (serotonin, dopamine, etc.) • Regulation of glycogen metabolism: hormonal regulation

	(liver, muscle) • Examples of pathologies due to a disruption of carbohydrate metabolism (lactose intolerance, type 1 diabetes, Fabry disease, etc.)
ChapterVI	**Hormonal regulation of protein metabolism** • Protein biosynthesis • Hormonal regulation: Role of insulin; GH; sex hormones; and glucocorticoids. •
ChapterVII	**Hormonal regulation of lipids metabolism** • Reminders on lipidmetabolism • Hormonal regulation: lipogenesis, lipolysis, cholesterol metabolism regulation (synthesis and catabolism) and ketogenesis • metabolism Regulation by steroidal hormones (cortisol) • Examples of pathologies due to deregulation of lipid metabolism (hypercholesterolemia and atherosclerosis, hypertriglyceremia, …)
ChapterVIII	**Regulation of phosphocalcic metabolism and pathologies (dwarfism, gigantism, etc.).**
ChapterIX	**Functional relationships between the immune and endocrine systems**
ChapterX	

Course leader	
Cycle : *Licence thirdyear*	
Course title: Biologicalanalysis techniques (TUM1.5.1)	
Course content :	
Chapter I	**General notion** 1. Solutions 2. Concentrations 3. Buffers
ChapterII	**Homogenization and extraction techniques** 1. Mechanical grinding 2. Gas homogenizer 3. French Press 4. Sonication 5. Freezing-defrosting 6. Osmotic lysis 7. Ionic strength modifications 8. Enzymatic lysis
ChapterIII	**Separation or fractionation technique** 1. Centrifugation

	2. Precipitation 3. Filtration 4. Dialysis
ChapterIV	**Spectroscopic technique** 1. UV-Vis spectrophotometry 2. IR spectroscopy 3. Mass spectroscopy
ChapterV	**Chromatographic techniques** 1. Size exclusion chromatography 2. Ion-exchange chromatography 3. Affinity chromatography 4. Reverse phase adsorption chromatography 5. Gas chromatography (GS) 6. High-pressure liquid chromatography (HPLC) 7. Thin-layer chromatography 8. Paper chromatography
ChapterVI	**Electrophoresis techniques** 1. Non-denaturing electrophoresis 2. Denaturing electrophoresis 3. Isoelectrofocusing 4. Two-dimensional electrophoresis 5. Immunoelectrophoresis 6. Capillary electrophoresis

Course leader : *Chala Adel*	
Cycle : *Licence thirdyear*	
Course title: *Data Analysis (TUM1.5.2)*	
Course content :	
Chapter I	**Definitions of concepts:** *- Descriptive Statistic.* *- Characteristics parameters.*
Chapter II	**Coincidence Tests:** *-Comparison test between observed distribution and theoretical distribution (khysquar test).* *- Comparison test between observed proportion and theoretical proportion.* *- Comparison test between observed mean and theoretical mean.* *-Influence of two qualitative variables (khysquar test).*
Chapter IV	**Homogeneous Test :** *- Comparison between two populations in small tails (Student's*

	test). *- Comparison between two populations in big tails (reduce test).*
Chapter IX	**-Application with SPSS, and theuse of calculator.** **-Application examples in biology science.**

Course leader	
Cycle : ***Licence thirdyear***	
Course title: English I (TUT1.5.1)	
Course content :	
Chapter I	**Terminology :** In the forme of simplifiedscientifictexts or diagrams and figure 1. The human body 2. A plant 3. An insect 4. An ecosystem….
ChapterII	**Lessons** 1. Presentation of dialogues with figures 2. Common abbreviations and irregularplurals 3. Comparatives

Semester 6

Course leader	
Cycle : ***Licence thirdyear***	
Course title: Molecularbiology(TUF1.6.1)	
Course content :	
Chapter I	**The carrier of geneticinformation: DNA** 1. Structure and dynamics of DNA and theirbiologicalimplications . 2. Structure and organization of the prokaryotic and eukaryoticgenome
ChapterII	**Mutations, mutagenesis and detection** 1. Gene mutations 2. Mutagenesis 3. Genotypicdiagnosis
ChapterIII	**Transmission and conservation of genetic information** 1. DNA replication and its regulation 2. DNA repair and detection of mutagenicity

	3. Restriction-modification systems
ChapterIV	**Expression of genetic information and its control** 1. RNA transcription and processing 2. Protein translation and maturation 3. Regulation of gene expression *4.* Pathways Regulating genes by extracellular signals
ChapterV	**Methodology and molecular biology** 1. DNA characterization and analysis methods

Course leader : SAIDI Asma	
Cycle : *Licence thirdyear*	
Course title : Genetic engineering(TUF1.6.2)	
Course content :	
Chapter I	**Basic concepts**:
Chapter II	**Enzymatic tools in genetic engineering**: Restriction enzymes: Nucleases Polymerases Nuclear acids modifying enzymes (transferases, phosphatases, methylases, kinases) Ligases
Chapter III	**Host-Vector systems and molecular cloning**
Chapter IV	**Molecular hybridization** Probes DNA marking (radioactive and fluorescent methods)
ChapterV	**Genome analysis Techniques** Genomic modifications and gene amplification Genomic and cDNA libraries
ChapterVI	**selective in vitro amplification (PCR)** Production of recombinant proteins of therapeutic interest (insulin, HB, interferon, etc.) DNA chips
Chapter VII	**Nucleic acid sequence determination** **genomic DNA and cDNA libraries.**
Chapter VIII	**analysis techniques of Gene expression and modification of genetic material:** Northern-blot analysis run-on analysis RT-PCR and quantitative PCR methods Reporter genes gel delay method Foot-printing method

