

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

**MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH**

Compliance framework

TRAINING OFFER LMD

ACADEMIC LICENSE

2018 - 2019

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

Domain	Sector	Speciality
Natural and Life Sciences	Agricultural Sciences	Animal production

الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي و البحث العلمي

عرض تكوين

ل. م. د

ليسانس اكاامية

2019 - 2018

القسم	الكلية/ المعهد	المؤسسة
علوم زراعية	كلية علوم الطبيعة والحياة وعلوم الأرض	جامعة الجيلالي بونعامة خميس مليانة

التخصص	الشعبة	الميدان
إنتاج حيواني	علوم زراعية	علوم الطبيعة والحياة

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I - Identity sheet of the licence

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

Academic year: 2018/2019

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1 - location of Training:

Faculty (or Institute): Natural and Life Sciences and Earth Sciences - Département :Sciences Agronomiques

References of the authorization order for the license (attach a copy of the order)

2 – External partners :

- Other partner establishments:

- National superior school of Agronomy - El Harrach
- University of Blida
- University of Chlef

- Companies and other socio-economic partners:.

- National Livestock Feed Office (ONAB)
- ORAVIC
- Interprofessional milk group (ORLAC)
- Dairy Wanis
- Private animal product processing units (e.g. Bellat, etc.)
- Analysis laboratories of the Ministry of Commerce
- Private breeders
- Pilot farms
- DSA veterinary and animal production services
- Office of Poultry
- Specialized cooperatives (beekeeping and others)
- Chamber of Agriculture
- Specialized associations (CNIAAG)
- INRAA
- ITELV

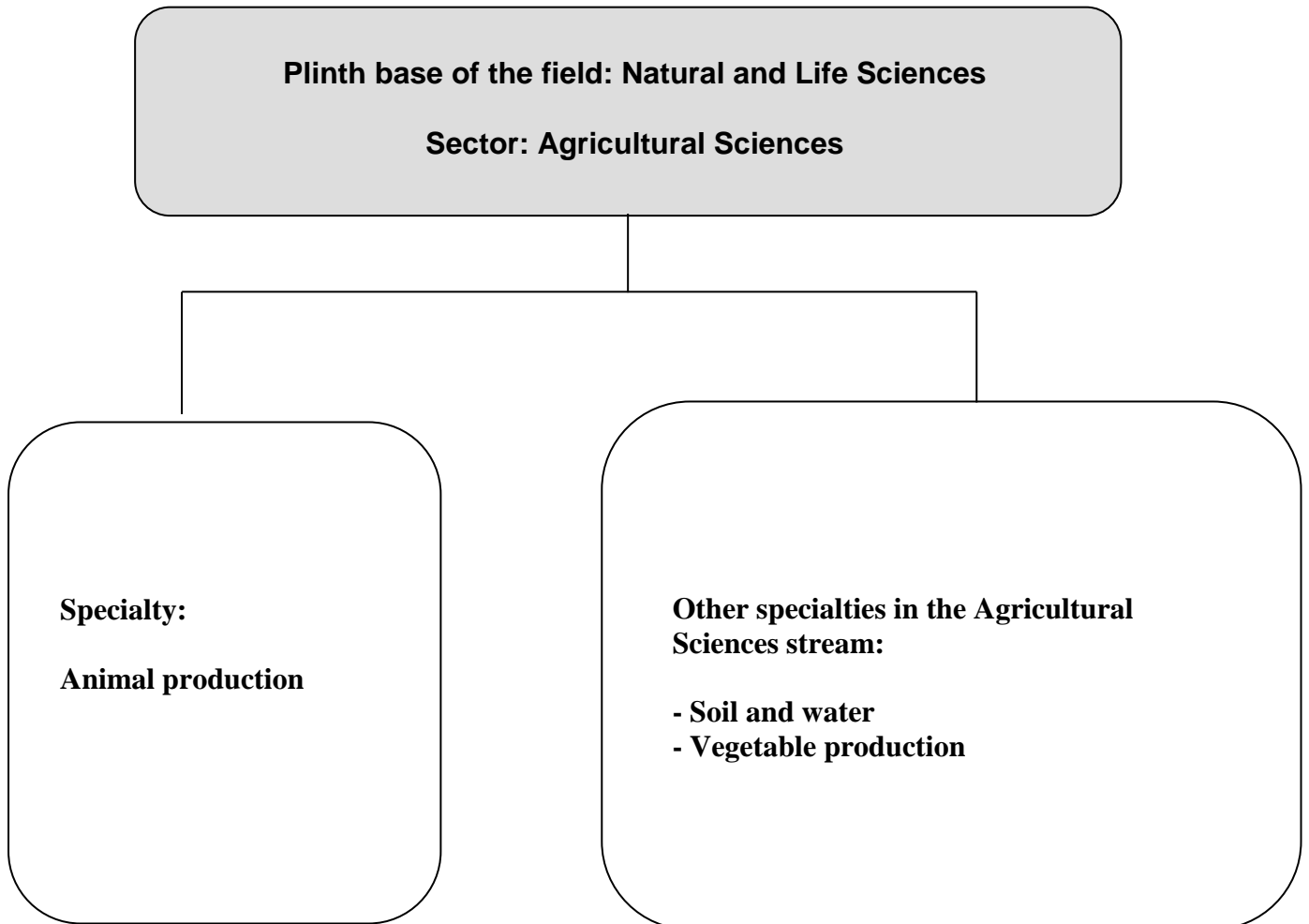
International partners:

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

Academic year: 2018/2019

3 – Context and objectives of the training

A – General organization of the training: position of the project



B - Objectives of the training

Algeria's food dependence is very high, and the dependence on animal products (milk, meat, etc.) remains very characteristic. Therefore, a real development of the animal production is necessary to reduce this dependence that only the hydrocarbon exports make possible at present but with future uncertainties.

Animal production can be developed in a real way, but certain conditions must be met and constraints must be lifted.

The training of high-level executives capable of developing a scientific reflection to build a basis for sustainable development of these sectors becomes more than necessary.

Also, the establishment of such a training that will provide a set of technical, scientific and economic knowledge will allow this reflection and provide solutions that will be required and will be a valuable support for actors upstream and downstream.

It is a question, for us, of seizing the opportunity of a sustainable development based on a strategy which takes into account all the aspects related to the animal production to specify more the approach of development of this sector which was already initiated by the National Plan of Agricultural and Rural Development.

This LMD project is therefore part of a future approach to the development of the animal sector.

C - Profiles and target skills

Animal production has been developing rapidly in recent years due to the advancement of knowledge in several areas such as biotechnology, nutrition, physiology, genetics, animal husbandry and animal behaviour. The breeding of farm animals and their products must be a priority activity today in the concerns of the different actors involved in the development of this activity.

Within the framework of the new LMD system, we propose a course in agronomic training, interested in animal production, integrating modern techniques, where computer science plays a predominant role.

This training must meet current and future needs in animal science research.

It aims to train specialists in animal production, integrating upstream and downstream aspects. The future managers thus trained will be capable of analysing, designing and proposing development programmes for these sectors, within the framework of sustainable development, and can also provide solutions adapted to the technical problems posed.

The first level is that of the Bachelor's degree, whose objective is to train qualified executives, and includes a common core of two years, with a third year reserved for in-depth notions specific to this specialty.

The second level is that of the Master's degree, which aims to train qualified managers and comprises four semesters of study, the last of which is reserved for the completion of the final dissertation.

On arrival, the student must register for the first year of the degree programme. The orientation towards this course will be made at the end of the second year by the decisions of the evaluation and orientation commission.

D - Regional and national employability potential

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

The region of Ain Defla has important potentialities in the field of farm animal breeding, nevertheless the results obtained in this field remain weak. In this respect, training in general and university training in particular, can play an important role in the development of the agricultural sector, and in livestock farming in particular.

The wilaya of Ain Defla and the region of Khemis Miliana in particular, is an agricultural area, since it is located in the plain of the Haut Chellif and its irrigated perimeter. This area has many farms practising various livestock activities (cattle, poultry, beekeeping, etc.).

These farms will play a major role in the future in supplying the agri-food sector and the market in general with milk, meat and other animal products.

In the region there are also some processing companies, especially in milk, such as the Arib and Wanis dairy, which can contribute and benefit from this training. In the framework of the agro-food sector of animal products, private investment requires little interest from entrepreneurs, due to the lack of skills and/or profiles adapted to their needs in this field. It is within this framework that this training is inserted, with a view to placing at the disposal of the employment market highly qualified executives, capable of taking charge of the concerns of the animal products sector and their technologies.

As for the national employability potential, it is important, particularly in the private sector, in the processing of animal products, such as milk, red and white meat, eggs, beekeeping products (honey, royal jelly, etc.). This sector, which includes production and agri-food, can generate many jobs if it is better known and organised.

E - Gateways to other specialities

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

For the time being, it is too early to draw up an outline of the pathways leading to other specialities, due to the lack of data on the various courses offered by the universities.

F - Expected performance indicators of the training :

The objective of the system is to diversify the methods of control in order to evaluate the students' skills as widely as possible. In this context, we will evaluate:

- (1) the empowerment of the student;
- (2) regular monitoring of knowledge acquisition;
- (3) the acquisition of oral expression;
- (4) the acquisition of teamwork and synthesis skills;
- (5) monitoring the student's abilities and not just his or her knowledge.

The distribution between the different forms of evaluation is as follows

Assessment of knowledge: 40

Oral expression: 20

Personal work: 20

Capacity for analysis and synthesis: 20%.

4-Human resources




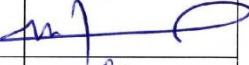


A- staff capacity: 40 students

B- Internal teaching team mobilised

4- Moyens humains disponibles

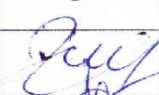


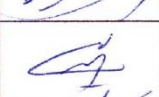

A - Capacité d'encadrement : 40 étudiants

B - Equipe pédagogique interne mobilisée pour la spécialité :

Nom, prénom	Diplôme graduation	Diplôme de spécialité (Magister, doctorat)	Grade	Matières à enseigner	Emargement
M. Mekhati Mohamed	Ingénieur d'état	Magister en Production animale	Maître assistant A	Sélection et amélioration génétique	
M. Kouache Benmoussa	Ingénieur d'état	Magister en Production animale	Maître assistant A	Anatomie et physiologie animale / Bâtiment, hygiène et prophylaxie / Elevage des ruminants	
M. Mouss Abdelhal Karim	Ingénieur d'état	Magister en Production animale	Maître assistant A	Alimentation et rationnement / Physiologie de la reproduction / Petits élevages / Visite d'une unité de production	
M. Belouazni Ahmed	Ingénieur d'état en biologie	Magister en sciences des eaux et bioclimatologie	Maître assistant B	Statistiques	
M. Karahacène Hafsa	Ingénieur d'état	Magister en hydraulique agricole	Maître assistant B	Anglais	
M. Ait Ouazzou Abdennour	Ingénieur d'état	Doctorat en qualité, sécurité et technologie des aliments	Maitre de conférences B	Produits animaux	

C- External teaching team mobilised for the speciality

C - Equipe pédagogique externe mobilisée pour la spécialité :

Nom, prénom	Etablissement de rattachement	Diplôme graduation	Diplôme de spécialité (Magister, doctorat)	Grade	Matières à enseigner	Emargement
M. Yakhlef Hacene	ENSA	Ingénieur d'état	Doctorat	Professeur	Cours, Encadrement de stage, Encadrement de mémoire	
M. Ghozlane Fayçal	ENSA	Ingénieur d'état	Doctorat	Professeur	Cours, Encadrement de stage, Encadrement de mémoire	
M. Benyahia Boudjema	Direction de commerce wilaya de Ain Defla	Ingénieur d'état	Master en sciences et techniques des productions animales	Chef de service direction du commerce Ain Defla	TD, TP, Encadrement de stage, Co encadrement de mémoire	
M. Mekaideche Soufiane	Etablissement Mekaideche	Docteur vétérinaire	Docteur vétérinaire	Docteur vétérinaire	TD, TP, Encadrement de stage, Co encadrement de mémoire	
M. Benmoussa Abdallah	DFEPP	Ingénieur d'état	Ingénieur d'état en informatique	Ingénieur d'état	TP, cours	

D - Overall summary of human resources mobilised for the speciality :

Grade	Internal Staff	External Staff	Total
Professeur	-	02	02
Sénior lecturer B	01	-	01
Sénior Assistant (A)	04	-	04
Sénior Assistant (B)	01	-	01
Other	15	-	15
Total	21	02	23

5 - Material resources specific to the speciality :

A - Teaching laboratories and equipment :

Title of the laboratory: **Geological, Cartographic**

Student capacity : 25

N°	Title of the equipment	Number	Observations
01	Manual scaler	05	
02	Digital Scaler	02	
03	Planimeter	01	
04	Compass	04	
05	Géological maps list	liste	
06	Topographics maps list	liste	
07	Double décameter	01	
08	Vernier caliper	03	
09	Electrical probe	02	
10	Digitizing table	01	
11	Hand-held meter	05	

Title of the laboratory: **Biochemistry**

Student capacity : 25

N°	Title of the equipment	Number	Observations
01	haematocrit	05	
02	microscope	02	
03	Hot plate	01	
04	Electronic balance	04	
05	Ph meter	liste	
06	Chromatography tank	liste	
07	electrophoresis	01	
08	centrifuge	03	
09	Water bath	02	

Title of the laboratory: **Microbiology**

Student capacity: 25

N°	Title of the equipment	Number	Observations
01	Manual Autoclave	02	
02	Automatic autoclave	01	
03	Incubator oven	02	
04	Pasteur loop	03	
05	Microscope	12	

