

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

**MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH**

HARMONISATION

OFFERING OF TRAINING MASTER

ACADEMIC

Establishment	Faculty / Institute	Department
Djilali Bounaama University-Khemis Miliana	Faculty of Natural and Life Sciences and Earth Sciences	Biology

Field: Natural and Life Sciences (NLS)

Field: Biological Sciences (SB)

Specialty: Cellular Physiology and Pathophysiology

Academic year: 2016 - 2017

الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي والبحث العلمي

مواعمة
عرض تكوين ماستر
أكاديمي

المؤسسة	/الكلية المعهد	القسم
جامعة الجبالى بونعامة بخميس مليانة	م الطبعة و الحياة و علوم الرض	بيولوجيا

الميدان : علوم الطبيعة و الحياة

الشعبة : علوم بيولوجية

التخصص : الفيزيولوجيا الخلوية و الأمراض الوظيفية

السنة الجامعية 2016 - 2017 :

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I - Identity of the Master

(All fields must be completed)

1 - Location of the course :

Faculty (or Institute): Faculty of Life and Nature Sciences and Earth Sciences

Department: Biology

2- Training partners

- Other academic institutions :
 - University of Bab Ezzouar (USTHB)
 - University of Blida (Saad Dahleb)
 - University of Boumerdes(UMBB)
 - Hassiba Benbouali University - Chlef
 - INPV of Elharach
 - ITGC of Khemis Miliana
- Companies and other socio-economic partners:
 - Department of Pathological Anatomy, Ain Defla Hospital
 - ORLAC
 - Aribis Dairy
 - Wanis Dairy
 - OREVC
 - ITEBO of Baba Ali
- International partners :

* = Present conventions as an annex to the training course

3 - Context and objectives of the training

A - Access conditions *(indicate the degree specialities that can give access to the Master)*

- Bachelor of Science in Animal Physiology
- Licence of Physiology and Pathophysiology
- Licence of Nutrition and Food Control
- Licence of Reproduction and Developmental Genetics
- Licence of Cellular and Molecular Pathophysiology
- Bachelor of Biology (related to animal physiology)

B - Objectives of the training *(skills targeted, educational knowledge acquired at the end of the training - maximum 20 lines)*

This project concerns the establishment of a new training course at Bac+5 level in the framework of the LMD. The main objectives are listed as follows

- To provide the university with a training programme that is part of its development plan and reflects one of its competences,
- To provide the user sector with efficient executives who are able to integrate into teams in the agri-food, medical, biomedical, pharmacological, biological analysis and forensic sectors, and who are able to develop their knowledge in a wide range of specialisations at a later stage.
- To encourage the acquisition of a general culture that will open up the mind and make it possible to adapt to professional life.
- To be able to enter a training cycle preparing for a doctorate.

C - Targeted profiles and skills (in terms of professional integration)

- maximum 20 lines) :

a) On the training plan

The training in question, which reflects one of the university's competences, is part of the overall development project of the Faculty of Science. The launch in the medium term of a doctorate course will give teachers the opportunity to exercise and further develop their theoretical and practical knowledge.

b) On the economic front

The Master's degree in Cellular Physiology and Pathophysiology will provide the labour market with an additional opportunity by providing specialists in various sectors of activity. The job opportunities are mainly :

- Medicine and health sector
- Agri-food sector.
- Research and education
- Pharmaceutical sector

D- Regional and national employability potential of graduates

The wilaya of Ain Defla has various potentialities in the field of agriculture. It practices various livestock (cattle, sheep, poultry and beekeeping, etc.). It is a focal point for milk processing companies such as dairies (Aribs and Wanis) and many investors exploiting agricultural products (about ten farms).

The specialisation in Cellular Physiology and Physiopathology will give a precision on animal nutritional physiology and will undoubtedly be a means of improving reproduction. This specialisation will therefore create many new jobs and open the door to collaborations with agronomists and veterinarians.

E - Bridges to other specialities

At the end of their training, students who have graduated from the "Animal Physiology" degree will have the possibility of continuing their studies in a Master's degree in the same speciality or to move on to other Master's degrees close to this one, such as the following: Biology and Physiology of Reproduction, Biology and Cellular Pathology, Microbiology and Health, Biology of Organisms, Biochemistry, Quality Control and Biotechnology...

F - Indicators for monitoring training

The aim of the system is to diversify the methods of assessment in order to evaluate the students' skills as widely as possible. In this context, the following will be assessed: (1) student empowerment; (2) regular monitoring of knowledge acquisition; (3) acquisition of oral expression; (4) acquisition of teamwork and synthesis skills; (5) control of the student's abilities and not just knowledge.

The breakdown between the different forms of evaluation is as follows:

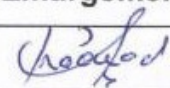

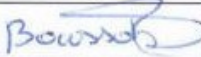
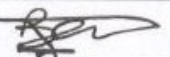





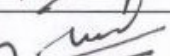


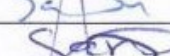
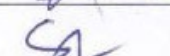
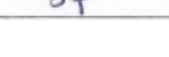
- Knowledge control: 40%.
- Oral expression: 20%.
- Personal work: 20
- Capacity for analysis and synthesis: 20

G - Staffing capacity (give the number of students that can be accommodated)

25 students

4 - Human resources available

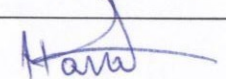


A: Teachers in the school involved in the speciality :

Nom, prénom	Diplôme graduation + Spécialité	Diplôme Post graduation + Spécialité	Grade	Type d'intervention *	Emargement
CHAOUAD Billel	DES en Physiologie Animale	Magister en Régulation Endocrinienne et métabolique	MAA	Cours, TD, TP, Encadrement	
SAHRAOUI Abdelhamid	DES en Physiologie Animale	Magister en Régulation Endocrinienne et métabolique	MAA	Cours, TD, TP, Encadrement	
BOUSSOUBEL Abdelkhader	DES en Biologie du Comportement	Magister en Neurosciences	MAA	Cours, TD, TP, Encadrement	
BENKHROUF Amina	DES en Physiologie Animale	Magister en Régulation Endocrinienne et Physiopathologie	MAA	Cours, TD, TP, Encadrement	
DIDAOUI Hayet	Ingénieur en control de Qualité des Aliments et Analyse	Magister en Immunologie	MAB	Cours, TD, TP, Encadrement	
GHALEM Meriem	Master en Physiologie Cellulaire et Physiopathologie	Doctorat en Physiologie et Biochimie de la Nutrition	MAB	Cours, TD, TP, Encadrement	
DAOUDI Ahlem	Ingénieur en sciences alimentaires	Magister en Sciences Alimentaires	MAA	Cours, TD, TP, Encadrement	
KARAHACEN Tahar	Ingénieur d'état en Zoologie	Doctorat en Agronomie – Zoologie Agricol	MCB	Cours, TD, TP, Encadrement	
MAHI Miloud	DES en Microbiologie	Magister en Microbiologie Alimentaire	MAA	Cours, TD, TP, Encadrement	
DJEZZAR Miliani	Ingénieur en agronomie	Magister en Zoologie Doctorat en sciences zoologiques	MCB	Cours, TD, TP, Encadrement	
GHOMARI Faiza Nawel	DES en Microbiologie	Magister en Microbiologie Appliquée	MAA	Cours, TD, TP, Encadrement	
ROUABAH Abdelkhader	Ingénieur en Sciences vétérinaires	Magister en Pisciculture	MAA	Cours, TD, TP, Encadrement	
SAADI Fadila	Ingénieur en sciences alimentaires	Magister en Sciences Alimentaires	MAA	Cours, TD, TP, Encadrement	
MOSTEFA SARI Fouzia	Ingénieur en Génie Biologique	Magister en Biotechnologie	MAA	Cours, TD, TP, Encadrement	
GUETARNI Hacina	Ingénieur en sciences alimentaires	Doctorat en Microbiologie Alimentaire	MCB	Cours, TD, TP, Encadrement	

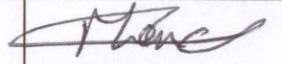

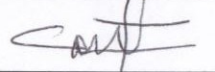
* = Course, TD, TP, Internship supervision, Thesis supervision, other (please specify)

B: External Management :

