

POEPLÉ'S DEMOCRATIC REPUBLIC ALGERIA

**MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH**

MASTER TRAINING OFFER

ACADEMIC

Establishment	Faculty	Department
<i>Mohamed Khider University, Biskra</i>	<i>Faculty of Exact Sciences and Natural Sciences and Life</i>	<i>Natural Sciences and Life</i>

Domain : Natural Sciences and Life

Section : Sciences Biology

Speciality : Parasitology

Academic year : 2016-2017

الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي والبحث العلمي

عرض تكوين ماستر
أكاديمي

القسم	الكلية/ المعهد	المؤسسة
علوم الطبيعة والحياة	العلوم الدقيقة وعلوم الطبيعة والحياة	جامعة محمد خيضر - بسكرة

الميدان : علوم الطبيعة والحياة

الشعبة : علوم بيولوجية

التخصص : علم الطفيليات

السنة الجامعية: 2016-2017

SUMMARY

I - Master's identity sheet -----	5
1 - Location of the training -----	5
2 - Training partners -----	5
3 - Context and objectives of the training-----	5
A - Conditions of access -----	6
B - Training objectives -----	6
C - Profiles and targeted skills -----	6
D - Regional and national employability potential -----	6
E - Gateways to other specialties -----	7
F - Training monitoring indicators -----	7
G – Management abilities -----	8
4 - Human resources available-----	8
A - Teachers working in the specialty -----	10
B - External supervision -----	11
5 - Specific material resources available -----	11
A - Educational Laboratories and Equipment -----	15
B- Internship sites and company training -----	15
C - Research laboratories supporting the master's degree-----	15
D - Research projects supporting the master's degree -----	16
E - Personal work spaces and ICT -----	16
II - Half-yearly teaching organization sheet -----	17
1- Semester 1 -----	18
2- Semester 2 -----	19
3- Semester 3 -----	20
4- Semester 4 -----	21
5- Overall summary of the training -----	21
III - Detailed program by subject -----	22
IV – Agreements / conventions -----	54

I – Master’s identity sheet

1 - Training location :

Faculty: Exact Sciences and Sciences of Nature and Life Sciences.

Department: Natural and Life Sciences.

2- Training partners :

Other academic establishments:

- University of Barcelona - National Genoscope Sequencing Center, University of Evry Val d'Essonne, France.
- Department of Biology, University of Las Palmas, Gran Canaria, Spain.
- Technical Institute of Fruit Arboriculture and Vine (ITAFV): Germplasm collections from Skikda, Mascara and Médéa.
- Technical Institute for the Development of Saharan Agriculture (ITDAS), Biskra
- National Center for Biotechnology, Madrid, Spain
- Center for Scientific and Technical Research on Arid Regions (CRSTRA)
- Intensive language teaching center – Biskra

Businesses and other socio-economic partners:

CRSTRA, ITDAS, INRAA Biskra, ITAF, ITAS, INPV Biskra, conservation of Biskra forests, DSA, Belezma National Park, Biskra hospital laboratory, Biskra hygiene laboratory, municipal and private slaughterhouses, practicing veterinarians, zoological park managers, forestry department, agricultural services department, domestic animal breeders, private pet stores, Pasteur Institute of Algiers.

International partners:

University Agency of the Francophonie,
Vaasa University of applied sciences FINLAND
Las Palmas University (Canary Islands, Spain)

3 – Context and objectives of the training

A–Conditions of access In the 1st year M1 is limited to a number of 50 students

Entry by title in semester 1 for license holders,

- in biochemistry.
- in microbiology.
- in animal biology and physiology
- in animal nutrition
- in parasitology
- in genetics
- in toxicology
- in immunology
- in molecular biology
- in biotechnology
- or other license equivalent to this specialty Entry based on equivalence of credits and subjects after advice from the educational commission.

In 2nd year: M2

Access to the 2nd year is open to students who have validated

- By capitalization the two semesters of the 1st year 60 credits (2 semesters)
- By compensation if he validates at least 50% of the credits of the 1st Year, including at least 1/3 in one semester. He is then required to re-register for the subjects not acquired in the UEs not acquired in the 1st Year.

B - Training objectives The objectives are:

- the improvement of the SNV department of the University of Biskra by the opening of new specialties. Animal biology was opened the previous year at the undergraduate level Students from this specialty must find a path to continue their higher studies in a master's degree This training offer is rich and attractive thanks to the strong interactions of this specialization with the strong industrial and agro-pastoral potential of the Biskra region and its impact on wildlife and ecosystems in general. Parasitology is a branch of zoology that studies the role of animals in the transmission or provocation of diseases. In-depth knowledge of unicellular organisms (protozoa) and multicellular organisms (parasitic worms, arthropod vectors) as well as their definitive hosts, whether invertebrates or vertebrates, is more than necessary in understanding certain parasitic diseases. In epidemiological studies, knowledge of these animals is imperative. Modeling the fight against these animals also requires a better knowledge of the animal (taxonomy, biology, ecotoxicology, etc.) The profiles concern several sectors of activity (Universities, Structures linked to the Ministry of Research, Private research laboratories, Industrial sector) and professions (Research professions in private or public organizations, Executive professions in the environmental sectors, the agri-food, biotechnology and pharmaceutical industries) and interface professions (science and communication, science and regulation in the corresponding scientific fields).

C – Targeted job profiles and skills:

This master's course concerns disciplinary fields where our establishment has many assets, in particular a strong training potential (a third of the teachers in our department have a diploma in or directly related to animal biology) and a research base with the creation of the first research laboratory. In addition, our establishment is located in a region with a geographical particularity as a transitional region between arid and semi-arid. This bioclimatic stage is characterized by very particular wild and domestic fauna, there are species adapted to continental climates (in the mountains), steppe species and typically Saharan species. We must add the existence of some wetlands such as the Chotts and dams. In these areas, there is a great diversity of aquatic animals, amphibians and birds. Fish farming (fish farming) which was introduced in recent years and which is gradually evolving. A close link between animal biology and agriculture, in other words the national economy, which requires the training of specialists in biology, ecology and animal pathologies to meet the needs for researchers, technicians and experts.

D- Regional and national employability potential of graduates

- Possibility of creating a group analysis laboratory (through ANSEJ or Bank, etc.)
- Possibility of opening private extension and public prophylaxis offices (through ANSEJ or Bank, etc.)
- University teaching and fundamental research; Ph.D.
- Possibility of professional activities in specialized structures (veterinary laboratories, slaughterhouses, hospital laboratories, research centers, industrial food processing units, etc.).
- Application in industrial microbiology, food safety, and environmental protection.
- Municipal hygiene offices.
- Services to combat nosocomially transmitted diseases in hospitals
- Forestry Department (wildlife and environmental health control).
- Assistance in health monitoring of exotic zoo animals (screening, serology, popularization)

E – Gateways to other specialties

It is possible to enroll in any other Master's or Doctorate related to the field of

- Biology, physiology, ecology and animal and veterinary pathology
- Parasitology-Microbiology. Animal health or epidemiology. Breeding or other equivalent masters

F – Training monitoring indicators

Continuous assessment of knowledge and presentations before committees (parts of the overall work) culminated by a defense before a jury.