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

06	Magnifying glass	10	
07	Bunsen burner	20	
08	Sterilizer oven	01	
09	Colony counter	01	
10	Refrigerator	01	
11	Analytical balance	01	
12	Water bath	01	

Title of the laboratory:

Vegetable biology

Student capacity:

25

N°	Title of the equipment	Number	Observations
01	Autoclaved	02	
02	Water bath	01	
03	Incubator oven	02	
04	Chromatography tank	03	
05	Microscope	12	
06	Magnifying glass	10	
07	Microtome	20	
08	Oven	01	
09	Potometer	01	
10	Distiller	01	
11	Analytical balance	01	
12	Water bath	01	

Title of the laboratory:

Animal Biology and Physiology

Student capacity:

25

N°	Intitulé de l'équipement	Number	Observations
01	Microscope	20	
02	Analytical balance	06	
03	Dissecting kit	12	
04	Spectrophotometer	01	
05	Vertical electrophoresis tank	01	
06	Thin layer chromatography	05	
07	overhead projector	02	
08	Slide apparatus	01	
09	PH meter	06	
10	Electronic thermometer	08	
11	Hematocrit apparatus	01	
12	centrifuge	02	
13	Water bath	03	
14	Magnifying glass	10	
15	Oven	02	
16	refrigerator	01	

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

17	Hot water balloon	04	
18	Hot plate	05	
19	Magnetic stirrer	04	
20	Biology model	20	
21	Prepared slide	Une série	
22	Magnetic stirrer	10	

Title of the laboratory:

Chemistry

Student capacity :

25

N°	Title of the equipment	Number	Observations
01	Laboratory Ph-meter	03	
02	Laboratory conductivity meter	02	
03	Portable Ph-meter	02	
04	Portable conductivity meter	02	
05	Oven	01	
06	Flame photometer	01	
07	Flask heater	02	
08	Hot plate	02	
09	Portable balance	02	
10	Analytical balance	01	
11	Electronic thermometer	04	
12	Vacuum pump	02	
13	UV visible spectrophotometer	01	
14	Gas chromatograph	01	
15	Portable oximeter	01	
16	Water bath	01	
17	Water analysis case	01	

Title of the laboratory:

Physics

Student capacity :

25

N°	Title of the equipment	Nombre	observation
01	Uncertainties	05	
02	Newton's second law	02	
03	Rectilinear motion	02	
04	The stiffness of a spring	05	
05	Free fall	01	
06	Electricity uncertainty	04	
07	Electric fields and potential	04	
08	Oscilloscope	04	
09	Ohm's law	04	
10	Charge and discharge of a capacitor	04	
11	R.L.C. circuits	04	

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B - Work placements and training in agri-food companies

Training place	Number of students	Duration of the internship
Broiler unit BOK (AVIB)	08	15 jours
Waniss Dairy	10	15 jours
Pilot farm Benbrik BOK	15	15 jours
Pilot farm Bessami Djilali BOK	15	15 jours
ONAB Sidi Lakhdar	04	15 jours
SIM Farm	10	15 jours
GIPLAIT Arib	08	15 jours
Farm Mordjani Ahmed Rouina	15	15 jours

C- Documentation available at the institution specific to the proposed training:

The library has documentation in different fields related to animal sciences, such as biological sciences, animal physiology, anatomy, genetics and genetic improvement, hygiene and animal health, as well as that related to reproduction and animal products such as milk, meat, eggs, beehive products, etc.

D - Personal work spaces and ICT available at the department, institute and faculty level:

- Experimental station of the faculty.
- Research laboratory of the Faculty: "Water, Rock and Plants".
- Faculty Research Laboratory: Agricultural Production and Natural Resources Development.
- Technical Institute for Large Crops (ITGC)
- Technical Institute for Livestock (ITELV).
- National Institute of Agronomic Research Algeria (INRAA).
- National Centre for Artificial Insemination and Genetic Improvement (CNIAAG).

- Audio-visual service.

II – Semi-annual organisation sheet of the courses of the specialty (S1, S2, S3, S4, S5 and S6)

(Include the annexes to the orders of the common bases of the domain
and the sector)

Semestre 1

Teaching unit	Matter		Credit	Coefficient	Hourly volume weekly			VHS (15 weeks)	Other*	Evaluation method			
	Code	Entitled			Cours	TD	TP			CC*		Exam	
Fundamental Unit Code : UEF 1.1 Credit : 18 Coefficient : 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	Mathematics and statistics	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
Methodological unit Code : UEM 1.1 Credit : 9 Coefficient: 5	M 1.1.1	Geology	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
	M 1.1.2	Technique of communication and expression 1 (French)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
Discovery unit Code : UED 1.1 Credit : 2 Coefficient : 2	D 1.1.1	Working method and terminology 1	2	2	1h30	1h30		45h00	5h00	x	40%	x	60%
Transversale Unit Code : UET 1.1 Credit : 1 Coefficient : 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				

Semestre 2

Teaching unit	Matter		Credit	Coefficient	Hourly volume weekly			VHS (15 weeks)	Other*	Evaluation method			
	Code	Entitled			Cours	TD	TP			CC*		Exam	
Fundamental Unit Code : UEF 2.1 Credit : 18 Coefficient : 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	Vegetal 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%
Methodological unit Code : UEM 2.1 Credit : 9 Coefficient : 5	M 2.1.1	Physic	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
	M 2.1.2	Communication and Expression Techniques 2 (English)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
Discovery unit Code : UED 2.1 Credit : 2 Coefficient : 2	D 2.1.1	Life sciences and socio-economic impacts	2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
Transversale Unit Code : UET 2.1 Credit : 1 Coefficient : 1	T 2.1.1	Working method and terminology 2	1	1	1h30	-	-	22h30	2h30	-	-	x	100%
Total Semestre 2			30	17	10h30	6h00	8h30	375h00	375h00				

Other* = Additional work in semi-annual consultation ; CC* = Continuous control.

**Annex to the teaching program for the second year of the bachelor's degree
Field of Natural and Life Sciences; « Agricultural Sciences branch**

Semestre 3

Teaching unit	Matter	Credit	Coefficient	Hourly volume weekly			VHS (15 weeks)	Other*	Evaluation method			
	Entitled			Cours	TD	TP			CC*		Exam	
Fundamental Unit Code : UEF 2.1.1 Credit : 6 Coefficient : 3	Zoology	4	2	1h30	-	1h30	45h00	55h00	x	40%	x	60%
	animal physiology	2	1	1h30	-	-	22h30	27h30	-	-	x	60%
Fundamental Unit Code : UEF 2.1.2 Credit : 12 Coefficient : 6	Biochemistry	6	3	3h00	1h30	-	67h30	82h30	x	40%	x	60%
	Genetic	6	3	3h00	1h30	-	67h30	82h30	x	40%	x	60%
Methodological unit Code : UEM 2.1.1 Credit : 4 Coefficient: 2	Communication and expression techniques (In English)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
Methodological unit Code : UEM 2.1.2 Credit : 5 Coefficient: 3	Biophysics	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
Discovery unit Code : UED 2.1.1 Credit : 2 Coefficient : 2	Environment and Sustainable Development	2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
Transversale Unit Code : UET 2.1.1 Credit : 1 Coefficient : 1	Ethics and university deontology	1	1	1h30	-	-	22h30	2h30	-	-	x	100%
Total Semestre 3		30	17	15h00	7h30	2h30	375h00	375h00				

Other* = Additional work in semi-annual consultation ; CC* = Continuous control.

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**Annex to the teaching program for the second year of the bachelor's degree
Field of Natural and Life Sciences;Agricultural Sciences branch**

Semestre 4

Teaching unit	Matter	Credit	Coefficient	Hourly volume weekly			VHS (15 weeks)	Other*	Evaluation method			
	Entitled			Cours	TD	TP			CC*		Exam	
Fundamental Unit Code : UEF 2.2.1 Credit : 8 Coefficient : 4	Agronomy I	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
	Agronomy II	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
Fundamental Unit Code : UEF 2.2.2 Credit : 10 Coefficient : 5	Microbiology	6	3	1h30	1h30	1h30	67h30	82h30	x	40%	x	60%
	Botanical	4	2	1h30	-	1h30	45h00	55h00	x	40%	x	60%
Methodological unit Code : UEM 2.2.1 Credit : 4 Coefficient: 2	Plant physiology	4	2	1h30	-	1h30	45h00	55h00	x	40%	x	60%
Methodological unit Code : UEM 2.2.2 Credit : 5 Coefficient: 3	Biostatistics	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
Discovery unit Code : UED 2.2.1 Credit : 2 Coefficient: 2	General ecology	2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
Transversale Unit Code : UET 2.2.1 Credit : 1 Coefficient : 1	Informatical tools	1	1	1h30	-	-	22h30	2h30	-	-	x	100%
Total Semestre 4		30	17	12h00	7h30	5h30	375h00	375h00				

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

Semester 5 :

Unit Teaching	HV	Weekly Volume				Coeff	Credits	Evaluation method	
	14-16Weekly	C	TW	PW	Other			Continuous (40%)	Examen (60%)
Fondamentale Unit Teaching									
FUT 3.1.1 (O/P)									
Mater 1 :Food and rationing	67h30	3h00	1h30	-	82h30	3	6	x	x
Mater 2 :Reproductive physiology	67h30	1h30	1h30	1h30	82h30	3	6	x	x
FUT 3.1.2 (O/P)									
Mater 1 :Selection and Genetic Improvemen	67h30	3h00	1h30		82h30	3	6	x	x
Methodological teaching unit									
MTU 1(O/P)									
Mater 1 : Animal anatomy and physiology	67h30	1h30		3h	82h30	3	6	x	x
MTU 2(O/P)									
Mater :Computer science	37h30	1h30		1h	37h30	2	3	x	x
Discovery teaching unit									
DTU1(O/P)									
Matière 1 : Statistics	45h00	1h30	1h30		5h	2	2	x	x
Transversal teaching unit									
TTU1(O/P)									
Valorization of agricultural by product	22h30	1h30			2h30	1	1		x
Total Semester 5	375	13h30	6h	5.5	375	17	30		

Semester 6 :

Unit Teaching	HV	Weekly Volume				Coeff.	Crédits	Evaluation method	
	14-16 sem	C	TD	TP	Autres			Continuous (40%)	Examen (60%)
Fondamentale Unit Teaching									
FUT 3.2.1(O/P)									
Mater1 :Ruminant breeding	67h30	3h00	1h30		82h30	3	6	x	x
Mater 2 : Small animal husbandry	67h30	3h00	1h30		82h30	3	6	x	x
FUT 3.2.2(O/P)									
Mater 1 :Livestock buildings, Hygiene and Prophylaxis	67h30	3h00	-	1h30*	82h30	3	6	x	x
Methodological teaching unit									
MTU 1 (O/P)									
Mater 1 : Animal products	45h	1h30	-	1h 30	55h	2	4	x	x
MTU 2 (O/P)									
Mater 2 : Breeding techniques	60h	1h30		2h30	65h	3	5	x	x
Discovery teaching unit									
DTU 1(O/P)									
Mater 1 : Knowledge of farming	45h			3h	5h	2	2	x	
Transversal teaching unit									
Mater 1 :Scientific English	22h30	1h30			2h30	1	1		x
Total Semester 6	375	16h30	3h	5h30	375	17	30		

- Overall summary of the course:

UE VH	FU	MU	DU	TU	Total
Course	607.5	15	9	7.5	24
TW	315	11.5	6	-	381
PW	270	11	3		284
Field trips	-	-	-	-	
Total	585	26	18		629
credits	108	54	13	5	180
% in credits for each EU	60	30	7	3	100

III - Detailed programme by semester and subject

Semester 1

EU: Fundamental Teaching Unit

Matter 1: GENERAL AND ORGANIC CHEMISTRY

Credit: 6

Coefficient: 3

Teaching objectives

This subject consists of teaching the fundamental bases of the organization and chemical structure of matter. It is a complement to the other subjects because it serves to facilitate the chemical understanding of biological phenomena.

Prior knowledge recommended

The student must master the basic notions of general and organic chemistry, namely the structure of the atom, atomic bonds and oxidation-reduction reactions.

Content of the matter

1. General Chemistry
 - 1.1. General
 - 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 reaction
 - 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. Energy rule (Klechkowski's rule)
 - 1.3.4. Pauli exclusion rule
 - 1.3.5. Hund's rule
 - 1.4. Periodic table
 - 1.4.1. Group (Column), Period (row)
 - 1.4.2. Evolution of physical properties within the periodic table: radius atomic, ionization energy, electron affinity....
 - 1.5. Chemical bond
 - 1.5.1. Introduction: strong bonds and weak bonds
 - 1.5.2. Representation of the chemical bond: Lewis diagram

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

1.5.4. Ionic character of a covalent bond

1.5.5. Geometry of molecules: 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
- Polyfunctional alcohols, thiols, thioethers, phenols, amine aldehydes
- heterocyclic polyfunctional 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. Substitution nucleophiles

2.2.6. Eliminations

2.2.7. Free radical reactions

2.2.8. Reduction reactions

2.2.9. Oxidation reaction

Tutorials

TW N°1: Fundamental notions of chemistry (atoms, molecules, gram atoms, moles, calculation of concentrations)

TW N°2: Stability of the nucleus and radioactivity

TW N°3: Electronic configuration and periodic classification of the elements

TW N°4: Chemical bonds

TW N°5: Nomenclature and stereo-chemistry

TW N°6: Reaction mechanisms

Practical work

PW N°1: Principles of experimental chemistry

Objective: Evaluate the student's knowledge of the equipment used in chemistry experiments and the safety rules to be observed in the laboratory.