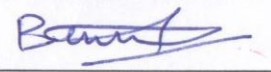
Etablissement de rattachement : USTHB

Nom, prénom	Diplôme graduation + Spécialité	Diplôme Post graduation + Spécialité	Grade	Type d'intervention *	Emargement
Hamlat NADJIBA	DES en Physiologie Animale	Doctorat en Physiologie Animale	MCB	Conférences	
Neggazi Samia	DES en Physiologie Animale	Magister en Physiologie Animale	MAA	Conférences	
Chabane Khahina	DES en Physiologie Animale	Magister en Physiologie Animale	MAA	Conférences	

Etablissement de rattachement : Université d'Alger 1

Nom, prénom	Diplôme graduation + Spécialité	Diplôme Post graduation + Spécialité	Grade	Type d'intervention *	Emargement
Menad Rafik	DES en Physiologie Animale	Doctorat en Physiologie Animale	MCB	Conférences	
Ousmaal Mohamed El fadel	DES en Physiologie Animale	Doctorat en Physiologie Animale	MCB	Conférences	
Maouche Maima	DES en Physiologie Animale	Doctorat en Physiologie Animale	MCB	Conférences	

Etablissement de rattachement : Université de Boumerdes

Nom, prénom	Diplôme graduation + Spécialité	Diplôme Post graduation + Spécialité	Grade	Type d'intervention *	Emargement
Benmouloud Abdeloufi	DES en Physiologie Animale	Doctorat en Physiologie Animale	MCB	Conférences	

* = Course, TD, TP, Internship supervision, Thesis supervision, other (please specify)

5 - Specific material resources available

A- Pedagogical Laboratories and Equipment: Sheet of existing pedagogical equipment for the practical training of the proposed course (1 sheet per laboratory)

Laboratory name: Biology and **Student capacity** 25

N°	Title of the equipment	Number	comments
01	Water bath	01	
02	Analytical balance	02	
03	Dissecting box	09	
04	Blade holder box	12	
05	Insect box	11	
06	MALASSEZ cell	03	
07	Centrifuge was refrigerated	01	
08	Prepared zoology blade case	01	
09	Histology Prepared Slide Set	01	
10	Conductimeter	01	
11	Dissecting tray	02	
12	Decameter	01	
13	Oven	01	
14	Hygrometer for livestock rooms	01	
15	Binocular magnifier	23	
16	Halogen lamp	01	
17	Hand-held magnifier	02	
18	Scalpel blade handle	02	
19	Model of DNA (large format)	01	
20	Model of the organisation of a flower	01	
21	Udder DNA model	01	
22	Cell division model	12	
23	Colour microphotography of biology	58	
24	Microscopes	14	
25	Micrometer	01	
26	Microtome	02	
27	Micropipette 1000µm	02	
28	Micro pipette 20 -200ul	01	
29	Micro pipette 100ul	01	
30	Micro pipette 10ul	01	
31	Ph meter	01	
32	Vernier caliper	01	
33	Pedagogical board	23	
34	Cork dissecting plate	14	
35	Hot plate	02	
36	Vacuum pump	01	
37	Human skeleton	01	
38	Screen	03	
39	Thermometer with probe	02	

Laboratory name: Biochemistry

Student capacity : 25

N°	Title of the equipment	Number	comments
01	Vortex shaker	(01)	
02	Chlorine analyzer (kit comparator)	(01)	
03	Bath -marie	(02)	
04	Sand baths	(01)	
05	Precision scale 1000g	(01)	
06	Precision scale 10g	(01)	
07	Precision scale 1200g	(01)	
08	Bunsen burner	(07)	
09	Dissecting box	(01)	
10	Centrifuge	(01)	
11	Balloon heater	(03)	
12	Chronometer	(03)	
13	Conductivity meter	(01)	
14	Colorimeter	(01)	
15	Knife	(01)	
16	Desiccator	(01)	
17	Densimeter 1400/1500	(02)	
18	Densimeter 2000	(02)	
19	5ml dispenser	(01)	
20	Protein electrophoresis cell (vertical)	(02)	
21	Oven	(01)	
22	Riser + heater support	(02)	
23	Hematocrit	(01)	
24	Ventilated hood	(01)	
25	Lactodensimeter	(01)	
26	Halogen lamp	(01)	
27	Protective glasses	(02)	
28	Mask + filter	(03)	
29	Micropipette 0 -50µl	(01)	
30	Micropipette 20-200µl	(02)	
31	Microscopes	(07)	
32	Vernier caliper	(01)	
33	pH meter	(03)	
34	Hot plate + agitator	(02)	

Laboratory name: Microbiology

Student capacity : 25

N°	Title of the equipment	Number	comments
01	Magnetic Agitator	01	
02	Vortex shaker	01	
03	Autoclave	03	
04	Magnetic rod	02	
05	Water bath	01	
06	Analytical balance	01	
07	Bunsen burner	30	
08	Dissecting box	02	
09	Centrifuge	01	
10	Pressure cooker	01	
11	Colony counter	01	
12	Vertical freezer -86°C	01	
13	Dig in will be mique	10	
14	Incubator	03	
15	Binocular magnifier	02	
16	Protective glasses	01	
17	Micro pipette 1000ul	01	
18	Micro pipette 10 -100ul	02	
19	Micro pipette 5 -50ul	01	
20	Motic microscope	06	
21	Mortar	02	
22	Vernier caliper	01	

Title of the laboratory: Water chemistry

Student capacity : 25



N°	Title of the equipment	Number	comments
01	Liquid expansion apparatus	(01)	
02	Melting point apparatus	(01)	
03	Apparatus for expanding gauze	(01)	
04	Water bath	(01)	
05	Sand bath	(01)	
06	Electronic scale	(01)	
07	Analytical balance	(01)	
08	Bunsen burner	(03)	
09	Ammonium test box	(01)	
10	Calorimeter	(01)	
11	Balloon heater	(3)	
12	Stopwatch	(02)	
13	Benchtop conductivity meter	(03)	
14	Portable conductivity meter	(02)	
15	Distiller	(01)	
16	Oven	(01)	
17	Shaker		
18	Vernier caliper	(01)	
19	PH - benchtop meter	(03)	
20	P h-portable meter	(01)	
21	Hot plate	(02)	
22	Vacuum pump	(01)	
23	T-connector	(01)	
24	Mercury thermometer	(09)	
25	Electric thermometer	(04)	
26	Immersion heater	(02)	
27	Extractor	(01)	
28	Metal cylinder for soil analysis	(10)	
29	Multi parameter	(01)	
30	Robinson's pipette holder	(01)	
31	Box of different soil types (18flask)	(02)	
32	Tariera	(02)	
33	Bernard's calcimeter	(02)	
34	Screen size (2; 0.25; 0.125; 0.045)mm		

B - Work placements and in-company training :

Location of the course	Number of students	Duration of the course
Pilot farms in the wilaya	04 per farm	1 month
ITEB of Baba Ali	10	1 month
CNIAAG of Baba Ali	10	1 month
Laboratory of the hospital of Khemis	10	1 month
House for diabetics in Khemis	10	1 month

C - Supporting research laboratory(ies)

at the

Chef du laboratoire
N° Agrément du laboratoire
Date :
Avis du chef de laboratoire :



Chef du laboratoire
N° Agrément du laboratoire
Date :
Avis du chef de laboratoire:

D- Support research project(s) at the

Title of the research project	Project code	Project start date	End date of the project
Cellular and molecular mechanisms of fibrosis induced during matrix remodelling	F0020130015	2013	2017
Study of markers of oxidative stress, inflammation and angiogenesis in cardiovascular disease and cancer. Nutritherapeutic influence	F00220140200	2014	2018

E - Personal workspaces and ICT :

- Library of the Faculty of Natural and Life Sciences
- Central University Library
- Department connected to the Internet
- Faculty internet room for students.
- Educational laboratories connected to the Internet.
- Research laboratory: Water Rock and Plant.
- Agricultural production and natural resource development laboratory.