G – Supervision capacity: 40 students

4 – Human resources available

A: Teachers at the establishment working in the specialty:

B : External supervision:**Home establishment:** University of Skikda

Name, first name	Graduation diploma + Speciality	Post graduation diploma + Speciality	Grade	Type of intervention	Registration
BelambriSahra Amel	Immunology	Immunology	M.C.A.	Memory Framing+ internship	

Home institution: University of Constantine

Name, first name	Graduation diploma + Speciality	Post graduation diploma + Speciality	Grade	Type of intervention	Registration
HamidchiAbdelhafidh	Microbiology	Bioinformatic	Pr.	Memory of internship	

Home establishment: Mila University Center

Name, first name	Graduation diploma + Speciality	Post graduation diploma + Speciality	Grade	Type of intervention	Registration
Boubendir Abd El Hafid	Microbiology	Food Microbiology	M.C.A.	Course + Memory Framing+internship	

Home institution: University of Batna

Name, first name	Graduation diploma + Speciality	Post graduation diploma + Speciality	Grade	Type of intervention	Registration
Bouras Mourad	Genetic	Molecular Biology	M.C.A.	Course + Memory Framing+internship	

Home institution: University of Limoges France

Name, first name	Graduation diploma + Speciality	Post graduation diploma + Speciality	Grade	Type of intervention	Registration
Daniel Petit	Genetic	Biodiversity & Genetic	MC	Audio-visual Conferences	

Home institution: University of Evry France

Name, first name	Graduation diploma + Speciality	Post graduation diploma + Speciality	Grade	Type of intervention	Registration
Seghir Abdelghani	Microbiology	Metagenomics	Pr.	Audio-visual Conferences	

5 – Specific material resources available

A-Pedagogical Laboratories and Equipment: Sheet of existing educational equipment for the practical work of the planned training

Laboratory title: laboratory 1: Animal Biology and Physiology

N°	Equipement title	Number	Observations
1	Stereomicroscope	04	Functional
2	Benchtop conductimeter	01	Functional
3	Cold light source	02	Functional
4	Trin eye stereomicroscope	01	Functional
5	Trinocular microscope	01	Functional
6	Microtome	02	Functional
7	Coloring box of 8 glass slides	10	Functional
8	Compass	01	Functional
9	Mercury thermometer, 22c +95/+103°c	10	Functional
10	Mercury controlled thermometer, 0 to +50°c	10	Functional
11	Alcohol bottle thermometer, -25 a -5°c	10	Functional
12	Single cell quad. malassez	05	Functional
13	Single cell quad. nageotte	05	Functional
14	Rotavapor r210/v vertical p+g	01	Functional
15	Universal oven type um 400	01	Functional
16	Single cell quad. thomas	05	Functional
17	Blade storage box	04	Functional
18	Dissection box	10	Functional
19	Staining box slide holder for 10 slides	02	Functional
20	Entomological pins	15	Functional
21	Entomological box	10	Functional
22	Microscopes	20	Functional

Laboratory title: laboratory 2: Vegetal Biology and Physiology

N°	Equipement title	Number	Observations
1	Vortex tube agitator	1	Functional
2	Precision scale	1	Functional
3	Calcination furnace 15l 1100c prog	1	Functional
4	Refractometer	1	Functional
5	Standard flame photometer	1	Functional
6	Rotavapeur	1	Functional
7	Bain marie agitator	2	Functional
8	Staining box slide holder for 10 slides	2	Functional
9	Spectrophotometer	2	Functional
10	Bain-marie	2	Functional
11	Microtome	2	Functional
12	Floor thermometers	2	Functional
13	Dryers	3	Functional
14	Fridge	3	Functional
15	Blade storage box	4	Functional

16	Storage cupboards and appliances	8	Functional
17	Micropipettes	10	Functional
18	Heating stirring plate	10	Functional
19	Mercury thermometer, 22c +95/+103°C	10	Functional
20	Stereomicroscope	24	Functional
21	Binocular microscope	20	Functional

Laboratory title: laboratory 3: Microbiology I and II

N°	Equipement title	Number	Observations
1	Microbiological hood	1	Functional
2	Agitator with incubation chamber	4	Functional
3	Vortex tube agitator	1	Functional
4	Bain marie agitator	2	Functional
5	Precision scale	1	Functional
6	Benchtop centrifuge	1	Functional
7	Micropipettes	10	Functional
8	Heating stirring plate	10	Functional
9	Mercury thermometer, 22c +95/+103°C	10	Functional
10	Single cell quad. malassez	5	Functional
11	Single cell quad. nageotte	5	Functional
12	Single cell quad. thomas	5	Functional
13	Blade storage box	4	Functional
14	Staining box slide holder for 10 slides	2	Functional
15	Spectrophotometer	1	Functional
16	Bacteriological stove	3	Functional
17	Pastor's oven	1	Functional
18	Autoclave	2	Functional
19	Distiller	1	Functional
20	Bain-marie	2	Functional
21	Bunsen burns	20	Functional
21	Microscopes	30	Functional
21	Colony counter	2	Functional

Laboratory title: laboratory 4: Biochimistry and Immunology

N°	Equipement title	Number	Observations
1	Agitator with incubation chamber	4	Functional
2	Vortex tube agitator	1	Functional
3	Bain marie agitator	2	Functional
4	Precision scale	1	Functional
5	Benchtop centrifuge	1	Functional
6	Micropipettes	10	Functional
7	Heating stirring plate	10	Functional
8	Mercury thermometer, 22c +95/+103°C	10	Functional
9	Spectrophotometer	2	Functional
10	Pastor's oven	1	Functional
11	Distiller	1	Functional
12	Bain-marie	2	Functional
13	Stirrer	8	Functional

14	Chemical hood	1	Functional
15	Ventilated benchmark centrifuge	1	Functional
16	Analytical balance	1	Functional
17	Microplate washer	10	Functional
18	Microplate reader	1	Functional
19	Thin layer chromatography system	10	Functional
20	Column liquid chromatography system	5	Functional
21	Electrophoresis system	5	Functional
22	Benchtop conductimeter	1	Functional