PW N°2: Determination of the amount of material

Objective: Determine the amount of material (expressed in number of moles) contained in a sample and prepare a sample containing a fixed amount of material

PW N°3: Preparation of solutions by dissolution and by dilution

Objective: This involves preparing a solution of sodium chloride (NaCl) with a normality of 0.1N and preparing a solution of hydrochloric acid (HCl) with a normality of 0.1N by diluting a solution of HCl with a normality of 1N.

PW N°4: Measurement of the density of some....

Objective: We want to determine the density of a saturated salt water solution and to determine the density of iron.

PW N°5: Search for functional groups

Objective: Identify functional groups: Alcohols and carbonyls.

Assessment method

Continuous control and semester examination;

References (Books and handouts, 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 1

EU: Fundamental Teaching Unit

Matter 2: CELLULAR BIOLOGY

Credit: 8

Coefficient: 4

Teaching objectives

The objectives of this course are to introduce students to the living world at the cellular level, to acquire the basic notions of the cell, eukaryote and prokaryote, and to study the cellular constituents. These objectives are reinforced by practical sessions in the laboratory.

Prior knowledge recommended

The student must have knowledge in General Biology

Content of the matter

1. General
 - 1.1. Classification and relative importance of the kingdoms
 - 1.2. Cell and cell theory
 - 1.3. Origin and evolution
 - 1.4. Cell types (Prokaryote, Eukaryote, Acaryote)
2. Methods of studying the cell
 - 2.1. Otic 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. The endoplasmic reticulum-Golgi apparatus system
9. The interphase nucleus
10. The endosomal system: endocytosis

11. Mitochondria
12. Chloroplasts
13. Peroxisomes
14. Extracellular matrix
15. Plant wall

Tutorials / Practical work

1. Methods of studying cells
 - 1.1. Separation of cell constituents
 - 1.2. Observation of cellular constituents
 - 1.3. Identification of cellular constituents
 - 1.4. Plant wall
2. Cell cultures
3. Tests of physiological functions
 - 3.1. Reconstruction of the function from the isolated constituents
 - 3.2. Anatomical tests: autoradiography, fluorescence labeling, proteins fluorescent green
 - 3.3. Physiological tests: control of the expression of a protein, mutation, over expression

Evaluation method

Continuous control and semester examination;

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

B. Albert, A. Johnson, J. Lewis, M. Raff, K. Roberts and P. Walter, 2011- *Molecular Biology of the Cell*. Ed. Lavoisier, Paris, 1601p.

Abraham L. Kierszenbaum, 2006- *Histology and cell biology*: Ed De Boeck, 619p.

Thomas Dean Pollard and William C. Earnshaw, 2004- *Cell Biology*. Ed. Elsevier Masson, Paris, 853p.

Marc Maillet, 2006- *Cell biology*. Ed. Elsevier Masson, Paris, 618p.

Semester 1

EU: Fundamental Teaching Unit

Matter 3: MATHEMATICS AND STATISTICS

Credit: 4

Coefficient: 2

Teaching objectives

This subject allows the student to integrate statistical and computer tools in the biological field, and to use numerical analysis, probability and calculation by computer tools.

Prior knowledge recommended

The student must have knowledge of functions, integrals and random variables.

Content of the matter

1.Math analysis

- 1.1. One-variable function, derivative and integrals.
- 1.2. Approximation method.
- 1.3. Series, series with positive terms, Rieman series.
- 1.4. Multivariate Functions, Partial Derivatives, Differentials
- 1.5. Double and triple integrals.
- 1.6. Calculation of surfaces and volumes.

2.probabilities

- 2.1. Random variables, Bernoulli variables
- 2.2. Statistical laws and bio-statistical applications
 - 2.2.1. Discrete laws (Binomial and Poisson)
 - 2.2.2. Continuous law (Gauss, reduced centered normal law, chi II law, Fischer law)
- 2.3. Parameters and properties
 - 2.3.1. Position parameters (median, mode, mean,.....etc)
 - 2.3.2. Dispersion parameters (variance, standard deviation,etc)
 - 2.3.3. Shape parameters (symmetry, flattening,....etc)
- 2.4. Distribution function and density function

3.Computer science

- 3.1. structure of a computer
- 3.2. Numerical Systems (Binary and Decimals)

Practical works

TP N°01: Handling on a word processor

TP N°02: Use of spreadsheets

Evaluation method

Continuous control and semester examination;

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

Jean Bouyer, 2000- Statistical methods: medicine-biology. Ed. Estem.

Gilles Stoltz and Vincent Rivoirard, 2012-Mathematical Statistics in Action. Ed. Vuibert, Paris, 448p.

Maurice Lethielleux, 2013- Descriptive statistics. Ed. Dunod, Paris, 160p.

Maurice Lethielleux and Céline Chevalier, 2013- Probabilities: Statistical Estimation. Ed. Dunod, Paris, 160p.

Semester 1

EU: Methodological teaching unit

Matter 1: GEOLOGY

Credit: 5

Coefficient: 3

Teaching objectives

Matter allows students to see the constituents and structure of the terrestrial globe, the interactions between these constituents, the external and internal geodynamics.

Prior knowledge recommended

No prerequisites

Content of the subject

- 1.General geology
 - 1.1. Introduction
 - 1.2. Earth
 - 1.3. Earth's crust
 - 1.4. structure of the earth
- 2.External geodynamics
 - 2.1.Erosion
 - 2.1.1.The action of water
 - 2.1.2.The action of the wind
 - 2.2.Deposits
 - 2.2.1.Study methods
 - 2.2.2.sedimentary rocks
 - 2.2.3.Notion of stratigraphy
 - 2.2.4.Paleontology concept
- 3.Internal geodynamics
 - 3.1. Seismology
 - 3.1.1.Study of earthquakes
 - 3.1.2.Origin and distribution
 - 3.1.3.Soft and brittle tectonics (folds and faults)
 - 3.2. Volcanology
 - 3.2.1.Volcanoes
 - 3.2.2.Magmatic rocks
 - 3.2.3.Magma study
 - 3.3. Plate tectonics

Practical works

PW N°1: Topography

WP N°2: Geology (Cuts)

PW N°3: Rocks and minerals

Evaluation method

Continuous control and semester examination;

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

Jean Dercourt, 1999- Geology: lessons and exercises. Ed. Dunod, Paris,

Denis Sorel and Pierre Vergely, 2010- Introduction to maps and geological sections. Ed. Dunod, Paris, 115p.

Jean Tricart, 1965- Principles and methods of geomorphology. Ed. Masson, Paris, 496p.

Semester 1

EU: Methodological Teaching Unit

Matter 2: TECHNIQUES OF COMMUNICATION AND EXPRESSION 1 (in french)

Credit:4

Coefficient: 2

Teaching objectives

This subject aims to understand and write scientific documents in French as well as the use and translation of scientific terms.

Prior knowledge recommended

No prerequisites.

Content of the subject

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

Tutorials

Proposal of exercises related to the points of language considered the most important.

Evaluation method

Continuous control and semester examination;

References (*Books and handouts, websites, etc.*): Scientific articles and dissertations.

Semester 1

EU: Discovery Teaching Unit

Material 1: WORKING METHOD AND TERMINOLOGY 1

Credit: 2

Coefficient: 2

Teaching objectives

Help students design research methods and synthesis of work according to scientific rules.

Prior knowledge recommended

The student must have notions in bibliographic research.

Content of the matter

1. Introduction to bibliographic research
2. Writing a scientific report
3. Introduction to reading and understanding a scientific article

Evaluation method

Continuous control and semester examination;

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

Scientific articles and dissertations

Semester 1

EU: Transversale Teaching Unit

Material 1: UNIVERSAL HISTORY OF BIOLOGICAL SCIENCES

Credit: 2

Coefficient: 2

Teaching objectives

This program must emphasize the history of biology, and the question of life through eras and civilizations. It must highlight the place of technical progress in the evolution of biology

Prior knowledge recommended

No prerequisites.

Content of the subject

1. Prehistory
2. antiquity
3. Middle Ages
 - 3.1. In Occident
 - 3.2. In the East (Muslim civilization)
4. Sixteenth and seventeenth centuries:
5. Eighteenth century: Darwin
6. Nineteenth century: cell theory (microscopy), Sexuality Embryology, Molecular biology (DNA) Genetics
7. Twentieth century: gene therapy and cloning

Evaluation method

Semester examination;

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

Denis Buican, 2008- Darwin in the history of biological thought. Ed. Ellipses, 232p.

Christophe Ronsin, 2005- History of molecular biology. Ed. De Boeck, 106p.

Jean Théodoridès, 2000- History of biology. Ed. PUF, 127p.

Semester 2

EU: Fundamental Teaching Unit

Matter 1: THERMODYNAMICS AND CHEMISTRY OF SOLUTIONS

Credit: 6

Coefficient: 3

Teaching objectives

This course provides a certain understanding of the principles governing the transformations and interactions of matter, the principle of thermodynamics, energy balance, and the kinetics of chemical reactions.

Prior knowledge recommended

The student must have knowledge of oxidation-reduction reactions.

Content of the matter

1. Chemical balances

1.1. Acid-base balance

1.1.1. Definition according to: Arrhenius; Bronsted; Lewis

1.1.2. Equilibrium constant: water dissociation, acidity and basicity

1.2.3. The pH: water, a strong monoacid, a strong monobase,

1.2. Redox balance

1.2.1. Redox reaction: 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 ion addition on solubility

1.3.3. Effect of pH

2. Chemical kinetics

2.1. Definition

2.2. Reaction speed

2.3. Expression of the rate law and order of a reaction

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2.4. Factors influencing reaction rate

3. Thermodynamics

3.1. Thermodynamic systems and quantities: Thermodynamic functions and 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 free enthalpy

3.4. Thermochemistry

3.4.1. Heat of reactions

3.4.2. Enthalpy of reactions

3.4.3. Calculating the internal energy of a reaction

3.4.5. Kingoff's Law

3.4.6. Hess's Law

3.5. Prediction of the direction of reactions

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

Tutorials

TW N°1: Chemical kinetics

TW N°2: Acid-base balances and precipitation balances

TW N°3: Oxido-reduction balances

TW N°4: Thermodynamics and thermochemistry

TW N°5: Organic chemistry (Reaction mechanisms)

Practical work

PW N°1: Chemical kinetics

Part 1: Experimental determination of the order of the reaction

Objective: Determination of the order of the reaction with respect to sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3$) using the method of initial rates.

Part 2: Influence of temperature on the rate of the reaction

Objective: Determination of reaction rates for the same concentration of reactants but for different temperatures.

PW N°2: Acid-base titrimetric analysis method. Acid-base neutralization

Part 1: Dosage by colorimetry

Objective: Dosage of a strong acid solution (HCl) by a strong base (NaOH), determination of the concentration of a weak acid solution (CH_3COOH) by a strong base solution (NaOH).

Part 2: Dosage by pHmetry

Objective: Dosage of a weak acid solution (CH_3COOH) with a strong base (NaOH).

PW N°3: Titration by the oxidation-reduction method. Manganometric determination of Fe^{2+}

Objective: Determination of the normality of a given solution of KMnO_4 , determination of the concentration of Fe^{2+} contained in a solution of FeSO_4 .

PW N°4: Identification of ions and separation of precipitates by centrifugation

Objective: Identify the ions present in a solution, write the chemical formulas of an ionic compound in solution, write the precipitation reactions, express the relationship between the equilibrium constant and the solubility.

Evaluation method

Continuous control and semester examination;

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

John C. Kotz and Paul M. Treichel, 2006- Chemistry of solutions. Ed. De Boeck, 376p.

René Gaborriaud et al., Thermodynamics applied to the chemistry of solutions. Ed. Ellipses, 335p.

Semester 2

EU: Fundamental Teaching Unit

Matter 2: VEGETAL BIOLOGY

Credit: 6

Coefficient: 3

Teaching objectives

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

Prior knowledge recommended

The student must have certain notions about the different parts of a plant

Content of the matter

1. Introduction to plant biology
2. Different types of fabrics
 - 2.1. Primary meristem (root and cell)
 - 2.1.1. Primary tissues
 - 2.1.2. Protective tissues (epidermis)
 - 2.1.3. Filling tissues (parenchyma)
 - 2.1.4. Supporting tissues (collenchyma and sclerenchyma)
 - 2.1.5. Conductive tissues (primary xylem, primary phloem)
 - 2.1.6. Secretory tissues
 - 2.2. Secondary (lateral) meristems (the cambium and the phellogen)
 - 2.2.1. Secondary tissues
 - 2.2.2. Conductive tissues (secondary xylem and secondary phloem)
 - 2.2.3. Protective tissues (suber or cork, phelloderm)

3. Anatomy of higher plants
 - 3.1. Root study
 - 3.2. Stem study
 - 3.3. leaf study
 - 3.4. Comparative anatomy between mono and dicots4.
4. Morphology of higher plants and adaptation
 - 4.1. Roots
 - 4.2. Leaves
 - 4.3. Rods
 - 4.4. Flowers
 - 4.5. Seeds
 - 4.6. Fruits
5. Gametogenesis
 - 5.1. Pollen
 - 5.2. Ovum and embryo sac
6. Fertilization
 - 6.1. egg and embryo
 - 6.2. Concept of development cycle

Practical work

- PW N°1:** Morphological study of Angiosperms (roots-stems-leaves-flowers)
- PW N°2:** Morphological study of Gymnosperms (roots-stems-leaves-flowers)
- PW N°3:** Primary meristems (root and stem)
- PW N°4:** Covering fabrics: epidermis – piliferous layer – corky layer - suberoid
- PW N°5:** Parenchyma (chlorophyllian-reserve-aeriferous-aquifer)
- PW N°6:** Supporting tissues (collenchyma-sclerenchyma)
- PW N°7:** Secretory tissues (hairs-glands-cell with tannins-laticiferous)
- PW N°8:** Primary conductive tissues (phloem-xylem)

Evaluation method

Continuous control and semester examination;

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

Alain Raveneau et al. 2014- Plant biology. Ed. De Boeck, 733p.