II - Semester organisation sheet for courses

(Please submit the 4 semester cards)

Semester 1

Teaching Unit	VHS	V.H. Weekly				Coeff	Credits	Evaluation method	
	51 sem	C	TD	TP	Other			Continuous	Review
Fundamental Teaching Unit						9	18		
FTU1(O/P): Physiology and Physiopathology of the Large functions I	112h30	3h		4h30	137h30	5	10		
Cardiac Physiology	67h30	1h30		3h	82h30	3	6	x	x
vascular cell physiology and of haemostasis	45h	1h30		1h30	55h	2	4	x	x
FTU2(O/P): Organisation and Cellular Physiology	90h	3h	3h		110h	4	8		
Cytoskeletal Biology and Traffic Cellular	45h	1h30	1h30		55h	2	4	x	x
Intercellular Adhesion and Matrix Extracellular	45h	1h30	1h30		55h	2	4	x	x
Methodology Teaching Unit						5	9		
MTU(O/P): Methodology I	105h	3h	4h		120h	5	9		
Cell Biology Techniques	45h		3h		55h	2	4	x	x
Applied Techniques in Biology Molecular	22h30	1h30			27h30	1	2	x	x
Biostatistics I	37h30	1h30	1h		37h30	2	3	x	x
Discovery Teaching Unit						2	2		
DTU 1(O/P): Pathogens and Immunity	45h	1h30	1h30		5h	2	2		
Pathogens and Immunity	45h	1h30	1h30		5h	2	2	x	x
Tranversal Teaching Unit						1	1		
TTU1(O/P): Communication	22h30	1h30			2h30	1	1		
Communication	22h30	1h30			2h30	1	1		x
Total Semester 5	375h	12h	8h30	4h30	375h	17	30		

Semester 2

Teaching Unit	VHS	V.H. Weekly				Coeff	Credits	Evaluation method	
	15 wks	C	TD	TP	Other			Continuous	Review
Fundamental Teaching Unit						9	18		
FTU1(O/P): Physiology and Physiopathology of large functions II	112h30	3h		4h30	137h30	5	10		
Respiratory and Renal Physiology	67h30	1h30		3h	82h30	3	6	x	x
Digestive Physiology and Metabolism	45h	1h30		1h30	55h	2	4	x	x
UEF 2(O/P): Physiology Molecular and Signalling	90h	3h	3h		110h	4	8		
Molecular Endocrinology	45h	1h30	1h30		55h	2	4	x	x
Cellular signalling	45h	1h30	1h30		55h	2	4	x	x
Methodology Teaching Unit						5	9		
EMU1(O/P): Methodology II	105h	4h30	1h	1h30	120h	5	9		
Reproductive Biotechnology	45h	1h30		1h30	55h	2	4	x	x
Cellular Proliferation and its Regulation	37h30	1h30	1h		37h30	2	3	x	x
English	22h30	1h30			27h30	1	2		x
Discovery Teaching Unit						2	2		
UED1(O/P): Neuroscience Molecular	45h	1h30	1h30		5h	2	2		
Molecular Neuroscience	45h	1h30	1h30		5h	2	2	x	x
Transversal Teaching Unit						1	1		
UET1(O/P): Legislation and Bioethics	22h30	1h30			2h30	1	1		
Legislation and Bioethics	22h30	1h30			2h30	1	1		x
Total Semester 5	375h	13h30	5h30	6h	375h	17	30		

Semester3

Teaching Unit	VHS	V.H. Weekly				Coeff	Credits	Evaluation method	
	15 wks	C	TD	TP	Other			Continu ous	Review
Fundamental Teaching Unit						9	18		
FTU1(O/P): Nutrition and Dietetics	112h30	3h		4h30	137h30	5	10		
Metabolic pathophysiology	67h30	1h30		3h	82h30	3	6	x	x
Food and Diet	45h	1h30		1h30	55h	2	4	x	x
FTU2(O/P): Pathologies	90h	3h		3h	110h	4	8		
Pathophysiology of Diseases Cardiovascular	45h	1h30		1h30	55h	2	4	x	x
Glandular pathologies Endocrine	45h	1h30		1h30	55h	2	4	x	x
Methodology Teaching Unit						5	9		
MTU(O/P): Methodology III	105h	4h30	2h30		120h	5	9		
Pharmacology	45h	1h30	1h30		55h	2	4	x	x
Biostatistics II	37h30	1h30	1h		37h30	2	3	x	x
Article Analysis	22h30	1h30			27h30	1	2		x
Discovery Teaching Unit						2	1		
DTU1(O/P): Physiology Neurosensory	45h	1h30		1h30	5h	2	2		
Neurosensory Physiology	45h	1h30		1h30	5h	2	2	x	x
Transversal Teaching Unit						1	1		
UET1(O/P): Entrepreneurship	22h30	1h30			2h30	1	1		
Entrepreneurship	22h30	1h30			2h30	1	1		x
Total Semestre 5	375h	13h30	2h30	9h	375h	17	30		

Semester 4 :

Field: Natural and Life Sciences (NLS)

Field of study: Biological Science (SB)

Specialty: Cellular Physiology and Pathophysiology

The end-of-study project, which lasts for one semester, will culminate in a dissertation and an oral presentation.

	VHS	Coeff	Credits
Personal work	500h	10	20
Internship in a company	250h	7	10
Seminars			
Other (specify)			
Total Semester 4	750 h	17	30

4- Overall summary of the training:(indicate the overall VH separated into courses, TD, for the 04 teaching semesters, for the different types of UE)

VH \ TU	FTU	MTU	DTU	TTU	Total
Course	270h	180h	67h30	67h30	585h
TD	90h	112h30	45h		247h30
TP	247h30	22h30	22h30		292h30
Personal work	742h30	360h	15h	7h30	1125h
Internship - dissertation	500h	250h			750h
Total	1850h	925h	150h	75h	3000
Credits	74	37	6	3	120
in credits for each EU	61,67	30,83	5	2,5	100

III - Detailed programme by subject

(1 detailed sheet per subject)

Semester : 1

**Title of Master's degree: Physiology cellular and pathophysiology
Physiology**

Title of the Unit: Physiology and Pathophysiology of Major Functions I

Title of the subject: Cardiac Physiology

Credits: 6

Coefficients: 3

Teaching objectives:

This subject aims to provide the student with the molecular, cellular and integrated physiological basis of the functioning of the cardiovascular system; the cellular and molecular aspect of the functioning of cardiac myocytes.

Prerequisite knowledge recommended: have knowledge Cellularbiology, Physiology of major functions.

Content of the subject:

I. Physiology of cardiac cell contraction

- Electrogenesis of cardiac myocytes
- The sarcomere in the contraction and relaxation functions of the cardiac myocyte
- Excitation-contraction-relaxation coupling of the cardiac myocyte
- Electrocardiogram (ECG).

II. The heart cycle

III. Cardiac output

- Regulation of the systolic flow
- Heart rate regulation: Nerve and chemical regulation

Personal work: 82h30

- Course review: 60h
- Preparation of reports: 5h
- Bibliographic research: 17:30

Evaluation method: Written exam and continuous assessment

Reference:

- Étienne -Paul D'ALCHÉ (2008).Understanding cardiovascular physiology. Edition FLAMMARION. 221p.
- Jean -Jacques LEMAIRE, Jean -Christophe BRUSTEL and Frédérique MARSON (2008).Anatomie physiologie Edition VERNAZOBRES. 340p.
- Patrick LACOLLEY, Dominique BABUTY, Chantal BOULANGER, Bijan GHALEH, Gervaise LOIRAND, Florence PINET,Janeise SAMUEL (2008).Biology and pathology of the heart andvessels. Edition JOHN LIBBEY. 700p.
- French Society of Cardiology(2007).Cardiology and vascular diseases. Edition MASSON. 1700p.

Semester: 1

TU Title: Physiology and Pathophysiology of Major Functions I

Title: Vascular Cellular Physiology and Haemostasis

Credits: 4

Coefficients: 2

Teaching objectives:

This subject aims to provide students with a basic understanding of haematology including haemostasis and blood-vessel interaction as well as vasomotor signalling and functions endothelial.

Recommended prior knowledge of cell biology and physiology of the major functions.

Content of the subject:

I- Cardiovascular haematology

- Cellular and molecular bases of haemostasis
- Cellular and molecular basis of fibrinolysis

II- Vascular Cell Biology and Physiology

- Regulation of vasomotricity
- Cell and tissue biology of the vascular wall
- Neuro-hormonal system and vascular regulation

III- Dysfunction of intercellular interactions

- 1- Endothelial cell and smooth muscle cell
- 2- Endothelial cell and circulating cells
- 3- Impaired endothelial function

IV- Haemostasis and thrombosis

- Description of the stages of haemostasis (primary haemostasis, coagulation, fibrinolysis)
- Mechanism of thrombosis

Personal work: 55h

- Course revision: 40h
- Preparation of reports: 5h
- Bibliographic research: 10 hours

Evaluation method: Written exam and continuous assessment

Reference :

- Sarah Bugiera, Guillaume Dumas^b, Jean Malfuson^b, Vincent Foissaud^a, Christophe Martinaud (2015). Hématologie. Revue Francophone des Laboratoires. 475 : 67-68
- Patrick LACOLLEY, Dominique BABUTY, Chantal BOULANGER, Bijan GHALEH, Gervaise LOIRAND, Florence PINET, Jane -Lise SAMUEL (2008). Biology and pathology of the heart and vessels. Edition JOHN LIBBEY. 700p.