Laboratory title: laboratory 5: Molecular Biology

N°	Equipement title	Number	Observations
1	Agitator with incubation chamber	1	Functional
2	Vortex tube agitator	1	Functional
3	Bain marie agitator	2	Functional
4	Precision scale	1	Functional
5	Benchtop centrifuge	1	Functional
6	Micropipettes	20	Functional
7	Heating stirring plate	10	Functional
8	Mercury thermometer, 22c +95/+103°c	10	Functional
9	Spectrophotometer	1	Functional
10	Chemical hood	1	Functional
11	Ventilated benchmark centrifuge	1	Functional
12	Analytical balance	1	Functional
13	Electrophoresis system	3	Functional
14	Oven	2	Functional
15	Autoclave	1	Functional
16	Bunsen burns	8	Functional
17	Mercury controlled thermometer, 0 to +50°c	10	Functional
18	Alcohol bottle thermometer, -25 a -5°c	10	Functional
19	Storage cupboards and appliances	8	Functional
20	Hotplate	2	Functional
21	Cold rooms	2	Functional
22	Thermocycler (PCR)	1	Functional

Laboratory title: laboratory 6: Botanical

N°	Equipement title	Number	Observations
1	Bain marie agitator	1	Functional
2	Balance	1	Functional
3	Heating stirring plate	1	Functional
4	Oven	1	Functional
5	Bunsen burns	8	Functional
6	Binocular microscope	20	Functional
7	Trin eye microscope	1	Functional

Laboratory title: laboratory 7: Zoology

N°	Equipement title	Number	Observations
1	Bain marie agitator	1	Functional
2	Balance	1	Functional
3	Heating stirring plate	1	Functional
4	Oven	1	Functional
5	Trin eye microscope	1	Functional
6	Binocular microscope	20	Functional
7	Binocular magnifiers	10	Functional

B- Internship sites and in-company training:

Training place	Number of students	Training period
Hygiene laboratory	15	15 days
Hospitals	30	15 days
Private veterinarians	15	15 days
Zoological parks	15	15 days
D.S.N.V experimental clinic (planned installation)	15	15 days
Milk collection and processing units	15	15 days
Forestry Department (wildlife)	15	15 days
Municipal and private slaughterhouses	15	15 days
Pet breeding farms	30	15 days
Private medical analysis laboratories	10	07 days
Technical Institute for the Development of Saharan Agronomy	10	15 days

C- Master's support research laboratory(ies):

D- Master's support research project(s):

Title of the research project	Project code	Project start date	Project end date
Biodiversity, conservation and valorization of plants of agronomic and medical interest	F01420140014	2014	2018
Phytochemical study and biological activity of extracts of some medicinal plants in the Biskra region.	F01420140020	2014	2018
Scorpions and Scorpionism	Submitted	2015	-
Projet : E-costBelgium	Submitted	2016	-
DAAD	In preparation for	2016	-

E- Personal work spaces and ICT:

The department is 90% covered by a wifi zone
The university center is connected to optical fiber
2 reading rooms with a WiFi area
2 computer rooms (15 workstations)
Internet room (25 stations).

At the faculty level

Library reading room
Internet room

At the university level

The central library has two large reading rooms with a capacity of 1,200 places for students, two reference rooms which have all the titles which the user can access directly and consult the document before requesting borrowing, a room reading for teachers, a central store and different offices for dragging the book's documentary from the analysis of the demand to the distribution of the document

- Audio videoconferencing center
- Audio-visual Center
- Laboratory: Scanning electron microscope
- Laboratory: X-ray
- Language and communication laboratories (3 rooms of 25 students)

II – Semester organization sheet for lessons

1- Semester 1 :

Teaching unit	VHS	V.H weekly				Coeff	Credits	Evaluation mode	
	15 sem	C	TD	TP	Pers.W			Continu	Exam
Fundamental Teaching Units (UF)	202.5	6	3	4.5	247.5	9	18		
Fundamental Teaching Units (UEF11)									
Matter UEF111: General Parasitology (part I)	45	1.5	-	1.5	55	2	4	40%	60%
Matter UEF112: Parasitic Zootaxis	67.5	1.5	1.5	1.5	82.5	3	6	40%	60%
Fundamental Teaching Units (UEF21)									
Matter UEF211 : Pharmacology	45	1.5	-	1.5	55	2	4	40%	60%
Matter UEF212 : Toxicology	45	1.5	1.5	-	55	2	4	40%	60%
Teaching Unit Methodology (UEM11)	105	3	0	4	120	5	9		
Matter UEM111 : Tools and Methodology of Molecular Biology	67.5	1.5	-	3	75	3	6	40%	60%
Matter UEM112 : Diagnostic Methods in Parasitology	37.5	1.5	-	1	45	2	3	40%	60%
Discovery Teaching Unit (UED11)	45	1.5	0	1.5	5	2	2		
Matter UED111 : Methodology in Animal Experimentation	45	1.5	-	1.5	5	2	2	40%	60%
Transversal Teaching Unit (UET11)	22.5	1.5	0	0	2.5	1	1		
Matter UET111 : Communication	22.5	1.5	-	-	2.5	1	1	-	100%
Total Semester 1	375	12	3	10	375	17	30		

- Face-to-face teaching: theoretical: 225 hours
- Face-to-face teaching: practical work: 150 hours
- Non-face-to-face teaching: personal work: 375 hours

2- Semester 2 :

Teaching unit	VHS	V.H weekly				Coeff	Credits	Evaluation mode	
	15 sem	C	TD	TP	Pers.w			Continu	Exam
Fundamental Teaching Units (UF)	202.5	6	3	4.5	247.5	9	18		
Fundamental Teaching Units (UEF12)									
Matter UEF121: Bacterial Zoonoses	45	1.5	-	1.5	55	2	4	40%	60%
Matter UEF122: General Parasitology (partie II)	67.5	1.5	1.5	1.5	82.5	3	6	40%	60%
Fundamental Teaching Units (UEF22)									
Matter UEF221 : Viral and Mycotic Zoonoses	45	1.5	-	1.5	55	2	4	40%	60%
Matter UEF222 : Parasite Interactions and Transmission Cycles	45	1.5	1.5	-	55	2	4	40%	60%
Teaching Unit Methodology (UEM12)	105	3	0	4	120	5	9		
Matter UEM 121: Parasite Sampling Techniques	67.5	1.5	-	3	75	3	6	40%	60%
Matter UEM 122: Biostatistics	37.5	1.5	-	1	45	2	3	40%	60%
Discovery Teaching Unit (UED12)	45	1.5	0	1.5	5	2	2		
Matter UED121 : Entomology Applied to Zoonotic Agents	45	1.5	-	1.5	5	2	2	40%	60%
Transversal Teaching Unit (UET12)	22.5	1.5	0	0	2.5	1	1		
Matter UET121: Legislation	22.5	1.5	-	-	2.5	1	1	-	100%
Total Semester 1	375	12	3	10	375	17	30		

- Face-to-face teaching: theoretical: 225 hours
- Face-to-face teaching: practical work: 150 hours
- Non-face-to-face teaching: personal work: 375 hours

3- Semester 3 :