Jean François Morot-Gaudry et al., 2012- Plant biology. Ed. Dunod, Paris, 213p.

Semester 2

EU: Fundamental Teaching Unit

Matter 3: ANIMAL BIOLOGY

Credit: 6

Coefficient : 3

Teaching objectives

This module consists of introducing students to the particularities of the developmental biology of certain animal species.

Prior knowledge recommended

No prerequisites

Content of the matter

First part: Embryology

1. Introduction
2. Gametogenesis
3. Fertilization
4. Segmentation
5. Gastrulation
6. Neurulation: becoming sheets
7. Delimitation: bird appendages
8. Peculiarities of human embryology (Cycle, nidation, appendix evolution, placenta)

Second part: Histology

1. Lining epithelia
2. Glandular Epithelia
3. Connective tissues
4. Blood tissue
5. Cartilaginous tissues
6. Bone tissue
7. muscle tissue
8. Nervous tissues

Tutorials / Practical work

TW/PWN°1:Gametogenesis

TW/PW N°2: Fertilization segmentation in the sea urchin

TW/PW N°3: Bird amphibian gastrulation

TW/PW N°4: Exercises on gastrulation and neurulation

TW/PW N° 5: Neurulation appendages birds

TW/PW N° 6: Human embryology

Evaluation method

Continuous control and semester examination;

References (*Books and handouts, websites, etc.*): Paul Richard W. FUNCTIONAL HISTOLOGY

Semester 2

EU: Methodological Teaching Unit

Matter 1: PHYSICAL

Credit: 6

Coefficient: 3

Teaching objectives

The objective of this course is to enable students to acquire knowledge related to the basic notions of physics that can be used in the SNV field.

Prior knowledge recommended

Students must have basic notions in mathematics and mechanics.

Content of the matter

1. Math Reminder

1.1. Physical quantities and dimensional analysis

1.2. Calculation of errors (Different types of errors, calculation of uncertainties and significant figures).

2. Optics

2.1. Introduction (lens of optics)

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

2.3. Geometrical optics

2.3.1. Principles of geometrical optics and propagation of light.

2.3.2. Refraction (Snell-Descarte's laws, limiting angle and total reflection)

2.3.2.1. Plane diopters, conjugation formula, Blade with parallel faces 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, association 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

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2.3.4.1. The eye

2.3.4.1. Magnifying glass and optical microscope

3. Fluid mechanics

3.1. Definition and characteristics of a fluid.

3.2. Hydrostatics (Fundamental relationship of hydrostatics, buoyancy, float)

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

4. Concept of crystallography

5. Notions of spectral analysis

Tutorials

TW N° 1: Exercises on dimensional analysis and error calculation.

TW N° 2: Exercises on the propagation of light, plane diopters and the prism

TW N° 3: Exercises on spherical diopters and thin lenses.

TW N° 4: Exercises on plane and spherical mirrors and the reduced eye.

TW N° 5: Exercises on Pascal's law and Archimedes' thrust. (Hydrostatic)

TW N° 6: Exercises on Bernoulli's law (hydrodynamics)

Evaluation method

Continuous monitoring (presentation + test) and semester examination;

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

Christophe Texier, 2015- Quantum mechanics. Ed. Dunod, Paris.

Eugene Hecht, 1998- Physics. Ed. De Boeck, 1304p.

Michel Blay, 2015- Optics. Ed. Dunod, Paris, 452p.

Semester 2

EU: Methodological Teaching Unit

Matter 2: COMMUNICATION AND EXPRESSION TECHNIQUES 2 (English)

Credit: 4

Coefficient : 2

Teaching objectives

This subject completes learning to understand and write scientific documents in English.

Prior knowledge recommended

No prerequisites

Content of the matter

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

Tutorials

Proposal of exercises related to the points of language considered the most important.

Evaluation method

Continuous control and semester examination;

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

Scientific papers

Semester 2

EU: Discovery Teaching Unit

Matter 1: LIFE SCIENCES AND SOCIO-ECONOMIC IMPACTS

Credit: 2

Coefficient: 2

Teaching objectives

Help students to conceive the concept of biotechnology and the fields of application.

Prior knowledge recommended

No prerequisites

Content of the subject

1. History and definition of concepts
2. Main fields of biotechnology
3. Introduction to Microbial Biotechnology
4. Introduction to Plant Biotechnology
5. Introduction to Animal Biotechnology

Evaluation method

Continuous control and semester examination;

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

Semester 2

EU: Transversale Teaching Unit

Matter 2: WORKING METHOD AND TERMINOLOGY 2

Credit: 1

Coefficient: 1

Teaching objectives

Help students design research methods and synthesis of work according to scientific rules.

Prior knowledge recommended

The student must have notions in bibliographic research.

Content of the matter

1. Terminology
2. Writing a scientific report
3. Introduction to reading and understanding a scientific article

Evaluation method

Semester examination;

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

Scientific papers

Semester 3

EU: Fundamental Teaching Unit1

Matter1: ZOOLOGY

Credit: 4

Coefficient : 2

Teaching objectives

Know the main groups of living organisms on the plans: General Architecture, Characteristics (Systematics, Morphology, Anatomy, reproduction, Ecology), constraints, adaptations, and evolution. Particular importance will be given to updating the classification and to zoological groups with an agricultural, medical, veterinary, fisheries or environmental interest.

Prior knowledge recommended

The student must have an idea about the different classes of the animal kingdom.

Content of the matter

1. Presentation of 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. Subkingdom 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 Cnidosporidia
3. Metazoan sub-kingdom
 - 3.1. Phylum sponges
 - 3.2. Phylum Cnidaria
 - 3.3. Ctenarian branch
 - 3.4. Platyhelminthes phylum:
 - 3.5. Phylum Nematelminthes.
 - 3.6. Phylum Annelids
 - 3.7. Phylum Molluscs
 - 3.8. Phylum Arthropoda
 - 3.9. Phylum Echinodermata
 - 3.10. Phylum Chordates

Practical work

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

PW N°1: Study of some typical species of Protozoa: Trypanosoma rhodesiense, Leishmania major, Leishmania infantum, Trypanosoma gambiense, Entamoeba histolytica, Paramecium sp.

PW N°2: Study of some flatworm type species: Moniezia expansa, Taenia hydatigena, Taenia pisiformis, Fasciola hepatica.

PW N°3: Study of some typical Annelid species: Lumbricus terrestris, Hirudo officinalis.

PW N°4: Study of some typical species of Arthropods: Crustaceans (Royal shrimp, Squill, morphology and biramous appendages), Chelicerates (Scorpion), Insects (Cricket, Bee).

PW N°5: Study of the mouthparts of insects: The different mouthparts and adaptation to diets, mouthparts of the crusher type (Orthoptera, Locust).

PW N°6: Study of some typical species of Echinoderms: Echinids (sea urchin), asterids (starfish).

PW N°7: Study of some typical species of Vertebrates: Fish (Carp), Birds (Pigeon), Mammals (Rat, Mouse)

Film screening: Turtles, Birds, Amphibians.

Evaluation method

Continuous control and semester examination;

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

ARAB A., CHERBI M., KHERBOUCHE-ABROUS O., Amine F., BIDI AKLI S., HADDOU SANOUN G., 2013: Zoology Volume 1. Polycopie, Works and University Publications. Algeria. 152p.

ARAB A., CHERBI M., KHERBOUCHE-ABROUS O., Amine F., BIDI AKLI S., HADDOU SANOUN G., 2013: Zoology Volume 2: Practical work. Handout, Works and Academic Publications. Algeria. 224p.

Semester 3

EU: Fundamental Teaching Unit1

Matter 2: ANIMAL PHYSIOLOGY

Credit: 2

Coefficient: 1

Teaching objectives

At the end of this course, students will have acquired the basic notions of animal physiology and the strategies used in the animal world to respond to the physical and chemical constraints of the environment.

Prior knowledge recommended

The student must have knowledge of cell physiology.

Content of the matter

1. Invertebrates.
 - 1.1. Circulatory system and hemolymph circulation.
 - 1.2. Respiration in Invertebrates.
 - 1.3. Nutrition in Invertebrates.
 - 1.4. Excretion in Invertebrates.
 - 1.5. Nervous system of invertebrates.
2. Vertebrates
 - 2.1. Physiology of the endocrine glands
 - 2.2. The fluid compartments of the body
 - 2.3. Breathing
 - 2.4. Blood flow
 - 2.5. Renal Excretion
 - 2.6. The digestion
 - 2.7. Thermoregulation

Evaluation method

Semester examination ;

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

Lamb JF, 1990- Handbook of Physiology. Ed. Elsevier Masson, Paris, 480p.

Easel P. and Richard D., 1999-The notion of regulation in physiology. Ed. Nathan, Paris, 128p.

Couée I., Fontaine-Poitou L. and Guillaume V., 2010-[Cellular and Molecular Biology and Physiology](#): Transmission of knowledge and preparation for competitions. Ed. De Boeck.

Gilles R., 2006-[animal physiology](#). Ed. De Boeck.

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

Semester 3

EU: Fundamental Teaching Unit2

Matter 1: BIOCHEMISTRY

Credit: 6

Coefficient: 3

Teaching objectives

This subject consists of teaching the fundamental bases of biochemistry and the notions of enzymology, and familiarizing students with biochemical techniques.

Prior knowledge recommended

The student must have some knowledge of chemical bonds (weak and strong) and of the physicochemical properties of organic molecules.

Content of the matter

1. Chemical bonds
 - 1.1. Strong links
 - 1.2. Weak bonds
2. Structure and physico-chemical properties of carbohydrates
 - 2.1. simple dares
 - 2.2. Oligosides
 - 2.3. Polysaccharides, heterosides.
3. Structure and physico-chemical properties of lipids
 - 3.1. Simple lipids
 - 3.2. Complex lipids
4. Structure and physico-chemical 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 effect of treatments (solubility, electrophoretic behavior, denaturation.)
 - 4.4. Protein separation
5. Notions of enzymology
 - 5.1. Definition, classification
 - 5.2. Mechanisms of action
 - 5.3. Active website
 - 5.4. Enzyme kinetics and types of representation
 - 5.5. Enzymatic inhibition
 - 5.6. Allostery phenomenon
6. Notions of bioenergetics
 - 6.1. Types of chemical reaction

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

- 6.2. The respiratory chain and energy production
- 6.3. Phosphorylation and redox reaction
- 7. Carbohydrate metabolism
 - 7.1. Catabolism (glycolysis, glycogenolysis, pentose phosphate pathway, Krebs cycle, energy balance)
 - 7.2. Anabolism (gluconeogenesis and glycogenesis)
 - 7.3. Regulation
- 8. Lipid metabolism
 - 8.1. Catabolism of fatty acids (Beta-oxidation)
 - 8.2. Sterol catabolism
 - 8.3. Biosyntheses 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. Side chain catabolism
 - 9.4. Glucoforming and ketogenic acids
 - 9.5. Biosynthesis of essential amino acids
 - 9.6. Nitrogen removal, urea cycle
 - 9.7. Example of peptide biosynthesis (case of peptides with biological activity)
 - 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

Evaluation method

Continuous control and semester examination;

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

Catherine Baratti-Elbaz and Pierre Le Maréchal, 2015- Biochemistry. Ed. Dunod, Paris, 160p.

Norbert Latruffe, Françoise Bleicher-Bardelett, Bertrand DucloS and Joseph Vamecq, 2014- Biochemistry. Ed. Dunod, Paris.

Serge Weinman and Pierre Méhul, All biochemistry. Ed. Dunod, Paris, 464p.

Françoise Lafont and Christian Plas, 2013- Biochemistry exercises. Ed. Doin, Paris, 410p.

Semester 3

EU:Fundamental Teaching Unit2

Matter 2:GENETIC

Credit: 6

Coefficient: 3

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 the mechanisms of regulation of gene expression.

Prior knowledge recommended

The student must have knowledge of nucleic acids and Mendelian genetics.

Content of the matter

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
 - 5.4. Mixed infection in viruses
6. Protein Synthesis
 - 6.1. Transcription
 - 6.2. Genetic code
 - 6.3. Translation
7. Gene Mutations

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

8. Chromosomal mutations
 - 8.1. Structural variation
 - 8.2. Numerical variation (human example)
9. Gene structure and function: biochemical genetics
10. Regulation of gene expression
 - 10.1. Lactose operon in prokaryotes
 - 10.2. Example in eukaryotes
11. Notions of extra-chromosomal genetics
12. Concept of population genetics

Tutorials

- TW N°1:** Genetic material
- TW N°2:** Transmission of characters
- TW N°3:** Mono and di hybridism (Special cases)
- TW N°3:** Linked genes
- TW N°4:** Genetic maps
- TW N°5:** Synthesis of proteins (Genetic code)
- TW N°6:** Fine structure of the gene (intragenic recombination)
- TW N°7:** Conjugation and factorial map
- TW N°8:** Population genetics
- TW N°9:** DNA extraction
- TW N°10:** DNA assay
- TW N°11:** BARR corpuscle

Evaluation method

Continuous control and semester examination;

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

- Pasternak JJ, 2003- Human Molecular Genetics. Ed. De Boek, 522 p.
- Harry M., 2008-Molecular and evolutionary genetics. Ed. Maloine.
- Watson J., Baker T., Bell S., Gann A., Levine M. and Losick R., 2010- Molecular Biology of the Gene. Ed. Pearson.
- Henry JP and Gouyon PH, 2003- Summary of Population Genetics. Ed. Dunod.