Semestre: 1

Title of the Unit: Organisation and Cellular Physiology

Title of the subject: Cytoskeleton Biology and Cell Trafficking

Credits: 4

Coefficients: 2

Teaching objectives :

This module aims to provide the student with information on the involvement of the cytoskeleton in cellular functions and the role of the endomembrane system in the intracellular trafficking of different biomolecules.

Recommended prior knowledge :

Knowledge of Cell Biology, Biochemistry

Content of the subject:

I. Cytoskeletal biology

- Study techniques
- Actin microfilaments: structure, biochemistry and assembly, relationship between actin microfilaments and the plasma membrane (the cell cortex), actin and amoeboid movements, actin-myosin microfilament interactions
- Intermediate filaments: biochemistry and structure, role as differentiation markers and cell integrators.
- Microtubules: Structure and biochemistry, cellular functions of microtubules, microtubules and associated proteins.
- Cytoskeleton and vesicular trafficking, Cytoskeleton and cell migration

II. Cellular traffic

- Protein synthesis and addressing (sorting signals)
- Translocation of proteins into the ER (SRP signal), Modifications of proteins in the ER (cleavage of the signal sequence, Acquisition of secondary and tertiary structure, Oligomerisation, Glycosylation, Addition of a GPI group)
- Passage of proteins to the Golgi apparatus: Structure of the Golgi apparatus, coatamer-coated transition vesicles, protein maturation and post-translational modifications (Glycosylations, Sulfatations, Maturations by protein cleavage). The Trans-Golgi Network (TGN): a sorting centre towards the primary lysosomes, the plasma membrane and the extracellular medium
- Clathrin-dependent endocytosis pathway: Internalisation (clathrin-coated vesicles). Endosomes (sorting station for internalised receptors).
- Regulation of membrane trafficking

Personal work: 55h

- Course revision: 35h
- Exercises: 10 hours
- Bibliographic research: 10 hours

Evaluation method: Written exam and continuous assessment

Reference :

- ALBER T S, JOHNSON, LEWIS, RAFF, ROBERTS, WALTER, (2004).molecular biology of the cell. Edition FLAMMARION. 1500p.
- B . Albert, D. Bray , K. Hopkin, A . Johnson, J . Lewis, M. Raff, K. R oberts, P . Walter. (2005) . L'essentiel de la biologie cellulaire. Flammarion 2^{ème} edition

Title of Master's degree: cellular and physio-pathology

Physiology

Title of the Unit: Organisation and Cellular Physiology

Title of the subject: Intercellular Adhesion and Extracellular Matrix

Credits: 4

Coefficients: 2

Teaching objectives :

To explain the architecture of cell-cell adhesion, the recognition molecules and the general organisation of the extracellular matrix; its component and its interactions with the tissue and cellular environment. And to study certain pathologies related to the remodelling of this Matrix.

Recommended background: Knowledge of Cell Biology, Biochemistry

Content of the subject :

I. Intercellular adhesion

- Definitions, introduction, roles of adhesion molecules
- Cell-cell junctions (tight junctions, adherens junctions, desmosomes and gap junctions) and cell-matrix junctions (hemidesmosomes and focal contacts)
- Adhesion molecules: Immunoglobulins (N-CAM, V-CAM and I-CAM 1, 2, 3), cadherins (E-cadherin, N-cadherin, P-cadherin, VE-cadherin, desmogleins 1 and 3 and desmocollins), integrins, selectins, claudins and occludins and connexins
- Pathologies of adhesion molecules

II. Extracellular matrix

- Definitions, introduction, roles of the extracellular matrix
- Collagens: fibrillar collagens, fibril-associated collagens and network-forming collagens
- Elastic fibres: microfibrils and elastin
- Proteoglycans and glycosaminoglycans
- Structural glycoproteins: fibronectin, laminin, tenascin, entactin, vitronectin, thrombospondins, etc.
- The basal lamina: Organisation, composition and biological roles
- Matrix metalloproteinases (MMPs): classification, structure, activation, role and regulation of activity (role of TIMPs or Tissue Inhibitor of Metalloproteinases)

Personal work: 55h

- Course revision: 35h
- Exercises: 10 hours
- Presentations: 10am

Evaluation method: Written exam and continuous assessment

Reference :

- ALBERTS, JOHNSON, LEWIS, RAFF, ROBERTS, WALTER (2004). molecular biology of the cell. Edition FLAMMARION. 1500p.
- B. Alberts, D. Bray, K. Hopkin, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter (2005). L'essentiel de la biologie cellulaire. Flammarion 2^{ème} édition
- Steph en R. BOLSOVER, Jeremy S. HYAMS, Elisabeth A. SHEPHARD, Hugh A. WHITE, Claudia G. WIEDEMANN (2006). Cellular and molecular biology. Edition DUNOD. 583p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 1

Title of the Unit: Methodology I

Title of the subject: Cell Biology Techniques

Credits: 4

Coefficients: 2

Teaching objectives:

Knowledge recommended: Have some knowledge in Cellular Biology, Biochemistry

Content of the subject:

I. Morphological studies

- Light microscopy (vital observation, smears and histological sections).
- Special optical microscopies (fluorescence, phase contrast and interference microscopes).
- Transmission and scanning electron microscope.

II. Biochemical studies

- Cell fractionation methods (cell dissociation and cell bursting, organelle separation by differential ultracentrifugation and density gradient ultracentrifugation).
- Chromatography and electrophoresis
- Absorption spectrophotometry

III. Operational studies

- Cell culture (techniques, culture conditions and applications)
- Cell labelling (radioactive isotope labelling and antibody labelling: immunohistochemistry, western blot and ELISA)
- Mass spectrometry
- Flow cytometry

Personal work: 55h

- Course revision: 35h
- Exercises: 10 hours
- Presentations: 10am

Evaluation method: Written exam and continuous assessment

Reference :

- **ALBERTS, JOHNSON, LEWIS, RAFF, ROBERTS, WALTER (2004).** Molecular Biology of the Cell. Edition FLAMMARION. 1500p.
- **B. Alberts, D. Bray, K. Hopkin, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter (2005).** L'essentiel de la biologie cellulaire. *Flammarion* 2^{ème} edition
- **LODISH, BERK, MATSUDAIRA, KAISER, KREIGER, SCOTT, ZIPURSKY, DARNELL (2005).** Biology molecular of the cell. Edition DE BOECK. Edition ELSEVIER. 853p.
- **Stephen R. BOLSOVER, Jeremy S. HYAMS, Elisabeth A. SHEPHARD, Hugh A. WHITE, Claudia G. WIEDEMANN (2006).** Cellular and molecular biology. Edition DUNOD. 583p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 1

Title of the Unit: Methodology I

Title of the subject: Applied Techniques in Molecular Biology

Credits: 2

Coefficients: 1

Teaching objectives:

Knowledge recommended: Have some knowledge in CellBiology, Biochemistry and Genetics.

Content of the subject:

I. Molecular biology

- Deoxyribonucleic acid (DNA): Primary, secondary and tertiary structure, physicochemical properties of DNA, the different forms of DNA, DNA replication and repair
- RNA: Structure, different types of RNA, transcription of genetic information and regulation of transcription in prokaryotes and eukaryotes
- Translation, genetic code and mutations
- Gene organization in prokaryotes and eukaryotes

II. Applied Techniques in Molecular Biology

- DNA extraction, purification, quantification and electrophoresis
- Nucleic probes
- Restriction enzymes
- DNA sequencing (Maxam and Gilbert method and SANGER method)
- Southern blot and RFLP technique
- Northern blot
- Footprinting technique
- DNA chip
- PCR and RTPCR
- Recombinant DNA technology (cloning vectors and molecular cloning)
- cDNA and genomic libraries

Personal work: 27h30

- Course review: 20 hours
- Exercises: 7.30 am

Evaluation method: Written exam and continuous assessment

Reference:

- ALBERTS, JOHNSON, LEWIS, RAFF, ROBERTS, WALTER (2004).Molecular biology of the cell. Edition FLAMMARION. 1500p.
- B. Alberts, D. Bray, K. Hopkin, A. Johnson, J . Lewis, M. Raff, K. Roberts, P. Walter (2005). L'essentiel de la biologie cellulaire. Flammarion 2^{ème} edition
- LODISH, BERK, MATSUDAIRA, KAISER, KREIGER, SCOTT, ZIPURSKY, DARNELL (2005).Biology molecular of the cell. Edition DE BOECK. Edition ELSEVIER. 853p.
- Stephen R. BOLSOVER, Jeremy S. HYAMS, Elisabeth A. SHEPHARD, Hugh A. WHITE, Claudia G. WIEDEMANN (2006). Cellular and molecular biology. Edition DUNOD. 583p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 1

Title of the Unit: Methodology I

Title of the subject: Biostatistics I

Credits: 3

Coefficients: 2

Teaching objectives:

This module will cover all the basic elements of inferential biostatistics; it will also provide the student with basic information about regression and analysis of variance with two selection criteria

Recommended prior knowledge :

Cell Biology, Mathematics - Statistics

Content of the subject:

I. Reminders and notions on basic hypothesis testing

- Estimation of statistical parameters.
- Hypothesis testing.