Teaching unit	VHS	V.H weekly				Coeff	Credits	Evaluation mode	
	15 sem	C	TD	TP	Pers.w			Continu	Exam
Fundamental Teaching Units (UF)	202.5	6	3	4.5	247.5	9	18		
Fundamental Teaching Units (UEF13)									
Matter UEF131: Prophylaxis and Control of Parasitoses	45	1.5	-	1.5	55	2	4	40%	60%
Matter UEF132: Parasitic Immunology and vaccinology	67.5	1.5	1.5	1.5	82.5	3	6	40%	60%
Fundamental Teaching Units (UEF23)									
Matter UEF231 : Applied and Molecular Epidemiology	45	1.5	-	1.5	55	2	4	40%	60%
Matter UEF232 : Parasites of Bees and Fish	45	1.5	1.5	-	55	2	4	40%	60%
Teaching Unit Methodology (UEM13)	105	3	0	4	120	5	9		
Matter UEM131: Scientific Research Methodology	67.5	1.5	-	3	75	3	6	40%	60%
Matter UEM132: Hematology	37.5	1.5	-	1	45	2	3	40%	60%
Discovery Teaching Unit (UED13)	45	1.5	0	1.5	5	2	2		
Matter UED131 : Scientific English II	45	1.5	-	1.5	5	2	2	40%	60%
Transversal Teaching Unit (UET13)	22.5	1.5	0	0	2.5	1	1		
Matter UET131: Entrepreneuriat	22.5	1.5	-	-	2.5	1	1	-	100%
Total Semester 1	375	12	3	10	375	17	30		

- Face-to-face teaching: theoretical: 225 hours
- Face-to-face teaching: practical work: 150 hours
- Non-face-to-face teaching: personal work: 375 hours

4- Semester 4:

Domain: Natural and Life Sciences

Field: Biological sciences

Specialty: Parasitology

Internship in a laboratory, an experimental station or company culminated by a dissertation and a defense.

			VHS	Coeff	Credits
Fundamental Teaching Unit (UEF14)	Travail Personnel	Memory (manuscript)	400	6	12
		Memory (defence)	50	3	6
Methodological Teaching Unit (UEM14)	Stage en laboratoire, entreprise ...etc.	Presentation of an internship report (written)	225	4	9
Discovery Teaching Unit (UED14)	Séminaires et/ou jours master		50	2	2
Transverse Teaching Unit (UET14)	Teamwork in the SNV department of Biskra	- scientific event - scientific magazine - scientific presentation	25	1	1
Total Semester 4			745	16	30

5- Overall training summary :

VH \ UE	UEF	UEM	UED	UET	Total
Course	270	135	67.5	67.5	540
DW	135	0	0	0	135
PW	202.5	180	67.5	0	450
Personal work	742.5	360	15	7.5	1125
Semester 4	450	225	50	25	750
Total	1800	900	200	100	3000
Credits	72	36	8	4	120
% in credits for each UE	60	30	6.7	3.3	100

III - Detailed program by subject

(1 detailed sheet per subject)

Master title: Parasitology

Semester : S1

EU Title : UEF11: Fundamental (Obligatory)

SubjectTitle : UEF111 : General Parasitology (part I) PAG1-MP11

Credits : 4

Coefficients : 2

Teaching objectives

The aim of this course is to teach students the basics of parasitology in natural populations. Deepen students' knowledge of infectious zoonoses caused by bacteria and viruses, with the study of their epidemiology, pathophysiology and immune responses during their interactions with the host. In this way, students will gain a good understanding of the routes by which contamination of humans, the seriousness of the after-effects caused by each infectious agent and thus deduce the means of prophylaxis and control.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology.

Course Content

In-person:

Introduction: Definitions and basic concepts.

Chapter I: Protozooses

- **Protists:** 1- Amoebiasis; 2-Giardiasis; 3- Leishmaniasis; 4-Sleeping sickness; 5-Chagas disease; 6-Toxoplasmosis; 7-Malaria; 8-Pneumocystis.
- Systematic presentation of animal parasitoses.
- Definition: Definition of animal parasitoses.
- Historical background.
- Location of parasites
- Evolutionary cycle
- Epidemiology
- Parasitic disease
- Biological diagnosis of a parasitosis

Chapter II: Helminthiases

- **Cestodoses:** 1- Teniasis (*T. saginata*); 2- Teniasis (*T. solium*); 3- Hydatidosis; 4- Echinococcosis alveolaris; 5- Dipylidiosis
- Systematic presentation of animal parasitoses.
- Definition: Definition of animal parasitoses.
- Historical background.
- Location of parasites
- Evolutionary cycle
- Epidemiology
- Parasitic disease
- Biological diagnosis of a parasitosis

Practical work :

On the various parasites

- protists
- Helminthiasis
- Cestodosis
- Trematodosis

Personal work:

Each student must carry out a bibliographical study on a parasite species (anatomy, life cycle). This work must be presented during the practical course. A second part of this work will be required in the parasitic zootaxi subject.

Evaluation method :

60% final exam,

40% continuous (20% in the form of tests or practical examinations, practical reports, etc.) + 20% on personal work (bibliographical research and presentation).

References

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- Villeneuve A., (2003). Les zoonoses parasitaires. Ed. presse de l'université de Montréal, Montréal, 499p.

Master title: Parasitology**Semester : S1****EU Title : UEF11: Fundamental (Obligatory)****Subject Title : UEF112 : Parasitic Zootaxis ZOPA-MP12****Credits : 6****Coefficients : 3****Teaching objectives**

The aim of this course is to teach students the basics of the systematics of the main animal parasites (protozoa, helminths, arthropods).

Recommended prior knowledge : Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Parasitology, mycology, algology.

Course Content**In-person:****Chapter 1 : Protozoa****1. Sarcostigophores****1.1. Flagellates**

Trypanosoma ; Leishmania

1.2. Rhizopoda

Entamoeba ; Diatomoeba ; Actinopoda

2. Apicomplexes

Plasmodium; Toxoplasma

3. Ciliates

Balantidium coli

Chapter 2 : Helminths**2.1. Plathelminthes****2.1.1. Trematodes****2.1.1.1. Distomes**

Dicrocoeliidae ; Brachylaemidae ; Heterophyidae ; Opisthorchiidae ; Echinostomatidae ; Fasciolidae

2.1.1.2. Amphistomes

Paramphistomidae ; Gastrothylacidae ; Gastrodicidae

2.1.1.3. Schistosomes

Shistomatidae

2.1.2. Cestoda

Cyclophyllidae; Pseudophyllidae

2.2. Nematelminthes

Trichostrongylidae

Strongylidae

Metastrongylidae

Rhabditidae; Ascaridae; Oxyuridae; Filaridae; Spiruridae; Trichuridae; Dictyophymatidae

Chapter 3 Arthropods

3.1. Insects

Mallophaga; Anoplura; Siphonaptera; Dermoptera; Hemiptera; Coleoptera; Lepidoptera; Diptera

3.2. Arachnids

Parasitiformes (Anactinotrichida)

Metastigmata (Ixodida)

Argasidae ; Ixodidae ; Amblyommidae.