Semester 3

EU: Methodological Teaching Unit

Matter 1: COMMUNICATION AND EXPRESSION TECHNIQUES (IN ENGLISH)

Credit: 4

Coefficient: 2

Teaching objectives

Learn and apply research methods and the collection of useful and essential information for the synthesis and the written form (report, oral, defense). Application of English grammar in a scientific context.

Prior knowledge recommended

Certain notions of terminology and research methodology acquired in L1.

Content of the matter

1. Study of proposed texts (observe, analyze, take stock, written expression)
2. Terminology
3. Bibliographic research methodology.
4. Methods of writing scientific reports.

Evaluation method

Semester examination;

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

Research papers

Semester 3

EU: Methodological Teaching Unit

Matter 2: BIOPHYSICS

Credit: 5

Coefficient: 3

Teaching objectives

The general objective of teaching the biophysics course is to enable SNV students to acquire the basics in biophysics.

Prior knowledge recommended

The student must have some notions of physics acquired in L1.

Content of the matter

- I. The states of matter
 - I.1. Gases: elements of kinetic theory, equation of state of ideal or real gases, changes of state
 - I.2. Liquids: structure of water, dissolution
 - I.3. Solids: different structures
 - I.4. Intermediate states: glasses, liquid crystals, granular states, deformable polymers
- II. General information on aqueous solutions
 - II.1. Study of solutions: classification of solutions
 - II.2. Concentrations: molar fraction, molarity, molality, concentration by weight, 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. Capillarity phenomenon: 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 works

PW N°1: Surface tension

PW N°2: Conductometric titration

PW N°3: Titration by PH-meter

PW N°4: Viscosity measurement

PW N°5: Spectrophotometer

PW N°6: Refractometer

Evaluation method

Continuous monitoring (presentation + test) and semester examination;

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

F. Grémy and J. Perin. Elements of Biophysics. Volume 1 and 2. Flammarion. Paris.

C. Bénézech and J. Llory. Physics and Biophysics. Mason and Co. Paris, 1973.

Y. THOMAS, 2000, Biophysics for the use of students in biological sciences, Bréal, Paris.

A. Bertrand, D. Ducassou and JC. Healy. Biophysics. Medical use of radiation – Vision – Hearing.

Semester 3

EU: Discovery Teaching Unit

Matter 1: ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

Credit: 2

Coefficient: 2

Teaching objectives

This teaching aims to make students aware of the issues, content and actions of sustainable development. It is a question of making them aware that it is possible to act for the preservation of the environment, through their training, as well as at their level, on their consumption, their daily activities and their society. During his university education, whatever his specialty and his ambition for his future professional orientations, the student will have the opportunity to learn and experience his knowledge of sustainable development.

Sustainable development is currently one of the responses that is emerging around the world, to deal with the current conjunction of the world's major ecological, economic and societal challenges.

Prior knowledge recommended

No prerequisites

Content of the matter

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. Durable development, why?
 - 2.3. The Concept of Sustainable Development
 - 2.4. The domains of sustainable development
 - 2.5. SD principles and their origins: precaution, prevention, responsibility, solidarity, equity, polluter pays
 - 2.6. Some indicators of sustainable development: ecological footprint and biocapacity, impact on the environment, environmental performance index, human development index, GDP: gross inferior product (economic) and enrollment rate boys / girls (societal), accessibility to care (societal).
 - 2.7. Environmental education, awareness and nature animation, environmental communication.

Tutorials

Program for personal work

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

- 1-Find examples in the press (international and national) illustrating the principles of sustainable development (precaution, responsibility, for example).Presentation and discussion.
- 2-Test ecological reflexes
- 3-Comparison of the life cycle of a biodegradable product and a non-biodegradable product
- 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 the implementation of preservation, conservation or restoration of environments

Evaluation method

Continuous control and semester examination;

References(*Booksand handouts, websites, etc.*)

Semester 3

EU: Transversale Teaching Unit

Matter 1: ETHICS AND UNIVERSITY DEONTOLOGY

Credit: 1

Coefficient: 1

Teaching objectives

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

Prior knowledge recommended

No prerequisites

Content of the matter

1. Introduction: Contexts of the Algerian University
2. concepts
 - 2.1 Moral
 - 2.2 Ethics
 - 2.3 Deontology
 - 2.4 Right
 - 2.5 Professional values
 - 2.6 Learning and teaching
 - 2.7 Didactics and pedagogy
3. The charter of ethics and university deontology
 - 3.1 Fundamental principles
 - 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 method

Continuous control and semester examination;

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

- Bergadaà, M., Dell'Ambrogio, P., Falquet, G., Mc Adam, D., Peraya, D., & Scariati, R. (2008). The ethics-plagiarism relationship in the realization of personal work by students.
- Charter of ethics and university deontology, Algiers, May 2010 www.mesrs.dz
- Gilbert Tsafak, Ethics and Deontology of Education Collection Sciences of Education Presses Universitaires d'Afrique, 1998
- Gohier, C., & Jeffrey, D. (2005). Teaching and training in ethics. Laval University Press.
- Jaunait, A. (2010). Ethics, morals and deontology. Pocket-Ethical Space, 107-120.

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

Semester 4

EU: Fundamental Teaching Unit 1

Matter 1: AGRONOMY I (WATER, SOIL)

Credit: 4

Coefficient: 2

Teaching objectives

The student must know the notions and terminology of water and the different soils, mode of study and analysis in correlation with the different ecosystems.

Prior knowledge recommended

No prerequisites

Content of the smatter

1. Introduction
 - Definition of the ground and the
 - Role of water in soil sciences

A- THE GROUND

2. Constituent elements of the soil - Mineral constituents - Organic constituents - Colloidal complexes
3. Morphological organization of soils - Elementary organizations - Soil horizon - Soil profiles - Soil cover - Soil and water - Soil atmosphere - Soil temperature - Soil color
- 4- Chemical and biological properties of the soil
 - Ion exchange phenomena
 - Electro-ionic properties of soil
- 5- Soil organisms - Transformations of microbial origin
- 6- Classification of soils (Notions) - The different classifications (Russian, American, French) - Overview of the soils of Algeria and their relationship with climate and geomorphology.

B- WATER

- Role of soil water.
- Relations between the three phases of soil.
- Measurement of the volumes occupied by the different phases of the soil.
- The forms of water in the ground.
- The forces of water retention by the soil.
- The states of water in the ground.
- The water potential in the soil.
- The movements of water in the ground.
- Soil water balance.
- Water requirement of plants.

Tutorials

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

TW N°1: Relations between the units of measurement used in soil sciences (Reminder and exercises on the methods of preparing analysis solutions; unit conversion exercise).

TW N°2: Exercises on the physical aspect of the ground (three-phase system)

TW N°3: Slide projection session (the different soils of the CPCS and USDA classifications).

Evaluation method

Continuous control and semester examination;

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

LIM H., 1982- Modern agronomy. Physiological and agronomic basis of plant production. Ed. Masson.

DUCHAUFOR P., 1994- Pedology, soil, vegetation, environment. Ed. Masson.

BLONDEL J., 1979- Biogeography and ecology. Ed. Masson

Semester 4

EU: Fundamental Teaching Unit1

Matter 2: AGRONOMY II (Plants, Animals)

Credit: 4

Coefficient: 2

Teaching objectives

The lessons on the animal part provided in this part aim to give students the basics necessary to master the nutrition and feeding of animals. Also, at the end of the module, students should be able to:

- Know the methods and efficiency of food digestion
- Know the fate of the main nutrients within the animal body: water, carbohydrates, lipids, proteins, minerals including trace elements, vitamins.
- Know the origin of the different needs of animals, the importance of their coverage through the general consequences of imbalances, and their units of expression.
- Know the methods of calculating the nutritional value of food for the main domestic animals.

Those of the plant part aim to provide students with the common bases for all plant production

Prior knowledge recommended

No prerequisites

Content of the matter

It is highly desirable for this subject to be taught by two teams or two teachers, a phytotechnician for part 1 and a zootechnician for part 2.

Part 1: Animals

1. Use and composition of food
 - a. Food and diet concept
 - b. Comparative anatomy of the digestive system
2. Digestive actions of different animal species
 - a. In ruminants-
 - b. At the hen
 - c. At the rabbit
3. Energy supply
 - a. Importance
 - b. Dietary needs
 - c. Effects of nutritional deficiency or excess
4. Nitrogen supply
 - a. Importance
 - b. Dietary needs
 - c. Effects of nutritional deficiency or excess
5. Mineral and vitamin food
 - a. Importance

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- b. Dietary needs
- c. Effects of nutritional deficiency or excess

Part 2: Vegetal

1. The agricultural plant
 - a. Relations between cultivated plants: rotation and rotation
 - b. Seeds: (Classification, Morphology and physiology, Qualities of a good seed, Seed preparation)
 - c. The vegetation cycle of a plant: (the main stages of vegetation: germination-active growth-flowering-fruiting-maturation.)
 - d. The cultivation cycle
 - e. “Plant – microflora” nutrient associations
2. The plant grown in its environment
 - a. The management of a culture.
 - b. Crop yield and its components
 - c. Soil preparation
 - d. The establishment of culture
3. The main cultural care
 - a. Fertilization
 - b. Weed control-
 - c. The fight against crop pests
4. Harvest
5. Fertilization
 - a. General notions
 - b. Amendments
 - c. Mineral fertilizers.

Tutorials

TW N° 1: Characterization of livestock feed (grains and feed concentrates-cakes-protein crops-fodder and preservation methods)

TW N°2: Principle of animal rationing (dairy, growing and fattening)

Evaluation method

Continuous control and semester examination;

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

Dominique Soltner, 2015- Guide to the new agriculture. Ed. Agricultural Sciences and Techniques, 120p.

JM Meynard, A. Messéan and coordinators, 2014- Crop diversification. Ed. Quae, 103p.

Martine and Yannick Croisier, 2014- Animal feed. Ed. Educagri, 110

Semester 4

EU: Fundamental Teaching Unit2

Matter 1: MICROBIOLOGY

Credit: 6

Coefficient: 3

Teaching objectives

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

Prior knowledge recommended

The student must have a global notion of pathogens.

Content of the matter

1. The Microbial World

- 1.1. Historical
- 1.2. Place of microorganisms in the living world
- 1.3. General characteristics of the prokaryotic cell

2. The Bacterial Cell

- 2.1. Bacterial Cell Observation Techniques
- 2.2. Cell morphology
- 2.3. 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. The chromosome
 - 2.6.1. Morphology
 - 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. Pili
 - 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. Sprouting
- 3. Bacterial classification
 - 3.1. Phenetic classification
 - 3.2. Phylogenic classification
 - 3.3. Bergey classification
- 4. Bacterial Nutrition
 - 4.1. Basic needs
 - 4.2. Growth factors
 - 4.3. Trophic types
 - 4.4. Physico-chemical parameters (temperature, pH, O₂ and aW)
- 5. Bacterial growth
 - 5.1. Growth measurement
 - 5.2. Growth Parameters
 - 5.3. Growth curve (batch culture)
 - 5.4. Bacterial culture
 - 5.5. Antimicrobial agents.
- 6. Notions 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

TW N°1: Introduction to the microbiology laboratory

TW N°2: Method of studying micro-organisms and the different sterilization processes

TW N°3: Sowing methods;

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

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

TW N°6: Colouring of gram

TW N°7: Culture media

TW N°8: Study of bacterial growth

TW N°9: Criteria for the biochemical identification of bacteria

TW N°10: Yeasts and cyanobacteria

TW N°11: Growth inhibitors, antibiogram

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

Evaluation method

Continuous control and semester examination;

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

Henri Leclerc, Jean-Louis Gaillard and Michel Simonet, 1999- General microbiology. Ed. Doin, Paris, 535p.

Jerome Perry, James Staley and Stephen Lory, 2004- Microbiology-Course and review questions. Ed. Dunod, Paris, 889p.

Jean-Pierre Dedet, 2007- Microbiology, from its origins to emerging diseases. Ed. Dunod, Paris, 262p.

Semester 4

EU: Fundamental Teaching Unit2

Matter 2: BOTANICAL

Credit: 4

Coefficient: 2

Teaching objectives

This subject aims to initiate the classification and anatomical characterization of the major groups of the plant kingdom. The teaching provided also attempts to provide students with the means of reproduction.

Prior knowledge recommended

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

Content of the matter

Introduction to Botany

Definitions, concepts and classification criteria. Systematics of the major groups of the "plant" kingdom

FIRST PART: Algae and Mushrooms

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 gamy, development cycle)

1.3. Systematics and particularities of the main groups

1.3.1. Glaucophyta

1.3.2. The Rhodophyta

1.3.3. Chlorophyta and Streptophyta

1.3.4. The Haptophyta, Ochrophyta, Dinophyta, Euglenozoa, Cryptophyta, Cercozoa

2. Fungi and lichens

2.1. Problems posed by the classification of fungi

2.2. Structure of the thalli (mycelia, stroma, sclerotia)

2.3. Reproduction

2.4. Systematics and peculiarities of the main groups of fungi

2.4.1. Myxomycota

2.4.2. The Oomycota

2.4.3. Eumycota (Chytridiomycota, Zygomycota, Glomeromycota, Ascomycota,

Basidiomycota)

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

2.5. A particular algae-fungus association: lichens

2.5.1. Morphology

2.5.2. Anatomy

2.5.3. Reproduction

SECOND PART: Embryophytes

1. The Bryophytes: Morphology and reproduction of the different branches
 - 1.1. Marchantiophytes
 - 1.2. Hookworms
 - 1.3. Bryophytes s. str.
2. Pteridophytes: Morphology and reproduction of the different branches
 - 2.1. Lycophytes
 - 2.2. Sphenophytes (= equisetinated)
 - 2.3. Filicophytes
3. Gymnosperms sensu lato
 - 3.1. The Cycadophytes: concept of ovule
 - 3.2. Ginkgophytes
 - 3.3. Coniferophytes: concept of flower, inflorescence and seed
 - 3.4. The Gnetophytes: hinge group
4. Angiosperms
 - 4.1. Vegetative apparatus and notion 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. Notion of modern systematics, cladogenesis and main taxa. Presentation classifications (Engler 1924, APG II)

Practical work

PW N° 1: Algae (Phycophytes), Morphology and reproduction of some species such as *Ulva lactuca* and *Cystoseira mediterranea*.