II. Normality and homoscedasticity

- Normality tests (empirical and graphical methods, whisker box, Henry's line, Kolmogorov-Smirnov, Shapiro-Wilk statistical tests)
- Homogeneity tests (Fischer, Bartlett and Leven tests)
- One and two-sided parametric tests based on the normal distribution (student's test...)

III. Comparison of several means: Analysis of Variance(ANOVA)

- Analysis of variance with one classification criterion
- Analysis of variance with two classification criteria

IV. Regression

- Simple non-linear regression.
- Linear multiple regression.

The different parts of this programme are accompanied by sessions of software manipulation (Excel, Statistica,..) allowing the processing of data on which the various approaches adapted to each type of concern are applied.

Personal work: 37h30

- Course review: 20 hours
- Exercises: 17:30

Evaluation method: Written exam and continuous assessment

References

- **Gilbert Saporta (2011).** Probability, data analysis and statistics. *Third edition*. P656
- **Bruno Scherrer (2007).** Biostatistics, *2nd edition*. P832

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 1

EU Title: Pathogens and Immunity

Title of the subject: Pathogens and Immunity

Credits: 2

Coefficients: 2

Teaching objectives

This course should enable a student not specialised in immunology to acquire the essential notions on the inflammatory reaction, adaptive immunity in order to understand the physiopathology of the immune response and the immunotechnological aims.

Recommended prior knowledge

Cell Biology, General Immunology, Biochemistry, BCM and PCM

Content of the subject:

I. Pathogens

- Viruses: Structure and classification
- Bacteria: Structure, mode of transmission of bacterial infections, pathophysiology of bacterial diseases
- Parasites: Definition of parasitism, life cycles, host-parasite interrelationships, protozoa and metazoa.

II. Immunity

- The cells of immunity: natural and acquired
- The inflammatory reaction, an example of an innate response
- Mechanisms of cell-mediated and humoral acquired immunity (roles of antibodies)
- Immune system dysfunctions: hypersensitivity reactions, and some examples of autoimmune diseases

Personal work: 5h

- Course review: 5h
- Exercises: 5h

Evaluation method: Written exam and continuous assessment

Reference :

- Fritz H. KAYSER, Erik C. BÖTTGER, Rolf M. ZINKERNAGEL, Otto HALLER, Johannes ECKERT and Peter DEPLAZES (2008). Pocket manual of medical microbiology. Edition FLAMMARION. 764p.
- Jérôme J. PERRY, James T. STALEY, Stephen LORY (2004). Microbiology. Ed. DUNOD. 891p.
- TORTORA, FUNKE and CASE (2003). Introduction to Microbiology. Edition ERPI. 945p
- GUILLAUME Viviane (2007). Parasitology. Edition DE BOECK. 184p
- EUZÉBY Jacques, BOURDOISEAU Gilles and CHAUVE Claude (2005). Dictionary of medical and veterinary parasitology. Edition TEC ET DOC/ EM INTER / LAVOISIER. 492 p.
- Moitt, Brostoff, Male (2002). Immunology. Edition De Boeck

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 1

Title of the course: Communication

Title of the subject: Communication

Credits: 1

Coefficients: 1

Teaching objectives:

Analyse the objectives of internal and external communication and present the methodologies needed to conduct the main communication actions

Recommended prior knowledge

The linguistic bases

Target skills :

- Ability to communicate well orally and in writing
- Ability to present and speak well in public
- Ability to listen and exchange
- Ability to use professional internal and external communication documents
- Ability to write professional documents for internal and external communication

Content of the subject:

- Strengthening language skills
- Communication methods
- Internal and external communication
- Meeting techniques
- Oral and written communication

Personal work: 2h30

- Course review: 2h30

Evaluation method: Written examination

Reference:

- **Michelle Fayet ; Jean -Denis Commeignes (2013).** 12 methods of written and oral communication. 4^{ème} edition. P14.
- **Christian Vandendorpe; Yvan Lepage (2002).** Communication écrite. Manual d'accompagnement. Writing Centre. University of Ottawa. P 144

Semester : 2

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

Title of the Unit: Physiology and Pathophysiology of Major Functions II

Title of the subject: Respiratory and renal physiology

Credits: 6

Coefficients: 3

Teaching objectives:

This subject aims to provide the student with the molecular, cellular and functional basis of the respiratory and renal system, including cellular responses to certain physiological and pathological situations and their implication in the maintenance of homeostasis.

Knowledge: Knowledge of Cell Biology, Physiology of major functions.

Content of the subject:

I. Respiratory physiology

- Anatomy and histology of the respiratory system; The structure of the alveolar-capillary membrane and its role in the diffusion of respiratory gases; Physiology of inspiration and expiration.
- The different factors regulating the rate of breathing.
- Endothelium-derived vasoactive factors (NO and endothelin) and pulmonary hypertension
- Respiratory diseases and the molecular and cellular mediators involved; asthma, bronchitis, pulmonary emphysema, neonatal respiratory distress syndrome, respiratory failure, sudden infant death syndrome, pulmonary embolism, pulmonary oedema, cystic fibrosis and smoke inhalation injury to the respiratory system.

II. Renal physiology

- Anatomical and histological organisation of the kidney: the nephron as a structural and functional unit,
- Kidney physiology: Comparative analysis of plasma and urine, glomerular filtration, tubular reabsorption and secretion, regulation of urine concentration and volume
- Role of the kidney in water and electrolyte balance

Personal work: 82h30

- Course review: 60h
- Preparation of reports: 5h
- Bibliographic research: 17:30

Evaluation method: Written exam and continuous assessment

Reference:

- **Bernard DEBESSE, Jacques ROCHEMAURE (2007).** Dictionary of the respiratory system. Edition CILF. 336p.
- **Laure -Hélène NOËL (2008).** Atlas of renal pathology. Edition FLAMMARION. 1011p.
- **P. SIMON (2007).** L'insuffisance rénale. Edition MASSON. 283p.

**Title of Master's degree: Cellular and Pathophysiology
Physiology**

Title of the Unit: Physiology and Pathophysiology of Major Functions II

Title of the subject: Digestive Physiology and Metabolism

Credits: 4

Coefficients: 2

Teaching objectives:

This subject allows the mastery of digestive physiology and explains the molecular and cellular basis of the different metabolic pathways.

Knowledge: Knowledge of Cell Biology, Physiology of major functions.

Content of the subject :

I. Digestive physiology

- Organisation and histology of the digestive system
- Regulation of food intake
- Digestion in the mouth
- Gastric digestion: mechanical, chemical and regulatory
- Pancreatic secretion
- Intestinal digestion: mechanical, chemical and regulatory
- Physiology of intestinal absorption
- Digestion in the large intestine

II. Metabolism

- Fluid and electrolyte metabolism
- Carbohydrate metabolism
- Protein metabolism
- Lipid metabolism
- Vitamin metabolism

Personal work: 55h

- Course revision: 40h
- Preparation of reports: 5h
- Bibliographic research: 10 hours

Evaluation method: Written exam and continuous assessment

Reference :

- Laurent CHEVALLIER (2005). Nutrition: principles and advice. Edition MASSON. 260p.
- P. VALENSI, V. VIVIANI, R. DUTEIL (2005). Edition VERNAZOBRES. 246p.
- Mireille DUBOST (2005). La nutrition. Edition CHENELIERE. 366p.
- M. APFELBAUM, M. ROMON, M. DUBUS (2004). Dietetics and nutrition. Edition Masson. 535p.
- B. JACOTOT | B. CAMPILLO (2003). Nutrition humaine. Edition MASSON. 311p.
- Yves DACOSTA (2002). Nutrition and atherosclerosis. Edition DACOSTA. 334.
- HK. BIESALSKI, P. GRIMM (2001). Atlas de poche de nutrition. Edition MALOINE. 341p.