Mesostigmata ; *Dermanyssidae*

Prostigmata : *Macronyssidae ; Varroidae ;*

Actinotrichida ; *Trombiculidae ; Tarsonemidae*

Acaridae (Astigmata)

Sarcoptidae ; Cnemidocoptidae ; Psoroptidae.

Directed work: if necessary, the tutorialscanbetransformedinto short practicalwork to observe theprepared slides of a few parasite samples.

Practical work

In the form of field trips to nearby areas for the observation of a fewspecies

Personal work :

This is a continuation of the personalwork in the generalparasitologysubject.

Eachstudent must carry out a bibliographicalstudy on the systematics, distribution and diseases of a species of parasite.

Evaluation method :

60% final exam,

40% continuous (20% in the form of TD questions + reports on short practicalwork (...etc) + 20% on personalwork (bibliographicalresearch and presentation))

References

- Grassé P., (1961). *Traité de zoologie ; anatomie, systématique, biologie, tome IV, Plathelminthes, Mésozoaires, Acanthocéphales, Némertien.* Ed. Masson et Cie, Paris, 944p.
- Grassé P., (1984). *Traité de zoologie ; anatomie, systématique, biologie, tome II, Ciliés.* Ed. Masson et Cie, Paris, 821p.
- Grassé P., Poisson., R. A., Tuzet O., (1970). *Zoologie I Invertébrés.* Ed. Masson et Cie, Paris, 935p.
- Joyeux C. H. et Baer J. G., (1936). *Cestodes, faune de France.* Ed. Paul Lechevalier, Paris, 613p.
- Séguy E., (1944). *Insectes ectoparasites, faune de France.* Ed. Paul Lechevalier, Paris, 684p.

- Alain Villeneuve. 2003. Les zoonoses parasitaires: L'infection chez les animaux et chez l'homme. PUM, 499 pages.
- Pedro N. Acha, Boris Szyfres. 2005. Zoonoses et maladies transmissibles communes à l'homme et aux animaux: Bactérioses et mycoses. Vol. 1. OIE Office International des Epizooties, 382 pages

Master title: Parasitology

Semester : S1

EU Title : UEF21: Fundamental (Obligatory)

SubjectTitle : UEF211 : Pharmacology PHAR-MB13

Credits : 4

Coefficients : 2

Teaching objectives

In pharmacology,

Understand the organization of the pharmaceutical industry and the drug market,

- the physical and chemical characteristics which lead to their different properties, whether with regard to the formulation of drugs or their fate in animals and in the environment, their toxicity and/or pharmacological activity,
- the principles of determining dosage regimens, their adjustments as well as interspecific extrapolation,
- the legal framework allowing them to hold, prescribe, deliver veterinary medicinal products and report adverse effects,

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology.

Course Content

Comprendre les modes d'entrée et mécanismes d'action des substances pharmacologiques. Identifier les groupes de médicaments et leurs propriétés pharmacodynamiques. Neuropharmacologie périphérique et centrale. Pharmacologie humorale. Mécanismes d'action des médicaments. Chimiothérapie.

In-person:

Part 1 : Pharmacology

Chapter I : General information about medication

Chapter II : Origin and nature of medicines

Chapter III : Main groups of active substances

Chapter IV : Pharmacokinetics of medicinal products

Chapter V : Pharmacodynamics of drug substances

Practical work :

On the following different techniques (of your choice), the teacher responsible can suggest other feasible protocols.

- Determination of nitrites using Zambelli reagent method, dosage of sulfate ions, dosage of nitrate ions
- Determination of cholinesterase activity
- measurement of drug concentrations and therapeutic monitoring
- Determination of the pharmacokinetic parameters of Phenol Sulfonephthalein (PSP)
- Determination of the LD50
- Influence of pH on the absorption rate
- Anticoagulant effect of drugs in vitro
- Effects of drugs on arterial blood pressure of rabbit anesthesia

Personal work:

Each student must carry out a bibliographic study on the drugs used for the treatment of parasitoses (their modes of action, effectiveness, novelty, etc.), the presentation is done during the tutorials.

Evaluation method:

60% final exam,

40% continuous (20% in the form of questions or practical examination, practical practical reports...etc. + 20% on personal work (bibliographic research))

References

- Isabelle Claverie-Morin, Isabelle Claverie, H el ene Hedde. 2008. Pharmacologie g en erale, toxicologie: m ecanismes fondamentaux. Wolters Kluwer France, 100 pages.
- Pascal Kintz. 1998. Toxicologie et pharmacologie m edicol egales. Elsevier Masson, 719 pages
- Turner, R. A. (2013). *Screening methods in pharmacology*. Elsevier.
- Pour les TP : un document est disponible au niveau du d epartement

Master title: Parasitology

Semester : S1

EU Title : UEF21: Fundamental (Obligatory)

SubjectTitle : UEF212 : Toxicology TOXI-MB14

Credits : 4

Coefficients : 2

Teaching objectives

In toxicology, students will be able to explain:

- the main mechanisms of action of toxicants,
- the principles and objectives of experimental toxicity study methods,
- the assessment of the chemical safety of foods using the example of veterinary drug residues.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology.

Course Content

Understanding the modes of entry and mechanisms of action of toxic substances Principles of toxicology and applications to the field of medicines. Nature and extent of toxicology. Toxicokinetics: absorption, metabolism and elimination. Modulation of toxicity. Classes of toxic substances.

In-person:

Part 2 : Toxicology

Chapter I : General Toxicology Data

Chapter II : Nature of the different toxic groups

Chapter III : Mechanisms of action of toxicants

Chapter IV : Toxicological study

Chapter V : Typical principles of poisoning

Chapter VI : Mutagenesis, carcinogenesis and teratogenesis

Directed work :

Series of exercises, diagrams, methods explaining parts of the course

Presentation of personal work

Personal work:

Each student must carry out a bibliographic study on the toxins produced during parasitoses (their modes of action, physiology, etc.), the presentation is made during the tutorials.