PW N° 2: Fungi (Fungi), Morphology and reproduction of *Rhizopus nigricans* (Zygomycetes), *Agaricus campestris* (Basidiomycetes)

PW N°3: Lichens, Morphology of the different types of lichens and study of *Xanthoria parietina*

PW N° 4: Bryophytes, Morphology and reproduction of *Bryum* sp.

PW N°5: Pteridophytes, Morphology and reproduction of *Polypodium vulgare* and *Selaginella denticulata*

PW N° 6: Cycadophytes, Morphology and reproduction of *Cycas revoluta*

PW N°7: Coniferophytes (Gymnospermes sensu stricto), Morphology and reproduction of *Pinus halepensis* and *Cupressus sempervirens*

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PW N°8 and 9: Monocotyledonous and Eudicotyledonous Angiosperms. Illustration of the notion of trimery and pentamery, of the notion of actinomorphy and zygomorphy; dialypetaly, gamopetally, hypogynous flower, epigynous flower... .

TP N°8. Floral morphology of Monocotyledonous Angiosperms on examples such as *Asphodelus* (or *Allium*)

TP N°9. Floral morphology of Eudicotyledonous Angiosperms on examples such as *Lathyrus* or *Vicia*

PW N°10: Sexual reproduction in Angiosperms, Pollen grain, pollination and fertilization in Angiosperms, Types of fruits and types of seeds.

Evaluation method

Continuous control and semester examination;

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

APG II. 2003. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. *Bot. J. Linnean Society* 141:399–436.

APG III. 2009. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. *Bot. J. Linnean Society* 161:105–121.

Lecointre G. and Le Guyader H. 2001. *Phylogenetic classification of living organisms*. Ed. Belin.

Reviere de B. 2002. *Biology and Phylogeny of Algae*. Volume 1 and 2. Ed. Belin.

Meyer S., Reeb C. and Bosdeveix R. 2004. *Botany: Plant Biology and Physiology*. Ed. Maloine.

Dupont F., Guignard JL 2012. *Botany Plant families*. Ed. Elsevier-Masson

Semester 4

EU: Methodological Teaching Unit

Matter 1: PLANT PHYSIOLOGY

Credit: 4

Coefficient: 2

Teaching objectives

This subject allows students to have general notions on plant systematics (interest of classification in botany, notions of species and identification, evolution and classification of the plant kingdom), and to sharpen the sense of observation: one of the essential bases of the biologist's approach.

Prior knowledge recommended

The student must master concepts in Botany and Plant Physiology.

Content of the matter

Part I. Nutrition

1. Reminder of the basic concepts
 - 1.1. Organization of a plant
 - 1.2. Organization of a plant cell
2. Water nutrition (mechanism of water absorption and transit)
3. Perspiration and water balance
 - 3.1. Highlighting
 - 3.2. Location and measurement
 - 3.3. Change in perspiration
 - 3.3.1. Influence of plant morphology
 - 3.3.2. Influence of environmental factors
 - 3.4. Physiological determinism of perspiration
 - 3.5. The water balance of plants
 - 3.6. Interest of transpiration for plants
4. Mineral nutrition (macro and trace elements)
5. Nitrogen nutrition (nitrogen cycle, transport and assimilation of nitrates)
6. Carbon nutrition (Photosynthesis)

Part II: Development

1. Seed formation
2. Germination
3. Growth
4. Bloom
5. Fruiting

Practical work

A. Water nutrition

PW N°1: Osmolarity (spectrophotometry)

PW N°2: Sweating

PW N°3: Stomata

B. Mineral nutrition

PW N°4: Growth of broad bean seedlings in different nutrient solutions

C. Nitrogen nutrition

PW N°5: Electrophoresis of total proteins

PW N°6: Breathing

PW N°7: Separation of pigments by chromatography

D. Growth

PW N°8: Growth of seedlings in different solutions

PW N°9: Tropisms

PW N°10: Seed germination

Evaluation method

Continuous control and semester examination;

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

Béraud J., 2001- The biological analysis technician. Theoretical and practical guide. Ed. Tec and Doc, Paris, 208p.

Dupont G., Zonszain F. and Audigié C., 1999- Principles of biochemical analysis methods. Ed. Doin, Paris, 207p.

Burgot G., Burgot JL, 2002-Instrumental methods of chemical analysis and applications: Chromatographic methods, electrophoresis and spectral methods. Ed. Tec and Doc, Paris, 306p.

Heller R., Esnault R. and Lance C., 2005- Plant Physiology: Volume 1, Nutrition. Ed. Dunod, Paris, 209p.

Morot-Gaudry JF, Moreau F. and Prat R., 2009-Plant biology: Nutrition and metabolism. Ed. Dunod, Paris, 224p.

Semester 4

EU: Methodological Teaching Unit

Matter 1: BIOSTATISTICS

Credit: 5

Coefficient: 3

Teaching objectives

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

Prior knowledge recommended

The student must have notions of probability and numerical analysis already seen in the first year.

Content of the matter

1. Reminders
 - 1.1. Reminders on descriptive statistics
 - 1.1.1. Position parameters
 - 1.1.2. Dispersion Parameters
 - 1.1.3. Shape Parameters
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. Correlation significance test
 - 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 the 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.

Tutorials

Series of exercises on each chapter of the course

Evaluation method

Continuous control and semester examination;

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

BENZEON JP, 1984- Data analysis. Ed. Bordas, Volumes I and II.

HUET S., JOLIVET E. and MESSEON A., 1992- Nonlinear regression: methods and applications in biology. Ed. INRA.

TROUDE C., LENOUR R. and PASSOUANT M., 1993- Statistical methods under Lisa - multivariate statistics. CIRAD-SAR, Paris, PP: 69-160.

Semester 4

EU: Discovery Teaching Unit

Matter 1: GENERAL ECOLOGY

Credit: 2

Coefficient: 2

Teaching objectives

The objective of the subject is to make 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.

Prior knowledge recommended

No prerequisites

Content of the matter

Chapter I

- 1.1. Definition of the ecosystem and its constituents (Notions of biocenosis and ecological factor.)
- 1.2. Areas of intervention

Chapter II: Environmental Factors

- 2.1. Abiotic factors
 - 2.1. Climatic
 - 2.2. Edaphic
 - 2.3. Waterborne
- 2.2. Biotic factors
 - 2.2.1. Competitions
 - 2.2.2. Pests and Predators
 - 2.2.3. Cooperation and symbiosis interaction
 - 2.2.4. Parasitism
- 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

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. The consumers (Heterotrophs) who are linked to the producers and finally the decomposers that ensure the recycling and mineralization of matter organic.

Chapter IV: Functioning of ecosystems

- 4.1. Energy flow at the biosphere level:
- 4.2. Concepts of ecological pyramids, production, productivity and yield bioenergetics
- 4.3. Circulation of matter in ecosystems and main bio cycles geochemical
- 4.4. Influence of human activities on biological balances and particularly on the disruption of bio-geochemical cycles (consequences of the pollution of aquatic environments and atmospheric pollution (eutrophication, greenhouse effect, ozone, acid rain.))

Chapter V: Summary description of the main ecosystems

- 5.1. Forest, grassland, surface water, ocean
- 5.2. Evolution of ecosystems and notion of climax

Tutorials

The tutorials concern the methods applied for the study of the environment.

Evaluation method

Continuous control and semester examination;

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

- DAJET P. and GORDAN M., 1982- Frequency analysis of the ecology of the species in the communities. Ed. Masson.
- RAMADE F., 1984- Elements of ecology: Fundamental ecology. Ed. McGraw-Hill.

Semester 4

EU: Transversale Teaching Unit

Matter 1: INFORMATICAL TOOLS

Credit: 1

Coefficient: 1

Teaching objectives

Introduction to the basic definitions of the computer resource operating system. At the end of this course, the student will be able to design documents and tables in Word and Excel.

Prior knowledge recommended

No prerequisites

Content of the matter

1. Discovery of the operating system
 - Definition of an OS
 - Different existing OS: Windows, Linux and Mac OS.
2. Discovery of the office suite
 - Design documents on WORD.
 - Design tables with EXCEL.
 - Design of a presentation with Powerpoint.
 - Introduction to Latex.
3. software and algorithms
 - Definition of software.
 - Definition of algorithmic.
 - Use of algorithms in biology.

Evalutaion method

Semester examination;

Semester 5

Fundamental teaching unit1 (FTU 3.1.1)Matter1: Food and rationing		
Semester : 5		
Overall hourly volume of the matter in the un¹ 67h30		
Course : 45h	Tutorial work (TD) : 22h30	Practical Work (TP) : /
Natural of tutorial work : In the form of exercises		
Nature of the internship and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university environment in relation to the objectives of the training offer: Projection or forecast of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits² : 06 67h30 in presencial 82h30 in personal work		
Pre requisite³ : Knowledge of animal biology and physiology		
Objective : To teach the student the basics of determining nutritional requirements and establishing feed rations. At the end of this course, the student must be aware of the repercussions of feeding on the maintenance of livestock and on the quality of their production.		
Content elements: The programme is composed of 07 chapters		
Content : 1. Use and constitution of food (Concept of food and nutrition-Physiology of digestion comparative anatomy of the digestive system) 1.1. The different systems of fodder production 1.2. The main cultivated forage species 1.3. Fodder crops 1.4. Different ways of using fodder 1.5. Fodder conservation processes (hay, dehydration, silage) 1.6. Fodder balance 1.7. Comparative anatomy of the digestive system of herbivorous and granivorous polygastrics and monogastrics. 1.8. Motor function and digestive transit 1.9. Physiological functions and role of the digestive flora 1.10. Absorption of nutrients 2. Digestive actions of different animal species (In horses-in ruminants-in hens-in rabbits) 3. Energy supply (importance -food requirements -effects of nutritional deficiency or excess) 3.1. General principles on food energy		

- 3.1.1. Sources of food energy
- 3.1.2. Energy requirements of the body
- 3.1.3. Energy expenditure by the body
- 3.1.4. Use of food energy by the body
- 3.2 .Measuring metabolism**
- 3.2.1. Direct calorimetry method
- 3.2.2. Indirect calorimetric method
- 3.3. Different categories of energy expenditure**
- 3.3.1. Maintenance expenditure
- 3.3.2. Production expenditure and variation factors
- 3.4. Form of food energy**
- 3.4.1. Forms of food energy
- 3.4.2. Use of metabolizable energy for maintenance and production
- 3.5. Factors for variation in the yield of metabolizable energy to net energy**
- 3.5.1 Influence of dry matter
- 3.5.2 Influence of consumption time
- 3.6. History of food energy systems**
- 3.6.1. Metabolisable energy system
- 3.6.2. Systems for estimating the net energy value of feeds
- 3.6.3 Introduction to the milk and meat feed unit system
- 3.7. fodder unit milk and meat (UFL, UFV)**

Tutorial works

- N°1 : Exercise in applying the balance sheet method: case of a sheep and a young cattle
- N°2: Exercise in the application of the gas exchange method: case of the main nutrients
- N°3: Application exercise of the gas exchange method: case of a sheep
- N°4: Application exercise on the determination of the energy value (fodder unit milk and meat) of different types of forage and/or feed (green, hay, silage and concentrate)
- N°5: Application exercise: use of regression equations to estimate the energy value (fodder unit milk and meat ; UFL, UFV) of forages and concentrates.

4. Nitrogen supply-(Importance -Food needs -effects of nutritional deficiency or excess)

- 4.1. Place of nitrogenous materials in animal nutrition
 - 4.1.1. Role of nitrogenous materials in the body
 - 4.1.2. Effects of excess and deficiency of nitrogenous materials
- 4.2. Nitrogen expenditure of the body
 - 4.2.1. Maintenance nitrogen expenditure
 - 4.1.2. Production nitrogen expenditure
- 4.3. Use of nitrogenous materials
 - 4.3.1. Degradation of nitrogenous materials degradation of simple nitrogenous forms
 - 4.3.2. Fate of ammonia generated by hydrolysis of nitrogenous matter in the rumen
 - 4.3.3. Digestive use
 - 4.3.4. Metabolic use
- 4.4. Digestible Protein System in the Small Intestine (DPI)
- 4.5. DPI requirements of different polygastric species

Tutorials works

- N°1: application exercises on the evaluation of protein flow in the gut
- N°2: application exercises on the estimation of the real digestibility and the theoretical degradability of nitrogen

- N°3: application exercises on equations for estimating the nitrogen value of green fodder.
 N°4: application exercises of the equations allowing to estimate the nitrogen value of hays.
 N°5: exercises in applying the equations for estimating the nitrogen value of silages
 N°6: application exercises of the equations for estimating the nitrogen value of concentrates.