Title of Master's degree: cellular and pathophysiology
Physiology

Title of the Unit: Molecular Physiology and Signalling

Title of the subject: Molecular Endocrinology

Credits: 4

Coefficients: 2

Teaching objectives:

This unit will provide knowledge of the molecular aspects of the various pathways and molecules involved in endocrine physiology.

Knowledge: Knowledge of cell biology, biochemistry and endocrine physiology.

Content of the subject:

I. Information molecules (I)

- Amino acid derivatives
- Alcohols derived from phospholipids
- Nucleotides
- Fatty acids

II. Information molecules (II)

- Peptides
- Polypeptides, proteins, glycoproteins
- Steroids

III. Other informational molecules (Ig, growth factors, cytokines...)

IV. Examples of mechanisms of hormonal action

Personal work: 55h

- Course revision: 35h
- Exercises: 10 hours
- Presentations: 10am

Evaluation method: Written exam and continuous assessment

Reference :

- Alice Meunier (2004). Endocrinology and physiology of human reproduction. Vernazobres. 113p.
- Simon Idelman and Jean Verdeti (2000). Endocrinology and cellular communications, Collection Grenoble Sciences. 584p.
- Jean-Marc KUHN (2008). Endocrinology. Edition ERNAZOBRES. 250p.
- D. REINWEIN, G. BENKER (1996). Endocrinology and metabolism. Edition MALOINE. 479.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 2

Title of the Unit: Molecular Physiology and Signalling

Title of the subject: Cellular Signalling

Credits: 4

Coefficients: 2

Teaching objectives :

This module aims to provide the student with information on the different signalling pathways and mechanisms of cell transduction.

Knowledge: Have knowledge of Cell Biology, Biochemistry and Endocrinology

Content of the subject:

I. Introduction :

- notion of sender, message and receivers,
- modes of intercellular communication,
- agonist and antagonist.

II. Receivers :

- ligand-dependent ion channel receptors,
- G protein coupled receptors,
- enzyme receptors with tyrosine kinase and non-tyrosine kinase activities (tyrosine phosphatase, threonine/serine kinase and guanylyl cyclase activities).

III. Secondary messengers :

- cAMP, cGMP
- inositol phosphate pathways
- choline phospholipid pathways.

IV. Targets of intracellular messengers: protein kinase

V. Fat-soluble messengers and intracellular receptors

VI. Interactions between signalling pathways

VII. Oncogenes and signalling.

Personal work: 55h

- Course revision: 35h
- Exercises: 10 hours
- Presentations: 10am

Evaluation method: Written exam and continuous assessment

Reference :

- BOLSOVER Stephen R., HYAMS Jeremy S., SHEPHARD Elizabeth A., WHIT Hugh A., WIEDEMANN Claudia G. (2006). Cellular and molecular biology, Edition *Lavoisier*. B. Alberts, D. Bray, K. Hopkin, A. Johnson, J . Lewis, M. Raff, K. Roberts, P. Walter (2005). The essentials of cell biology. *Flammarion* 2^{ème} edition
- Lodish, Harvey (2005). Molecular Biology of the Cell. Edition *De Boeck*
- Mclennan, A -G. (2000). Molecular Biology. Publisher *Betri*

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 2

Title of the Unit: Methodology II

Title of the subject: Reproductive Biotechnology

Credits: 4

Coefficients: 2

Teaching objectives :

In this module, the skills that the student will have acquired relate to new approaches to reproduction, in relation to biotechnological approaches and which concern *in vivo* animal insemination, *in vitro* fertilisation, cloning, transgenesis and techniques for the control of human reproduction.

Recommended prerequisites: knowledge of Cell Biology, Biochemistry and Endocrine Physiology.

Content of the subject:

I. Animal reproductive biotechnology :

- IVF,
- sexing,
- cloning,
- transgenesis

II. Reproduction and Breeding :

- nutrition,
- reproduction
- female fertility: embryonic mortality, epidemiological data in humans and experimental study in animals

III. The economics of animal reproduction :

- economic aspects and development of biotechnology in animal husbandry,
- the economic challenges of biotechnology,
- reproductive strategies in higher vertebrates,
- the contribution of biotechnology to the conservation of animal biodiversity

IV. The ethics of reproduction :

- genetics and human reproduction,
- innovative therapies,
- ethics and reproductive biotechnology,

Personal work: 55h

- Course revision: 35h
- Report: 10:00
- Presentations: 10am

Evaluation method: Written exam and continuous assessment

Reference:

- Reichl (2004). Guide Pratique De Toxicologie, De Boeck, 348 p.
- Jesus Del Mazo and Jess Del Mazo (1998) Reproductive Toxicology: In Vitro Germ Cell Developmental Toxicology, from Science to Social and Industrial Demand, Kluwer Academic Publishers, 223 p.
- Atterwill (1992). Endocrine Toxicology, Hardback, 490p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 2

Title of the Unit: Methodology II

Title of the subject: Cell proliferation and its regulation

Credits: 3

Coefficients: 2

Teaching objectives:

This subject explains to students the mechanisms of the cell cycle and the regulation of cell proliferation using different genetic and biochemical approaches. The deregulation of the cell cycle in apoptosis and cancers is also covered.

Recommended prior knowledge: Knowledge of Cell Biology, Biochemistry and Genetics.

Content of the material:

I. The cell cycle :

- Definitions
- Demonstration of the cell cycle,
- Course of the cell cycle: G1, S, G2 phase and mitosis
- Mitosis and cytokinesis
- Roles of microtubules in cell division

II. Controlling the cell cycle

- Definitions, role of MPF in mitosis
- The different control points
- G1/S point control mechanism
- Mechanism of control at entry into mitosis

III. Deregulation of the cell cycle

- Apoptosis: molecular mechanisms of the intrinsic and extrinsic pathways, factors regulating apoptosis, method for studying apoptotic cells.
- Cancers: role of proto-oncogenes and anti-oncogenes

Personal work: 37h30

- Course revision: 25h
- Exercises: 7.30 am
- Presentations: 5h

Evaluation method: Written exam and continuous assessment

Reference :

- BOLSOVER Stephen R. , HYAMS Jeremy S. , SHEPHARD Elizabeth A. , WHITE Hugh A. , WIEDEMANN Claudia G. (2006). Cellular and molecular biology, Edition *Lavoisier*. B. Alberts, D. Bray, K. Hopkin, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter (2005). L'essentiel de la biologie cellulaire. *Flammarion* 2nd edition
- Lodish, Harvey (2005). Molecular biology of the cell. Edition *De Boeck*
- McLennan, A -G. (2000). Molecular Biology. Publisher *Betri*

Title of Master's degree: Cellular Physiology and Pathophysiology**Semester: 2****Title of the Unit: Methodology II****Title of the subject: English****Credits: 2****Coefficients: 1****Teaching objectives:**

The aim of the English course is to achieve the English language proficiency required for the Master's degree.

Recommended prior knowledge:

English prerequisites (Spelling, Grammar and Conjugation...)

Content of the subject:

- The active and passive form
- The past simple
- Past tense with its different forms
- Present with different forms
- Translation of scientific texts
- Writing a scientific topic
- Translation from oral to written

Personal work: 27h30

- Course review: 20 hours
- Exercises: 7.30 a.m.

Evaluation method: Written examination**Reference :**

- **BOSWORTH(1998)**. Understanding Scientific and Technical English. Edition ELLIPSES MARKETING.
- **BOSWORTH (1994)**. Writing English for Science and Technology (EAST). Edition Lavoisier.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 2

EU Title: Molecular Neuroscience

Subject Title:

Molecular Neuroscience **Credits: 2**

Teaching objectives:

The aim of this course is to explain the molecular and cellular basis of the major steps in the development of the Nervous System. It also improves our understanding of the pathophysiological mechanisms of CNS development, and introduces the main methods and techniques of investigation in Neuroscience: recording, reversible lesion, magnetic stimulation, functional imaging...

Recommended prior knowledge: Knowledge of Cell Biology, Physiology of the Organisms, Organisation of the Nervous System and the Neuron.