Evaluation method:

60% final exam,

40% continuous (20% in the form of questions or practical examination, practical practical reports...etc. + 20% on personal work (bibliographic research))

References

- Isabelle Claverie-Morin, Isabelle Claverie, Hélène Hedde. 2008. Pharmacologie générale, toxicologie: mécanismes fondamentaux. Wolters Kluwer France, 100 pages.
- Pascal Kintz. 1998. Toxicologie et pharmacologie médico-légales. Elsevier Masson, 719 pages
- Turner, R. A. (2013). *Screening methods in pharmacology*. Elsevier.
- Pour les TP : un document est disponible au niveau du département

Master title: Parasitology

Semester : S1

EU Title : UEM11: Methodological (Obligatory)

SubjectTitle : UEM111 : Tools and Methodology of Molecular Biology OMBM-MB15

Credits : 6

Coefficients : 3

Teaching objectives

This subject aims to provide students with practical training in fundamental Molecular Biology techniques used in the purification of nucleic acids. A large place is given to molecular biology tools as well as genetic engineering techniques.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Genetics, Molecular biology

Course Content

In-person:

Chapter I : Tools of molecular biology

1. Enzymes: restriction enzymes: origin, nomenclature and methods of restriction
2. Cloning vectors
3. DNA banks (DNAc preparation, genomics)

Chapter II: Methods of molecular biology

1. Extraction and purification of nucleic acids
2. PCR strategy
3. Sequencing
4. Cloning
5. Molecular hybridization
6. Nucleic acid electrophoresis
7. South and North Blot
8. Western blotting for proteins
9. ELISA

Practical work:

- PCR
- Electrophoresis of nucleic acids
- and we must propose other techniques that can be implemented in the department's laboratories.

Personal work:

Each student must carry out a bibliographic study on a recent technique in molecular biology, and propose an experimental protocol using this technique in the field of parasitology. This work must be presented in a short presentation (10 minutes in class or during practical work).

Evaluation method:

60% final exam,

40% continuous (20% in the form of practical exam, practical work reports, etc.) + 20% on personal work (presentation only)

References

- Denis Tagu, Christian Moussard. 2003. Principes des techniques de biologie moléculaire. Editions Quae, 176 pages
- Gérard Coutouly, Emile Klein, Eric Barbieri, MostafaKriat. 2006. Travaux dirigés de biochimie, biologie moléculaire et bioinformatique. Wolters Kluwer France. 346 pages
- Émile Biémont.2008. Spectroscopie moléculaire: Structures moléculaires et analyse spectrale De Boeck Supérieur 428 pages

Master title: Parasitology

Semester : S1

EU Title : UEM11: Methodological (Obligatory)

SubjectTitle : UEM112 : Diagnostic Methods in Parasitology MEDP-MP16 Credits : 3

Coefficients : 2

Teaching objectives

This subject aims to provide students with practical training in fundamental and recent techniques for the diagnosis of parasitoses.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Genetics, Molecular biology

Course Content

In-person:

Direct techniques

I. Parasitological examination of stools:

A- Direct microscopic examination in the fresh state.

B- Examination after coloring:

1. Staining with methionate formalin (MIF)

2. Lugol staining

C - Concentration methods:

-Flotation method (Willis, Janeckso-Urbanyl),

-Diphasic method (Ritchie, Bailanger),

-Kato lightening method,

-Junod's combined method.

- Egg count for the assessment of parasite load (Kato, Stoll): eggs of hookworms, schistosomes, whipworms, roundworms, *Hymenolepis nana*.

- Baermann extraction method for searching for eel larvae.

-Graham adhesive cellophane technique (scotch test) for highlighting pinworm and *Taenia saginata* eggs on the margin of the anus.

- Biopsy of rectal mucosa (BMR) for examination in the fresh state between slide and coverslip in the search for schistosome eggs.

II.Parasitological examination of urine

III.Parasitological examination of blood

IV.Parasitological examination of the skin

V. Parasitological examination of expectoration (sputum)

VI.Parasitological examination of duodenal fluid

VII.Parasitological examination of lymph node juice

VIII.Parasitological examination of cerebrospinal fluid

IX. Parasitological examination of a bone marrow smear

X. Parasitological examination of genital secretions

Indirect techniques

HAI, ELISA, IFI, Western Blot, PCR

Practical work

- the main techniques must be the subject of an experimental protocol and carried out in the laboratory, the choice of techniques will be based on feasibility and the available equipment. The practical work will be carried out on the basis of the (following) personal work of the students:

Personal work :

Each student must visit a parasitology laboratory or an animal breeding site or fish breeding site or other (it is preferable to differentiate the sites) and take a sample. The samples will be transferred to the laboratory level to carry out practical work. At least 3 students in each group must be responsible for each sample to ensure the availability of biological material. Each sample must be accompanied by a descriptive sheet (prepared by the student) which carries all the detailed information.

Evaluation method:

60% final exam,

40% continuous (20% in the form of practical work examination, practical work reports, etc.) + 20% on personal work (taking the sample and the descriptive sheet of the sample)

References

- Rousset, J. J. (1993). Copro-parasitologie pratique: Intérêt et méthodologie, notions sur les parasites du tube digestif. De Boeck Secundair.
- Golvan, Y. J., & Ambroise-Thomas, P. (1984). New techniques in parasitology and immunoparasitology. Flammarion médecine-sciences.
- Lévy-Lambert, E. (1982). Manuel des techniques de base pour le laboratoire médical.

Master title: Parasitology

Semester : S1

EU Title : UED11: Discovery (Obligatory)

SubjectTitle : UED111 : Methodology in Animal Experimentation MEXAP-MP17

Credits : 2

Coefficients : 2

Teaching objectives

This subject will allow students to learn the principles of experimentation on laboratory animals. Indeed, despite the constant development of "alternative methods", the use of animals remains essential in the scientific field. It is even a regulatory requirement for the establishment of Marketing Authorization (AMM) files for pharmaceutical products or even for the release marketed products, also these animals are used to isolate and identify certain pathogenic germs and ensure their cytopathic effects.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Genetics, Molecular biology.

Course Content

In-person:

I. Laboratory animals

1. Zoological classification of laboratory animals
2. General Biological Characteristics of laboratory animals
3. Ethology of laboratory animals
 - a - The mice
 - b - The rat
 - c - The guinea pig
 - d - The rabbit
 - e - The Nonhuman primates
 - f- The hen

II. Basic Experimental Techniques of laboratory animals

1. Handling and Restraining of Animals
2. Administration to Animals
3. Animal Blood Collection

III. Anesthesia and analgesia of laboratory animals

IV. Methods of euthanasia in laboratory animals

1. Advantages and disadvantages of physical methods
2. Advantages and disadvantages of chemical methods

V. Techniques for harvesting tissues and organs

VI. Application of Analytical Techniques in the medical laboratory relating to histology

- Use the hood to use the reagents used for coloring and the solvents used to treat and color fabrics.
- Demonstrate understanding of the risks associated with the use of the microtome.
- Use the microtome to safely produce tissue sections.
- Perform H&E staining on tissue sections produced in the laboratory.
- Perform special staining on various tissue preparations.
- Adjust the microscope according to Köhler illumination.
- Evaluate the staining of tissue slides using the microscope.