5. Mineral and vitamin feeding (importance -dietary requirements -effects of nutritional deficiency or excess)

- Introductory overview of the importance of minerals in farm animals
- Roles of mineral elements in the body
- Effects of mineral deficiency
- Use of mineral elements
- Phosphorus and Calcium
- Sodium chloride
- Magnesium
- Potassium
- Sulphur
- Iron
- Copper
- Cobalt
- Manganese
- Iodine
- Zinc and selenium
- Practical considerations

Vitamin nutrition

1. Definition
2. Classification of vitamins
 - 2.1. Fat-soluble vitamins
 - 2.2. Water-soluble vitamins
 - 2.2.1. Roles and effects of deficiency of group b vitamins
 - 2.2.2. Deficient animals
 - 2.2.2. Dietary intakes
 - 2.2.3. Apports alimentaires

6. Measurements of digestive utilisation of different animal species (Measurement of digestibility - Variation factors)

7. Study of livestock feeds (Grains and feed concentrates-Cakes-Proteaginous plants-Forages and methods of preservation)

Key words/concepts :

Feed - fodder - energy - nitrogen - digestive - livestock - needs

Pedagogical recommendations

Evaluation methods

CC + final exam

Evaluation criteria:

?

¹There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

¹ The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

¹To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Ressources bibliographiques :

Craplet C., Thibier M., 1984- Le mouton: production, reproduction, genetics, feeding, diseases. Ed. Vigot, Paris, 575p.

1- Explanation of the methodological approaches to documentary research in libraries and on the Internet.

2- The teacher must explain the role of the personal work that the student will have to provide in order to participate actively in his own training and which is taken into account in the evaluation within the framework of the continuous assessment. Craplet C., Thibier M., 1984- Le mouton: production, reproduction, genetics, feeding, diseases. Ed. Vigot, Paris, 575p.

Fundamental teaching unit 1 (UEF 3.1.1)Mater 2 : Physiology of reproduction		
Semester : 5		
Overall hourly volume of the matter in the un⁴		
67h30		
Course : 22h30	TW : 22h30	PW : 22h30
Nature of TW Program not including tutorials works	Nature TP Program not including practicals works	
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits⁵ : 06 67h30 in présencial 82h30 inpersonnal work		
Pre requisite⁶ :		
The notions of physiology, reproduction, genetics and bio-statistics acquired in the SNV core curriculum or in the bachelor's degree in animal nutrition and breeding are fundamental for the understanding of these applications		
Objectives:		
The target varies according to the species, 1 calf/cow/year; 3 farrowings/ewe/2 years. Farrowing maintains the level of milk production. Biotechnological methods help to achieve high numerical productivity and genetic quality of products with high genetic potential. These modern techniques make it possible to program the farrowing according to a forage calendar.		
Content elements:		
The programme is composed of 04 chapters		

⁴There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

⁵The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

⁶To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Content :

Chapter I: Reproductive physiology of farmed mammals

1. Embryological sexual differentiation.
2. Anatomy of the male reproductive system.
3. Physiology of male reproduction.
4. Anatomy of the genitalia of farmed females.
5. Physiology of oestrus cycles in farmed females.
6. Physiology of gestation and parturition.
7. Physiology of milk secretion.
 - 7.1. Galactogenesis.
 - 7.1. Galactopoiesis.

Chapter II. Physiology of reproduction in farmed birds

1. Anatomy of the male and female genitalia.
2. Endocrine control in egg formation.

Chapter III: Natural reproduction

1. Cycles of farmed females and oestrus.
2. Optimal mating time.
3. Pregnancy planning.
4. Pregnancy diagnostics.
5. Pregnancy monitoring.
6. Practice and benefits of drying off.
7. Parturition process.
8. Dystocia.
9. Calving sequence.
10. Weaning
11. Reproductive parameters (fertility, fertility, prolificacy, numerical productivity).
12. Causes and treatments of infertility.

Chapter IV: Reproductive biotechnologies

1. Heat detection.
2. Synchronisation of heat and counter-seasonal effect.
3. Semen control and artificial insemination (farmed mammals and domestic birds).
4. Super ovulation treatment.
5. Embryo transplantation.
6. Somatic cloning
7. Embryonic cloning.

Key words/concepts:

Reproduction - mating - insemination -- parturition - estrous cycle - biotechnology

Pedagogical recommendations

Evaluation method:

CC(Written test - reports - Report) + final exam

Evaluation criteria:

?

References :

1. 1. Gilbert B., Jeanine D., Carole D., Raymond G., Roland J., André L., Louis M., Gisèle R., 1988-
Reproduction of farmed mammals.Ed FOUCHER, Paris, 239p. 2. Thibault M. and Levasseur C., 1991-
The reproduction of mammals and man.INRA publishing.France.

1. Explanation of the methodological approaches to documentary research in libraries and on the Internet.

2. The teacher must explain the role of the personal work that the student will have to provide in order to participate actively in his own training and which is taken into account in the evaluation within the framework of the continuous assessment.

Fundamental teaching unit 2UEF 3.1.2 Selection and Genetic Improvement		
Semester : 5		
Overall hourly volume of the subject in the unit⁷ 67h30		
Course :45h	TW :22h30	PW : /
Natural TW Exercices series		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits⁸ : 06 67h30 in présensial 82h30 in personal work		
Pre requisite⁹ : The notions of genetics and biostatistics acquired in the SNV core curriculum or in the bachelor's degree in animal nutrition and breeding are fundamental for the understanding of these applications.		
Objectives : Performance improvement consists of acting on the environment or on the additive genetic value of livestock. Genetic improvement by these two methods inbreeding consists of improving purebred animals while conserving genetic pools or outbreeding favourable to the creation of new strains.		
Content elements : The programme is composed of 3 chapters		
Content : Chapter 1: Qualitative genetics and interests in agricultural sciences (animal). 1. Interactions between allelic and non-allelic genes. 2. Sex-linked genetics. 3. Lethal and undesirable genes.		

⁷There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

⁸ The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

⁹To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

4. Trademarks and major genes.

Chapter 2: Population genetics.

1. Gene and genotype frequencies.
2. Hardy Weinberg equilibrium.
3. Frequency estimation.
4. Modification of frequencies.
5. Selection case
6. Case of mutation
7. Case of migration
8. Case of mating systems.

Chapter 3: Quantitative genetics and improvement.

1. Additive effects of genes.
2. Study of genetic parameters: heritability; repeatability and correlations.
3. Selection objectives and criteria.
4. Genetic progress and its components.
5. Indirect response to selection.
6. Selection methods.
7. Estimation of the additive genetic value of sires.
8. Use of sires in purebred or crossbred breeding.
9. Different selection plans.
10. Selection assisted by genetic markers.

Tutorials (Series of exercises proposed)

Series 1: linkage and independence of genes

Series 2: calculation of genetic distances

Series 3: calculation of frequencies (H-W equilibrium)

Series 4: frequency calculation (selection)

Series 5: calculating frequencies (migration-mutation)

Series 6: coefficient calculation (heritability, repeatability, inbreeding)

Key words/concepts:

Gene - allele - dominance - recessivity - gene markers - selection - cross-breeding - sire.

Pedagogical recommendations

Evaluation methods:

CC (Written test)+Final Exam

Evaluation criteria:

1. Bibliographic references

1. Ollivier L., 2002- Elements of quantitative genetics, INRA. 2. Henry J.-P., 2003- Summary of population genetics: course, exercises and solved problems.Ed. Dunod, Pa3. Falconer (1980). Introduction to quantitative genetics.

1. Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet.

2. The teacher must explain the role of the personal work that the student will have to do in order to participate actively in his or her own training and which is taken into account in the evaluation within the framework of the continuous assessment

Establishment: Djilali Bounaama Khemis Miliana University Title of license: Animal production

Methodology Unit 1 Anatomy and animal physiology		
Semester : 5		
Overall hourly volume of the subject in the unit¹⁰		
67h30		
Course : 22h30	TW : /	PW : 45h
Natural PW : Dissection		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits¹¹ : 6 67h30 in présencial 82h30 in personnal work		
Pre requisite¹² :		
Notions of anatomy and animal physiology, the student must have mastered a certain number of notions in cytology, in chemistry and biochemistry, in animal histology		
Objectives :		
The knowledge acquired in this course will enable future graduates to understand the concepts of feeding, reproduction, development and animal behaviour.		
Content elements :		
The subject consists of lectures and practical sessions. The lectures are given in the classroom using teaching aids such as boards, data shows, etc. The practical sessions are held in the laboratory. .		
Content:		
<ul style="list-style-type: none"> - Chapter 1: Internal environment (blood, lymph and cerebrospinal fluid) - Chapter 2: The circulatory system - Chapter 3: The digestive system - Chapter 4: The respiratory system - Chapter 5: The excretory system - Chapter 6: The muscular system - Chapter 7: The bone system - Chapter 8: The nervous system 		

¹⁰There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

¹¹ The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

¹²To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

- Chapter 9: The endocrine system -	
Key words/concepts: Organe - système - hormone - tissu - cellule - sang - enzyme - glande	
Pedagogical recommendations	Evaluation method: CC + Final exam Evaluation criteria:

8. Bibliography and explanation of methodological procedures for researching documents in libraries and on the Internet.

9. The teacher must explain the role of self-work that the student will need to perform in order to actively participate in his/her learning and that is taken into account in the continuous assessment assessment.

Methodology Unit 2 Computer science		
Semester 5 :		
Overall hourly volume of the subject in the unit¹³ 37h30		
Course : 22h30	TW : /	PW : 15h
NaturalPW: Computer handling (Computer labo.)		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit..		
Credits¹⁴ : 3 37h30 in présencial 37h30 in personals work		
Pré requisites¹⁵ : - Theoretical and practical bases in computer science acquired during the SNV core curriculum		
Objective : Mastering the use of computer tools		
Content elements : The subject consists of lectures and practical sessions. The lectures are given in the classroom using teaching aids such as boards, data shows, etc. The practical sessions are held in rooms equipped with computers (computer block)		
Content: - - Computer operating systems - - Introduction to the use of software		
Key words/concepts: computer - unit - databases - software - IT		
Pedagogical recommendations	Evaluation method: CC + Final exam	
	Evaluation criteria:	

¹⁰There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

¹¹ The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

¹²To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

8. Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet.
 9. The teacher must explain the role of the personal work that the student will have to do in order to participate actively in his/her own training and which is taken into account in the evaluation within the framework of the continuous assessment.
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Discovery Unit 1		Statistics
Semester : 5		
Overall hourly volume of the subject in the unit¹⁶ 45h		
Course : 22h30	TW : 22h30	PW : /
Natural TW: In the form of series of exercises related to the course program		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit..		
Credits¹⁷ : 2 45h in présencial 5h in personal work		
Pré requisite¹⁸ : Basic mathematics		
Objectives : Mastery of the statistical tool and its use in scientific research (classical statistical calculation and in relation with the computer tool).		
Content elements : The subject consists of lectures and tutorials. Classes are held in the classroom. TD sessions are held in classrooms.		
Content : 1- Theoretical bases in statistics 2- Introduction to the use of statistical software.		
Key words/concepts : Variable - mean - mode - standard deviation - distribution - static - descriptive - mutivariable		
Pedagogical recommendations	Evaluation methods: CC + Final exam	
	Evaluation criteria :	

¹⁶There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

¹⁷The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

¹⁸To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

2. Bibliographie et explication des démarches méthodologiques de la recherche documentaire en bibliothèque et sur internet.
3. L'enseignant doit expliquer le rôle du travail personnel que devra fournir l'étudiant pour participer activement à sa propre formation et qui est prise en compte dans l'évaluation dans le cadre du contrôle continu.

Transversal Unit 1	Valorisation of agricultural by-products	
Semester : 5		
Overall hourly volume of the subject in the unit¹⁹ 22h30		
Course : 22h30	TD : /	TP : /
Nature TD: /		
<p>Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer:</p> <p>Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit..</p>		
Credits²⁰ : 1 22h30 in présencial 2h30in personal work		
Pre requisite²¹ : Background on feeding of domestic animals		
Objectives : To know the agricultural, agro-industrial and other by-products to better valorise them.		
Content elements : The content of the programme is divided into two chapters, in the first one it will be a question of identifying the main by-products and in the second chapter it will be a question of studying the different treatments of the by-products.		
<p>Content :</p> <p>CHAPTER 1: Agricultural and agro-industrial by-products in livestock feed</p> <ul style="list-style-type: none"> -Straw -Wheat and barley by-products - Maize by-products - Olive pomace - Brewers' grains and leavings - Beet pulp - Citrus pulp - Molasses - Grape pomace -date palm by-products used in livestock feed - animal by-products <p>CHAPTER 2: The different treatments of agricultural by-products</p> <ul style="list-style-type: none"> 1)- Physical treatments 1-1)- Mechanical treatments 1-2)- Non-mechanical treatments 		

2)- Biological treatments 3)- Chemical treatments a)- Soda treatment b)- Ammonia (NH ₃) treatment c)- Urea treatment Practical work : 1- Agricultural by-products 2- Agro-industrial by-products 3- Different types of treatment	
Key words/concepts : By-product - straw - cereals - spent grain - animal meal - processing - pulp	
Pedagogical recommendations	Evaluation methods: Final exam Evaluation criteria :

¹⁹There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

²⁰The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

²¹To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Bibliographical references

CHENOST M. and DULPHY J. P., (1987): Improvement of the food value (chemical composition, digestibility, ingestibility) of bad hay and straw by different types of treatment. pp 199-288 in dry fodder: harvesting, processing, use/ under direction of C.DEMARQUILLY.PARIS.INRA, 1987. 689

1- Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet.