Content of the subject :

I. Neural signals :

- Axonal transport and the involvement of vesicular transport molecules (Dynein, Kinesin). Vesicular secretion at the neuronal level and involvement of vesicular secretion molecules (SNARE.).
- Neurotransmitters (Metabolism and release, tract of synthesis, behavioural impact).
- Neuronal receptors (ionotropic and metabotropic).
- Integration of neural information. Co-transmission.

II. Development of neurons and the nervous system :

- General organisation of the nervous system, general neurophysiological mechanisms. Phylo and ontogenetic considerations.
- Differentiation of neurons and synapses, neuro-cyto-architecture.
- Control molecular of development development. Growth of neural circuits. Neuron target interaction. Neurotrophic factors
- Regulation of gene expression by activity

III. Molecular and Cellular Approach to Nervous System Diseases :

- Exploration and diagnostic techniques used in neuroscience (MRI, PET, EEG, psychotherapeutic techniques.....)
- Neurodegenerative diseases (Alzheimer, Parkinson, Depression)

Personal work: 5h

- Course review: 3h
- Presentations: 2h

Evaluation method: Written exam and continuous assessment

Reference :

- J . CAMBIER, M. MASSON, H. DEHEN, C. MASSON (2008). Neurology. Edition MASSON. 540p.
- Mark F. BEAR, Barry W. CONNORS, Michael A. PARADISO (2007). Edition PRADEL. 881p.
- PUR VES, AUG USTINE, FITZPATR I C K , HALL, LAM ANT IA, MC NAMARA, WIL L IAMS (200). Neuroscience. Edition DE BOECK. 811p.
- PERK IN (2002). Neurology manual and atlas. Edition DE BOECK. 312p

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester : 2

EU Title: Legislation and Bioethics **Subject Title:**

Legislation and Bioethics **Credits:** 2

Coefficients: 1

Teaching objectives:

Introduce the learner to regulatory concepts, definitions and origins of legislation and knowledge of criminal consequences. This subject also aims to develop the ability to read and understand a legal text and the ability to apply a regulation. Knowledge of bioethics and current legislation.

Recommended prerequisite knowledge:

All the contents of the training course

Content of the subject :

- General legal concepts (introduction to law, criminal law).
- Presentation of Algerian legislation (www.joradp.dz, text references).
- Regulatory status of Biotechnology or biological agents
- Laboratory biosafety laws and standards
- Basic concepts in Bioethics (Morality, ethics, bioethics)
- Human genome, genetics and predictive medicine: the ethical perspective
- Organ donation and transplantation and legislation
- Cloning, therapy cell therapy and use therapeutic use of embryonic cells
- Protection of the human embryo and legislation
- Therapeutic overkill - Euthanasia
- AIDS and testing: legal analysis and ethical perspective
- Bioethics and the environment

Personal work: 2h30

- Course review: 2h30

Evaluation method: Written examination

Reference :

- www.joradp.dz
- **Ernest D. Olfert, DVM; Brenda M. Cross, DVM; and A. Ann McWilliam (1993).** Manual on the Care and Use of Experimental Animals. *Volume 1*. P311

Semester : 3

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

Title of the Unit: Nutrition and Dietetics

Title of the subject : Metabolic physiopathology

Credits: 6

Coefficients: 3

Teaching objectives:

This subject aims to provide students with a cellular and molecular basis for the understanding of certain metabolic pathologies.

Recommended prerequisites:

Digestive physiology and metabolism, endocrinology

Content of the subject :

I. Diabetes

- Definitions and history, screening, diagnosis and monitoring of diabetes.
- Vascular complications of diabetes mellitus and diabetes treatments.
- Therapeutic strategies of the future

II. Obesity

- Definitions
- Criteria - Measurement methods
- Physiopathology of obesity
- Obesity and energy balance
- Eating behaviour and obesity: the lipostat and leptin
- Metabolic and hormonal alterations in obesity
- Obesity as a risk factor for atherosclerosis

III. Nutrition and cancer

IV. Malnutrition

V. Malabsorption, allergies and food intolerances

VI. Anemia (iron or B12 deficiency)

Personal work: 82h30

- Course review: 60h
- Preparation of reports: 5h
- Seminars: 17:30

Evaluation method: Written exam and continuous assessment

Reference:

- Laurent CHEVALLIER(2005). Nutrition: principles and advice. Edition MASSON. 260p.
- P. VALENSI, V.VIVIANI, DUTEIL (2005). Diabetes, metabolic diseases and nutrition. Edition VERNAZOBRES. 246p.
- Mireille DUBOST (2005). La nutrition. Edition CHENELIERE. 366p.
- M. AP F ELBAUM, M.ROMON, DUBUS (2004). Di  t  tique et nutrition. Edition Masson. 535p.
- B. JACOTOT , B. CAMPILLO (2003). Nutrition humaine. Edition MASSON. 311p.
- Yves DACOSTA (2002). Nutrition and atherosclerosis. Edition DACOSTA. 334.
- HK. BIESA L SKI, P. GR IMM (2001). Atlas de poche de nutrition. Edition MALOINE. 341p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

Title of the Unit: Nutrition and Dietetics

Title of the subject: Food and dietetics

Credits: 4

Coefficients: 2

Teaching objectives :

This module enables students to provide knowledge of healthy and balanced nutrition and to provide knowledge of nutritional prevention of certain diseases.

Content of the subject

I. Knowledge of foods and their constituents

- Classification of foods according to their protein, fat and carbohydrate content and study of the different "nutrients": P.L.G., and their roles in the body.
- Study of the different "micronutrients": minerals, trace elements, vitamins, phyto-nutrients, fibres and their roles in the body.

II. Fashion and food supplements in certain diseases:

- Diabetes, hypercholesterolemia,
- Hypertension and cardiovascular pathologies.
- Intestinal pathologies (hyperpermeability, transit disorders, coeliac disease, Crohn's disease).
- Food intolerance or hypersensitivity

Personal work: 55h

- Course revision: 40h
- Preparation of reports: 5h
- Seminars: 10 hours

Evaluation method: Written exam and continuous assessment

Reference :

- **Laurent CHEVALLIER (2005)**. Nutrition: principles and advice. Edition MASSON. 260p.
- **P. VALENSI, V.VIVIANI, DUTEIL (2005)**. Diabetes, metabolic diseases and nutrition. Edition VERNAZOBRES. 246p.
- **Mireille DUBOST (2005)**. La nutrition. Edition CHENELIERE. 366p.
- **M. AP F ELBAUM, M.ROMON, DUBUS (2004)**. Di  t  tique et nutrition. Edition Masson. 535p.
- **B. JACOTOT, B. CAMPILLO (2003)**. Nutrition humaine. Edition MASSON. 311p.
- **Yves DACOSTA (2002)**. Nutrition and atherosclerosis. Edition DACOSTA. 334.
- **HK. BIESA LSKI, P. GR IMM (2001)**. Atlas de poche de nutrition. Edition MALOINE. 341p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

Title of the Unit: Pathologies

Title of the subject: Physiopathology of Cardiovascular Diseases

Credits: 4

Coefficients: 2

Teaching objectives :

This module will provide information on cardiovascular pathophysiology, the number one public health disease in the world. Students will be provided with the basics of dysfunctional intercellular interactions, haemostasis and thrombosis. This module will also provide information on the risk factors of CVD and the description of some molecular aspects of these diseases

Recommended prior knowledge

Nutrition, Haematology, BCM, Biochemistry, Elements of Physiology

Content of the subject :

I. Risk factors for cardiovascular disease

II. Endothelial dysfunction

- Impaired anti-thrombotic properties of the endothelium
- Impaired endothelium-dependent regulation of vascular tone
- Dysfunction of intercellular interactions

III. Involvement of oxidative stress in cardiovascular disease

IV. Atherosclerosis

- Pathophysiology of atherosclerosis
- Molecular aspects of the atherosclerotic process
- Aneurysm
- Vascular remodelling

V. Cardiomyopathies :

- Myocardial infarction
- Heart failure

Personal work: 55h

- Course revision: 40h
- Preparation of reports: 5h
- Seminars: 10 hours

Evaluation method: Written exam and continuous assessment

Reference :

- **Jacob *et al* (2003).** Atherosclerosis. Edition Masson
- **B. Bauduceau, O. Dupuy, H. Mayaudon, L. Bordier, J. Margery, J.P. Le Berre (2004).** Atherosclerosis: butter on the arteries? EMC-Medicine 1: 27-36

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

Title of the Unit: Pathologies

Title of the subject: Pathologies of the Endocrine Glands

Credits: 4

Coefficients: 2

Teaching objectives :

This module will provide information on endocrine pathophysiology as well as functional exploration of certain glands.