Practical work:

- Administration and organization of an animal store including hygiene and health control
- Intervention on animals; administration of substances, sampling technique and temperature taking.
- Anesthesia, Euthanasia, Autopsy.
- Anatomy by systems and topographic anatomy of rabbit or rat

Personal work:

Each student must prepare a short presentation on the anatomy of a laboratory animal

Evaluation method:

60% final exam,

40% continuous (20% in the form of practical examination, practical work reports, etc.) + 20% on personal work (presentation + manuscript)

References

- Julien Dumas 1953. Les animaux de laboratoire: anatomie, particularités physiologiques, hématologie, maladies naturelles, expérimentation. Flammarion
- M. J. Laroche, François Rousselet. 1990. Les animaux de laboratoire: éthique et bonnes pratiques. Masson.
- Kohn, D. F., Wixson, S. K., White, W. J., & Benson, G. J. (Eds.). (1997). *Anesthesia and analgesia in laboratory animals*. Academic Press.
- Institute of Laboratory Animal Resources (US). Committee on Care, Use of Laboratory Animals, & National Institutes of Health (US). Division of Research Resources. (1985). *Guide for the care and use of laboratory animals*. National Academies.

Master title: Parasitology

Semester : S1

EU Title : UET11: Transversal (Obligatory)

Subject Title : UET111 : Communication COMM-MB18

Credits : 1

Coefficients : 1

Teaching objectives

Analyze the objectives of internal and external communication and present the methodologies necessary to carry out the main communication actions

Give confidence to approach written scientific English, in its various forms and genres. Give confidence to express yourself orally in English, particularly in the specialty of the chosen field.

Awareness of certain linguistic and phonological aspects of scientific English. Present the basic tools of scientific communication in English.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Genetics, Molecular biology. Language and Linguistic Basics

Course Content

In-person:

Chapter I : Strengthening language skills

Chapter II : Communication methods

Chapter III : Internal and external communication

Chapter IV : Meeting techniques

Chapter V : Oral and written communication

Personal work:

For this subject and given the significant loads on the student, it is recommended to leave the decision during the first meeting of the educational committee and discuss whether it is necessary to request and evaluate personal work from the student?

Evaluation method:

100% final exam

References

- Martin, B., et Tony, D. E., 1983, Nucleus English for science and technology (General Science part II). Longman.
- Thomson, A. J., et Martinet, A.V., 1993, A practical English Grammar. Low Priced edition.
- Michael, S., 1984, Practical English Usage. Oxford University Press.
- Kristine, B., et Susan, H., 2003, Writing matters. Cambridge.
- <http://www.dictionary.com/>
- www.bbclearningenglish.com

Master title: Parasitology

Semester : S2

EU Title : UEF12: Fundamental (Obligatory)

Subject Title : UEF121 : Bacterial Zoonoses ZBAC-MP21

Credits : 4

Coefficients : 2

Teaching Objectives:

Deepen students' knowledge of infectious zoonoses caused by bacteria, including the study of their epidemiologies, pathophysiology, and immune reactions during their interactions with the host. This aims to enable students to understand the ways of human contamination, the severity of sequelae caused by each infectious agent, and to deduce specific prophylactic and control measures for each studied zoonotic agent. Additionally, students should be able to differentiate between zoonoses caused by domestic animals and those often attributed to exotic animals.

Recommended Prerequisite Knowledge:

Biochemistry, biophysics, microbiology, immunology, organic and mineral chemistry, cell biology, animal biology, and plant biology.

Course Content

In-person:

I – Bacterial Zoonoses from Domestic or Wild Animals:

Brucellosis

Tuberculosis

Salmonellosis
Listeriosis
Campylobacteriosis (Vibriosis)
Chlamydiosis
Escherichia coli (O157: H7)
Anthrax
Q Fever
Leptospirosis
Lyme Disease
Cat Scratch Fever
Ornithosis-Psittacosis
Pasteurellosis
Pseudotuberculosis
Rickettsiosis
Erysipelas
Shigellosis
Staphylococcal Infections
Streptobacillosis
Streptococcal Infections
Tetanus
Tularemia
Yersiniosis
Borreliosis
Meliodosis
Glanders
Plague

Practical Work:

Salmonellosis: symptoms, sampling, bacterial culture, isolation, and identification

Streptobacillosis: symptoms, sampling, bacterial culture, isolation, and identification of Streptobacillosis

Field Trip: Visit to a breeding site and observation of symptoms in animals

Personal Work:

Each student must conduct a bibliographic study on a type of zoonosis, and this work must be presented in tutorials.

Evaluation Method:

60% final exam

40% continuous assessment (20% in the form of quizzes in tutorials + practical exam, TP reports, etc.) + 20% on personal work (bibliographic research and presentation)

References:

- Bourée P., (1983). Aide mémoire de parasitologie. Ed. Flammarion, Paris, 289p.
- Bourée P., (1989). Dictionnaire de parasitologie. Ed. Ellipses, France, 126p.
- Cassier P., Brugerolle G., Combes C., Grain J. et Raibaut A., (1998). Le parasitisme un équilibre dynamique. Ed. Masson, Paris, 366p.
- Combes C., (1995). Interaction durable : écologie et évolution du parasitisme. Ed. MASSON. Paris
- Despomier ,Gwads, Hotez, Knirsch, (2006). Parasitic disease. Ed Apple Trees Productions, www.Parasitic disease.org
- Leventhal R., Cheadle R. F., (2002). Medical parasitology. Ed. DVIS COMPANY, Philadelphia,
- Thomas F., Renaud F., et Guegan G-F., (2005). Parasitism and ecosystems. Ed. Oxford university press, 221p.

- Villeneuve A., (2003). Les zoonoses parasitaires. Ed. presse de l'université de Montréal, Montréal, 499p.

Master title: Parasitology

Semester : S2

EU Title : UEF12: Fundamental (Obligatory)

SubjectTitle : UEF122 : General Parasitology (part II) PAG2-MP22

Credits : 6

Coefficients : 3

Teaching objectives

This course aims to teach students the basics of fundamental parasitology in natural populations. Deepen students' knowledge of infectious zoonoses caused by bacteria and viruses, with the study of their epidemiology, pathophysiology and immune reactions emanating during their interactions with the host. Thus, students could fully understand the routes of human contamination, the seriousness of the after-effects caused by each infectious agent and thus deduce the means of prophylaxis and control.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology.

Course Content

In-person:

Trematodoses: 1- Fascioliasis; 2- Clonorchiasis; 3- Opisthorchiasis; 4-Rectal schistosomiasis; 5- Urinary bilharzia

- Systematic presentation of animal parasitoses.
- Definition: Definition of animal parasitoses.
- History.

- Location of parasites

- Evolutionary cycle

- Epidemiology

- Parasitic Disease

- Biological diagnosis of parasitosis

• Nematodoses: 1- Ascariasis; 2- Trichocephalosis; 3- Oxyurosis; 4-Anguillulosis; 5- Creeping dermatitis; 6-Dracunculiasis; 7- Toxocariasis

- Systematic presentation of animal parasitoses.

- Definition: Definition of animal parasitoses.

- History.