2- The teacher must explain the role of the personal work that the student will have to do in order to participate actively in his own training and which is taken into account in the evaluation in the framework of the continuous assessment

Semestre6

Fundamental teaching unit1 1 (FTU 3.2.1)Ruminant breeding		
Semester : 6		
Overall hourly volume of the subject in the unit²² 67h30		
Course : 45h	TW : 22h30	PW : /
Natural TW		
Series of lectures + additional information provided by the subject leader. Note: In the programme of this subject, there are no titles of the TW sessions.		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits²³ : 06 67h30 in présencial 82h30 in personal work		
Pré requisite²⁴ :		
Knowledge of animal biology, physiology and zootechnics.		
Objectives :		
To teach the student to know the different breeds of cattle, sheep and goats as well as the techniques for managing ruminant livestock		
Content elements:		
The syllabus of the subject consists of 03 chapters, each dealing with a species of farmed ruminants: - Cattle - Sheep - Goats		
Content:		
Chapter 1: Cattle breeding 1. Cattle breeds in the world and in Algeria 2. Production and milk control 3. Meat production 4. Dairy and beef cattle assessment		

²²There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

²³The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

²⁴To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Chapter 2: Sheep farming

1. Sheep breeds in the world and in Algeria
2. Breeding systems in Algeria
3. Sheep production

Chapter 3: Goat breeding

1. Goat breeds in the world and in Algeria
2. Breeding systems in Algeria
3. Production and milk recording
- 4..Zootechnical control of the reproductive function (clod)

Key words/concepts :

Rumination - cattle - sheep - goat - breed - aptitude - milk - production

Pedagogical recommendations**Evaluation method :**

CC+Final exam

Evaluation criteria:The student must be able to distinguish between the main breeds of farmed ruminants, and have sufficient knowledge of the main animal productions.

Bibliographic references

1. Craplet C. and Thibier M., 1984- Le mouton : production, reproduction, genetics, feeding, diseases. Ed. Vigot, Paris, 575p.
10. Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet.
11. The teacher must explain the role of the personal work that the student will have to provide to participate actively in his own training and which is taken into account in the evaluation within the framework of the continuous control.

Fundamental teaching unit1 1 (FTU 3.2.1)Small-scale livestock		
Semester : 6		
Overall hourly volume of the subject in the unit²⁵ 67h30		
Course : 45h	TW : 22h30	PW : vol horaire /
Natural TW		
Note: In the program for this subject, there are no titles of the TW sessions.		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit		
Credits²⁶ : 06 67h30 in présencial 82h30 in personal work		
Pré requisite²⁷ :		
Note: In the program for this subject, there is no designation of the TD sessions..		
Objectifs :		
o teach the student to know the different categories of poultry and rabbit, as well as the techniques for the management of the different strains of poultry (meat, laying, breeding) and rabbit.		
Content elements :		
Le programme de la matière se compose de 05 chapitres, chacun traitant d'une espèce ou d'un groupe d'espèces de volailles, et se terminant par le lapin en tant qu'herbivore monogastrique.		
Content :		
<ol style="list-style-type: none"> 1. Anatomical and physiological reminders of birds 2. Broiler breeding <ol style="list-style-type: none"> 2.1. Types of breeding (traditional - industrial) 2.2. Feeding of the broiler chicken 3. Breeding of laying hens <ol style="list-style-type: none"> 3.1 Types of breeding (traditional - industrial) 3.1. Feeding of the laying hen 4. Breeding of other species (turkey, guinea fowl, goose) 5. Rabbit breeding <ol style="list-style-type: none"> 5.1. Anatomical and physiological background 5.1. Breeding techniques. 		

²⁵There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

²⁶The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

²⁷To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Key words/concepts : Poulet – poule – chair- ponte- reproducteur- dinde – oie- canard- élevage	
Pedagogical recommendations	Evaluation method : CC+Final exam Evaluation criteria: The student should be familiar with the main species of small farm animals in both anatomical and physiological terms.

Bibliographic references

10. Bibliography and explanation of methodological approaches to documentary research in the library and on the Internet.
11. The teacher must explain the role of the personal work that the student will have to provide to participate actively in his own training and which is taken into account in the evaluation within the framework of the continuous assessment

Fundamental teaching unit1 le 2 (FUT 3.2.2)livestock buildings, hygiene and prophylaxis		
Semester : 6		
Overall hourly volume of the subject in the unit²⁸ 67h30		
Course : 45h	TW : /	PW : 22h30
Natural TP		
The practical sessions will be done with the help of slides and prepared slides, as well as field trips to manipulate farm animals.		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit		
Credits²⁹ : 06 67h30 in présensial 82h30 in personal work		
Pré requisite³⁰ :		
Knowledge of general biochemistry and microbiology .		
Objectives :		
To teach the student the main diseases of farm animals and how to prevent them. This course also aims to show the importance of hygiene and its impact on animal health		
Content elements :		
The programme of the subject consists of two chapters, the first chapter lists the groups of diseases or pathologies encountered in animals. The second chapter deals with the hygiene of the livestock environment (buildings and equipment).		
Content :		
Chapter 1: Basics of the main diseases		
1. Nutritional diseases		
2. Infectious diseases of livestock		
3. Viral diseases		
4. Parasitic diseases		
5. Mycoses		
6. Basic notions of pathological anatomy		
7. Basic physiopathology (stress-shock)		
8. Basic knowledge of veterinary legislation		

²⁵There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

²⁶The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

²⁷To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Chapter 2: Basics of farm environment hygiene (building and equipment)

1. Reminder on the design of livestock buildings

1.1 Stable, sheepfold, milking parlour ...

1.2. Poultry buildings

1.3. Rabbit buildings

2. Hygiene of livestock premises

3. Hygiene of breeding equipment

Practical work

- Slides projections and observation of histo-pathological slides.

- Visits to farms :

1. Contact with the animal and means of restraint.

2. Examination of the skin, hair, dander (horns, hooves).

3. Clinical examination method (inspection-palpation)

Key words/concepts :

Hygiene – pathology – premises – equipment – Stable – sheepfold – treatment – prophylaxis

Pedagogical recommendations

Evaluation method :

CC+Final exam

Evaluation criteria: Be able to assess the quality of livestock buildings and the principles of hygiene and prophylaxis for good animal health and welfare

Références bibliographiques

1. Schmidt-Treptow and Schirmeisen T., 1973- Compendium of Small Domestic Species Medicine. Ed. Vigot Frères, Paris

1-Bibliographie et explication des démarches méthodologiques de la recherche documentaire en bibliothèque et sur internet.

2-L'enseignant doit expliquer le rôle du travail personnel que devra fournir l'étudiant pour participer activement à sa propre formation et qui est prise en compte dans l'évaluation dans le cadre du contrôle continu.

Methodology teaching unit 1 (UEM1)Animal products		
Semester : 6		
Overall hourly volume of the subject in the unit³¹ 67h30		
Course : 22h30	TW (Tutorial work) : /	PW (Practical work) : 22h30
Natural PW		
The practical sessions take place in the laboratory.		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits³² : 04 55h in présencial 55h in personal work		
Pré requisite³³ :		
Basic biology, chemistry, biochemistry and microbiology.		
Objective :		
The aim of this course is to provide sufficient knowledge of the different aspects of animal products (milk, meat, and other products).		
Content element :		
The syllabus is divided into three parts: the first chapter is reserved for milk, the second for meat, and the third for other animal products, such as eggs and beehive products.		
Content :		
Part I: Milk		
1. The composition of milk: (Fat, carbohydrates, nitrogenous and mineral substances, vitamins etc.)		
2. Physico-chemistry of milk		
3. Microbiology of milk		
4. Undesirable substances in milk (milk contaminants)		
5. Dairy products		

³¹There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

³²The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

³³To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Part II: Meat

- 1- Definition
- 2- Slaughter
- 3- Importance of meat in the diet
- 4- Transformation of muscle into meat
- 5- Colour and composition of meat
- 6- Quality of meat
- 7- Meat classification
- 8- Environmental aspects

Complement : Slaughterhouse

- 9- Slaughterhouse in general
- 10- Poultry slaughterhouse

- Practical work :

- Physico-chemical, microbiological and quality analyses (different types of residues), Milk technology (different transformations).
- Slaughter, Carcass, composition and quality of meat.

Part III - Other products: Eggs, beekeeping products etc..**Key words/concepts :**

Meat - milk - honey - offal - propolis - pollen - carcass - slaughterhouse - venom - wax

Pedagogical recommendations**Evaluation method :**

CC+Final exam
Basic knowledge of animal products

Evaluation criteria :**Bibliographical references**

- Adrian, J. 1973. the food value of milk, Ed: rustic house, Paris, 229p.
- Alais, C. 1984. Milk sciences, principles of dairy techniques, 4th edition.Paris, 812p.

11. This is the first time that a research project has been carried out in the field of agriculture and forestry.

12. The teacher must explain the role of the personal work that the student will have to do in order to participate actively in his own training and which is taken into account in the evaluation within the framework of the continuous assessment.

Methodological teaching unit 2 (MTU1)Breeding techniques		
Semester : 6		
Overall hourly volume of the subject in the unit³⁴ 60h		
Course : 22h30	TW : /	PW : 37h30
Natural PW		
Small-scale livestock : Monitoring of livestock Large livestock : Monitoring of livestock		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits³⁵ : 05 67h30h in présensial 7h30h in personal work		
Pré requisite³⁶ :		
Knowledge of breeding		
Objective :		
To be able to breed successfully (to conduct a breeding operation according to standards).		
Content element :		
Livestock husbandry techniques on both the theoretical and practical levels		

Content :

Chapter 1: Husbandry techniques for laying hens (table eggs and hatching eggs)

Chapter 2: Broiler, turkey and other poultry rearing techniques

Chapter 3: Rabbit rearing techniques

Chapter 4: Cattle, sheep and goat rearing techniques.

Chapter 5: Husbandry techniques for other livestock (camels, etc.)

Practical work: The practical sessions will include a theoretical aspect that will highlight the external morphology as well as the internal anatomy. These aspects will be put into practice through dissection sessions on different species of livestock, namely, broiler chickens, laying hens, rabbits, bees as well as some species of farmed fish. Also, practical sessions will be devoted to field trips in order to put the student in contact with the real practice of breeding in the field.

³⁴There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

³⁵The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

³⁶To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

Key words/concepts :

Farming - breeding - feeding - reproduction - fodder - management – standard

Pedagogical recommendations - Introduce the student to research work; - Accompany the student in the development of scientific reports	Evaluation method: CC : Periodically during the semester Examen : Medium final exam (EMD) Evaluation criteria: To enable the student to take charge of a farm .
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1. Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet.
2. The teacher must explain the role of the personal work which the student will have to provide in order to participate actively in his own training and which is taken into account in the evaluation within the framework of continuous monitoring

Discovery teaching unit 1 (MTU2) Knowledge of the farm		
Semester: 6		
Overall hourly volume of the subject in the unit³⁷ 60h		
Course :	TD : /	TP : 45h
Natural PW		
<ul style="list-style-type: none"> - Presentation of an internship guide - Periodic summary of the progress of the internship 		
<p>Nature of the internship and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university environment in connection with the objectives of the training offer:</p> <ul style="list-style-type: none"> - it's about : - to discover the different processes of animal production through field visits (one visit/animal sector) Or - to learn about the different analysis and/or control techniques for products of animal origin 		
Credits³⁸ : 02 60h in présencial 65hin personal work		
Pré requis³⁹ :		
Bases en zootechnie et en transformation des produits animaux		
Objective :		
Know the agricultural and agri-food environment in relation to animal production.		
Content element: /		
Content :		
This unit does not include lessons. It is planned for this teaching unit: - A one-day outing per animal sector		
Key words/concepts:		
Exploitation – breeding – food – reproduction – fodder – analysis		
Pedagogical recommendations	Evaluation : Written report and oral presentation in front of the teacher Evaluation criteria:	

³⁷There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

³⁸The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

³⁹To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

11. Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet. 12. The teacher must explain the role of the personal work which the student will have to

11. Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet.

12. The teacher must explain the role of the personal work which the student will have to provide in order to participate actively in his own training and which is taken into account in the evaluation within the framework of continuous monitoring.

Transversal teaching unit1 (TTU1)Scientific English		
Semester : 6		
Overall hourly volume of the subject in the unit⁴⁰ 22h30		
Course : 22h30	TW : /	PW : /
Natural TW and PW /		
Nature of the placement and characteristic or identification (identity) of the field in the socio-economic, socio-cultural and industrial environment of the university's surroundings in relation to the objectives of the training offer: Projection or prediction of the acquisition of the subject matter of the understanding of the problems that the field can solve or clarify or make explicit.		
Credits⁴¹ : 1 22h30 in présencial 2h30 in personal work		
Pré requisite⁴² :		
Basics in English		
Objectivs :		
Be able to read, understand a scientific document in English		
Content elements :		
Complete the basics in English and improve in writing summaries in English		
Content :		
Leave it to the discretion of the teacher		
Key words/concepts : /		
Recommandations pédagogiques - Accompany the student in the development of scientific reports in English;	Evaluation method : Final exam. Evaluation criteria: The student must be fluent in English	

1. Bibliography and explanation of methodological approaches to documentary research in libraries and on the Internet.
2. The teacher must explain the role of the personal work that the student will have to provide to actively participate in his own training and which is taken into account in the evaluation within the framework of the continuous control

⁴⁰There is an overall hourly volume of the unit, according to its nature (F, M, D, T), this hourly volume is distributed at the level of the subjects registered in the unit according to the hourly volume needed to reach the competences, the hourly volume of the subject is distributed according to the number of competences registered in the subject and the hourly volume necessary to reach these competences in Course/TD, TP

⁴¹The credit is obtained as soon as there is acquisition of learning, to obtain the credit it is necessary to reach competences and for that it is necessary to make a certain volume of hours of presential and personal and formative evaluation (to redirect and correct the failures) and summative evaluation at the end of training (for that a planning of the evaluation must be attached to the subject).

⁴²To evaluate, we must position the candidate in relation to a prerequisite of the subject, does he/she have all the fundamental knowledge necessary to start the subject. There must be a planning for the pre-requisites throughout the semester (CC).