Chapter IX	**Biotechnological applications of recombinant DNA**

Course leader	
Cycle : *Licence thirdyear*	
Course title: Personalproject and introduction to research (TUM1.6.1)	
Course content :	
Chapter I	**Introduction to research** 1. The different types of scientificwriting 2. IMRAD structure of scientificwork in experimental sciences 3. Methods for citingbibliographicreferences 4. Article analysis
ChapterII	**Personalproject** - At the beginning of S6 for the license, a subjectisproposed to the student. - This personalprojectwhichmaytake the form of a final studythesis or an internship report, isallocated a certain number of credits and ismentionedwhen the training offerisdeveloped. - The subject must berelated to the specialty and must becreated in collaboration with the student. - The subjectcanalsobesuggested by a company in the socio-economicsector.

Course leader	
Cycle : *Licence thirdyear*	
Course title: Appliedbiochemistry in animal and plant pathologies (TUD1.6.1)	
Course content :	
Chapter I	**Appliedbiochemistry in animal pathologies** 1. The differentbiochemicalparameters (normal values) 2. Techniques in hematology 3. Techniques for urine analysis 4. Analyzes of otherbiologicalfluids 5. - Specificanalyzes for somediseases
ChapterII	**Appliedbiochemistry in plant pathologies** 1. Plant biochemistry and plant physiology 2. Changes in biochemicalparameters in plants 3. Techniques for dosingdifferentelements in plants 4. Biochemical diagnostics of some plant diseases 5. Analyzescarried out on plant tissues 6. Analyzescarried out on saps 7. Dosage of plant hormones

	8. Soil dosages and analyzes 9. Water dosages and analyzes

Course leader YAACOUB Fadjeria	
Cycle : *Licence thirdyear*	
Course title: Appliedbiochemistry in foodindustry(TUD1.6.2)	
Course content :	
Chapter 1	**Part one** **Additives and processingauxiliary in the foodindustry** 1. Introduction 2. Food additives 3. General issues concerning additives and processingauxiliaries 4. Definitions and classification 5. Definition of food 6. Definition of processingauxiliary
Chapter 2	**The role and benefits of food additives in foodtechnology** 1 .Whatis a food additive? 2. The contribution of additives to innovative, high-qualityfoodproducts 3. The benefits of food additives 4. Improvingpreservation 5. Improvingorganolepticqualities 6. Improvingnutritional value 7. Responses to new consumer trends 8. Mention of additives on food packaging 9. Food additive safety
Chapter 3	**Substances added to food and consumer interest** 1. Consumer attitudes and reactions to substances added to food 2. Current and future consumer concerns about additives
Chapter 4	**Assessment of toxicological and nutritionalrisksassociatedwith the useof additives and processingaids** 1. Interest or role of food additives 2. Are additives toxic? 3. Additive risk
Chapter 5	**Part Two** **Additives for nutritionalpurposes** Vitamins, trace elements and varioussupplements:benefits and risks 1. Definitions 2. Benefits of supplementation 3. Risks of supplementation
Chapter 6	**Part Three** **Preservative additives**

	1. Preservative additives (antibacterial, antifungal) 2. General information 3. Mineralpreservatives 4. Organicpreservatives
Chapter 7	**Antioxidant additives** 1. Autoxidation - Preventivemeasures 2. Antioxidants 3. Toxicology of antioxidants
Chapter 8	**Part Four** **Additives to improvesensoryproperties** The role of additives in maintaining and improving the organolepticproperties of foodproducts 1. Organolepticproperties 2. The role of organolepticproperties in foodstuffs 3. Perception of organolepticproperties
Chapter 9	**Flavouring and taste-enhancing additives** 1. Role of flavorings, need 2. Nature of flavourings 3. Use of flavourings 4. Flavor modifiers
Chapter 10	**Polyols** 1. Regulatory aspects 2. Sorbitol 3. Mannitol 4. Xylitol 5. Maltitol and maltitol-basedsyrups 6. Isomalt 1. 7. Lactitol
Chapter 11	**Coloursauthorised for humanconsumption** 1. Differentapproaches to colouring 2. Requirements for colours 3. History of the use of colours in food 4. Classification tests 5. Yellow dyes 6. Orange and reddyes 7. Blue dyes 8. Green dyes 9. Brown and black dyes 10. Variousshades of dyes 11. Toxicological aspects 1. 12. Consumption
Chapter 12	**Emulsifying agents** 1. Chemical origins and structure 2. Characteristics and functions of emulsifiers **1.** 3. Food uses

Chapter 13	**Part Five** **Processingaids :** Use of enzymes in foodtechnology 1. General information 2. General information on enzyme applications 3. Possible risks of use 1. 4. Application
Chapter 14	**Additives used in dairyproducts** 1. Colours 2. Preservatives 3. Antioxidants 4. Emulsifiers, stabilisers, thickeners, gelling agents 5. Flavourings 6. Sweeteners 7. Additives in dietarydairyproducts 8. Processingaids

Course leader	
Cycle : ***Licence thirdyear***	
Course title: English II (TUT1.6.1)	
Course content :	
Chapter I	**Terminologies** 1. In the form of courses in English, courses in biology (fromdifferentsubjects) preferablytaught in commoncore. The courses must be a littledetailed as they are taught in French. 2. The best wayis to use, within the course text, detaileddiagrams (e.g. the structure of organs, cells;biological cycles. The stages of biochemicalreactions, etc.)
ChapterII	**Lessons** 1. Direct questions 2. The linkingwords 3. Abbreviations
ChapterIII	**Scientific texts** (texts or articles)