Recommended prior knowledge

Endocrinology, signalling, BCM, Biochemistry,

Content of the subject :

I. Thyroid gland diseases

- Goiters: epidemiology, classification, and pathophysiology (goitrogenesis and goitrogenic factors)
- Hyperthyroidism and hypothyroidism: pathophysiology, etiology and complications
- Thyroid nodules (cancers)

II. Parathyroid diseases

III. Pathologies of the adrenal gland the

- Cushing's Syndrome and Conn's Syndrome (Hyperaldosteronism)
- Slow adrenal insufficiency (Addison's disease)
- Pheochromocytomas

IV. Pituitary insufficiency

- Thyrotropic deficiency, corticotropic deficiency, gonadotropic deficiency
- Somatotropic and prolactin deficiency

V. Pituitary adenomas : Acromegaly and Hyperprolactinism

VI. Diabetes: definitions, epidemiology, classification, pathophysiology and complications

Practical work

- Observation of histological slides on certain endocrine pathologies
- Presentations on the functional exploration of certain glands: scintigraphy, ultrasound, X-ray tomography, MRI, hormone assays, tumour markers, and exploration by dynamic tests.

Personal work: 55h

- Course revision: 40h
- Preparation of reports: 5h
- Seminars: 10 hours

Evaluation method: Written exam and continuous assessment

Reference :

- Alice Meunier (2004). Endocrinology and physiology of human reproduction. Vernazobres. 113p.
- Simon Idelman and Jean Verdeti (2000). Endocrinology and Cellular Communications, Collection Grenoble Sciences. 584p.
- Jean -Marc KUHN (2008). Endocrinology. Edition ERNAZOBRES. 250p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

EU Title: Methodology III Subject Title:

Pharmacology Credits: 4

Coefficients: 2

Teaching objectives :

This unit will provide a good knowledge of modern aspects of pharmacology, allowing the application of new concepts at a fundamental and/or clinical level.

Recommended prerequisite knowledge:

Endocrinology, cell signalling, biochemistry

Content of the subject:

I. Introduction to pharmacology

- Definitions, Composition of medicines, Names of medicines, Origin of medicines. Routes of administration of medicines,
- Dosage forms, Drug activity, Adverse reactions

II. Pharmacokinetics

- Absorption (notion of bioavailability)
- Distribution (concept of volume of distribution)
- Drug metabolism (Phase I oxidation and phase II conjugation reactions)
- Drug elimination (half-life, extraction coefficient and clearance)
- infusion and loading dose

III. Pharmacodynamics

- Drug receptors. Quantification of receptor binding (concept of affinity): Saturation method and Displacement method
- Analysis of the dose-response curve (notions of potency and efficacy): cases of full and partial agonists and competitive and non-competitive antagonists
- Selectivity: binding selectivity and effect selectivity

IV. Some therapeutic strategies through the use of :

- Non-steroidal anti-inflammatory drugs and corticosteroids
- Antioxidants, Antithrombotics and Antihypertensives
- Hypolipidemics and Hypoglycaemics
- Anti-cancer drugs

Personal work: 55h

- Course review: 30h
- Exercises: 25h

Evaluation method: Written exam and continuous assessment

Reference :

- **CONSTANTI (1998)**. Basic endocrinology for students of pharmacy and allied health sciences. paperback 156p.
- **Schorderet M.** PHARMACOLOGY - From Basic Concepts to Therapeutic Applications. Edition Frison Roche

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

EU Title: Methodology III Subject Title:

Biostatistics II Credits: 3

Coefficients: 2

Teaching objectives:

This module will deal with non-parametric tests by comparison between samples and by correlation between two variables. The second part of the programme will focus on multivariate analysis

Recommended prior knowledge :

Cell Biology, Mathematics, Biostatistics

Content of the subject:

I. Non-parametric tests :

- Comparison between samples: Case of two samples (Kolmogorov-Smirnov test, Mann-Whitney U test, Wilcoxon test). Case of more than two samples (McNemar chi-square test, Kruskal & Wallis test)
- Correlation between two variables: Spearman's coefficient

II. Multivariate analysis

Personal work: 37h30

- Course review: 20 hours
- Exercises: 17:30

Evaluation method: Written exam and continuous assessment

Reference:

- Gilbert Saporta (2011). Probability, data analysis and statistics. *Third edition*. P656
- Bruno Scherrer (2007). Biostatistics, *2nd edition*. P832

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

Title of the Unit: Methodology III

Title of the subject: Analysis of Articles

Credits: 2

Coefficients: 1

Teaching objectives:

To become familiar with analysing a scientific article; to have the ability to synthesise the essence of a work and to become familiar with international research, both written and oral, in order to provide a sufficient basis for students to progress independently.

Recommended prior knowledge :

Scientific English

Content of the subject:

- Individual assessment of the student's level, identification of difficulties.
- Analysis session and reading of selected articles.
- Presentation session of selected articles.
- Writing summaries.
- Seminars followed by discussions with the speaker.
- End of course evaluation and discovery of autonomous work tools.

Person work I: 27h30

- Course review: 10 hours
- exercises: 17:30

Evaluation method: Written exam and continuous assessment

Reference :

- **Understanding scientific and technical English (1998).**BOSWORTH. Edition- ELLIPSES MARKETING.
- **Writing scientific and technical English (1994).** BOSWORTH, Edition *Lavoisier*.
- **Didier CARNET, Jean -Pierre CHARPY, (2002).** La communication orale scientifique en anglais. Edition ELLIPSES. 142p.

Title of Master's degree: Cellular Physiology and Pathophysiology

Semester: 3

Title of the course : Neurosensorial Physiology

Title of the subject: Neurosensory Physiology

Credits: 2

Coefficients: 2

Teaching objectives :

The aim of this course is to explain the physiological and molecular basis of the functioning of the sense organs, the sleep-wake cycle, emotion, pain and memory

Recommended prior knowledge: Knowledge of Cell Biology, Physiology of the Organisms, Organisation of the Nervous System and the Neuron.

Content of the subject :

- The eye and the physiology of vision
- The ear and hearing
- Skin and skin sensitivity
- The lingual mucosa and the physiology of taste
- The olfactory epithelium and the physiology of olfaction
- The sleep-wake cycle
- Physiology of emotion
- The memory
- The pain

TP :

- Visual acuity
- The visual field
- Tasting
- The memory
- The pain

Personal work: 5h

- Course review: 3h
- Preparation of reports: 2h

Evaluation method: Written exam and continuous assessment

Reference :

- J . CAMBIER, M. MASSON, H. DEHEN, C. MASSON (2008). Neurology. Edition MASSON. 540p.
- Mark F. BEAR, Barry W. CONNORS, Michael A. PARADISO (2007). Edition PRADEL. 881p.
- PURVES, AUGUSTINE, FITZPATRICK, HALL, LANZETTA, MCNAMARA, WILKINSON (2003). Neuroscience. Edition DE BOECK. 811p.
- PERKIN (2002). Neurology manual and atlas. Edition DE BOECK. 312p

Coefficients: 1

Teaching objectives :

To introduce the learner to project set-up, launch, follow-up and implementation.

Recommended prior knowledge

All the contents of the training course

Content of the subject:

I. Business and business management

- Definition of the company
- Business organisation
- Supply management: Purchasing management, stock management and warehouse organisation.
- Production management: Production mode and production policy
- Sales Management and Marketing: Product Policy, Pricing Policy, Advertising, Sales Techniques and Team

II. Setting up a business creation project

- Definition of a project
- Project specifications
- Project financing methods
- The different phases of project implementation
- Project management
- Time management
- Quality management
- Cost management
- Task management

Personal work: 2h30

- Course review: 2h30

Evaluation method: Written exam and continuous assessment

Reference :

- **Xavier Lecocp ; Benoit Demil ; Vanessa Warnier (2006).**the business model, a strategicanalysis model. *L'expansion Management Review no 123, winter*
- **Vanessa Warnier ; Xavi er Lecocp ; Benoit Demil (2004).** The business model, the forgotten strategy. AIMS Conference.
- **Bernard M aître; Grégoire Aladjidi (1999).** Les business models de la nouvelle économie.