- Location of parasites

- Evolutionary cycle

- Epidemiology

- Parasitic Disease

- Biological diagnosis of parasitosis

Chapter III: Pathologies due to Arthropods: 1- Sarcoptic mange; 2- Pediculosis of the head; 3- Pediculosis of the body; 4-Phthiriasis; 5- Myiasis

Practical work :

On the different parasites

- Trematodoses

- Nematodoses

- Arthropods

Personal work :

Each student must carry out a bibliographic study on a species of parasite (their biological cycle, distribution, disease, etc.). this work must be presented in TD.

Evaluation method:

60% final exam,

40% continuous (20% in the form of TD questions + TP exam, TP reports, etc.) + 20% on personal work (bibliographic research and presentation))

References

- Bourée P., (1983). Aide mémoire de parasitologie. Ed. Flammarion, Paris, 289p.
- Bourée P., (1989). Dictionnaire de parasitologie. Ed. Ellipses, France, 126p.
- Cassier P., Brugerolle G., Combes C., Grain J. et Raibaut A., (1998). Le parasitisme un équilibre dynamique. Ed. Masson, Paris, 366p.
- Combs C., (1995). Interaction durable : écologie et évolution du parasitisme. Ed. MASSON. Paris
- Despomier ,Gwads, Hotez, Knirsch, (2006). Parasitic disease. Ed Apple Trees Productions, www.Parasitic disease.org
- Leventhal R., Cheadle R. F., (2002). Medical parasitology. Ed. DAVIS COMPANY, Philadelphia,
- Thomas F., Renaud F., et Guegan G-F., (2005). Parasitism and ecosystems. Ed. Oxford university press, 221p.
- Villeneuve A., (2003). Les zoonoses parasitaires. Ed. presse de l'université de Montréal, Montréal, 499p.

Master title: Parasitology**Semester : S2****EU Title : UEF22: Fundamental (Obligatory)****SubjectTitle : UEF221 : Viral and Mycotic Zoonoses ZVMY-MP23****Credits : 4****Coefficients : 2****Teaching objectives**

To deepen students' knowledge of infectious zoonoses caused by bacteria, fungi and viruses, with the study of their epidemiology, pathophysiology and the immune reactions emanating from their interactions with the host. In this way, students will gain a good understanding of the ways in which humans are contaminated and the seriousness of the after-effects caused by each infectious agent, and will be able to deduce specific prophylactic and control measures for each zoonotic agent studied. They will also be able to differentiate between zoonoses caused by domestic animals and those often attributed to exotic animals.

Connaissances préalables recommandées

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology.

Course Content**In-person:**

I - Viral zoonoses caused by domestic or wild animals

- Rabies
- Arboviroses (Arbovirus)
- Lymphocytic choriomeningitis (Arenavirus)
- Cow-pox, vaccinia and related infections (Poxvirus)
- Ecthyma (Poxvirus)
- Tick-borne encephalitis (Flavivirus)
- Encephalomyocarditis (Cardiovirus)
- Haemorrhagic fever with renal syndrome (HHSR) (Hantavirus)
- Influenza (Orthomyxovirus)
- Viral hepatitis A (Hepatovirus)
- Aujeszky's disease (Herpesvirus)

- Creutzfeldt-Jacob disease (ESST) (Prions)
- Tahyna (Bunyavirus)
- West Nile (Flavivirus)
- Ebola (Filoviridae)
- Foot-and-mouth disease (Aphtovirus)
- Lassa fever (Arenavirus)
- Rift Valley fever (Phlebovirus)
- Yellow fever (Flavivirus)
- Herpesvirus B infection
- Marburg disease (Filoviridae)
- American viral meningoencephalomyelitis (M.E.M) (Alphavirus)
- Nipah disease
- Contagious vesicular stomatitis (Vesiculovirus)
- Monkey-pox (Poxvirus)

II - Mycoticzoonoses

- Aspergillosis
- Candidiasis
- Cryptococcosis
- Histoplasmosis
- Mycetoma
- Zygomycosis
- Blastomycosis

Practical work :

- Aspergillosis
- Candidiasis
- Aspergillosis
- Candidiasis
- Cryptococcosis
- Histoplasmosis
- Mycetoma
- Zygomycosis
- Blastomycosis

Or field trips.

Personal work :

Each student must carry out a bibliographical study on a type of zoonosis. This work must be presented during the practical course.

Evaluation method :

60% final exam,

40% continuous (20% in the form of TD exams + TP exams, TP reports, etc.) + 20% on personalwork (bibliographicalresearch and presentation).

References

- Bourée P., (1983). Aide mémoire de parasitologie. Ed. Flammarion, Paris, 289p.
- Bourée P., (1989). Dictionnaire de parasitologie. Ed. Ellipses, France, 126p.
- Cassier P., Brugerolle G., Combes C., Grain J. et Raibaut A., (1998). Le parasitisme un équilibre dynamique. Ed. Masson, Paris, 366p.
- Combs C., (1995). Interaction durable : écologie et évolution du parasitisme. Ed. MASSON. Paris
- Despomier ,Gwads, Hotez, Knirsch, (2006). Parasitic disease. Ed Apple Trees Productions, www.Parasitic disease.org
- Leventhal R., Cheadle R. F., (2002). Medical parasitology. Ed. DAVIS COMPANY, Philadelphia,

- Thomas F., Renaud F., et Guegan G-F., (2005). Parasitism and ecosystems. Ed. Oxford university press, 221p.
- Villeneuve A., (2003). Les zoonoses parasitaires. Ed. presse de l'université de Montréal, Montréal, 499p.

Master title: Parasitology

Semester : S2

EU Title : UEF22: Fundamental (Obligatory)

SubjectTitle : UEF222: Parasite Interactions and Transmission Cycles ICTP-MP24

Credits : 4

Coefficients : 2

Teaching objectives

This teaching allows students to deepen their knowledge of host-parasite interactions, modes of transmission and the dynamics of parasitoses.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology.

Basic notions already acquired in general parasitology (S1) and in parallel with specialized subjects (epidemiology and distribution of parasites).

Course Content

In-person:

General:

Ecology of Interactions

1: Predation

- Predation strategy
- Effect of predators on prey dynamics

2: Competition

- Intraspecific
- Interspecific

3: Commensalism

- Principle of association
- Mutual tolerance

4: Amensalism

- Principle of action
- Mutual tolerance

6: Impacts of parasites

- On age at maturity
- On fertility
- On longevity

7: From parasitism to mutualism

- Coevolution of host-parasite interactions
- Regulation of virulence and mutual longevity

I. Evolutionary cycle

- Direct cycle (monoxene parasite)

A single host (species or group of animal species) + external environment

- Indirect cycle (heteroxene parasite)

2 or more than 2 hosts (of different species) which necessarily follow one another

- Definitive host (hosts the sexual form of the parasite)
- Intermediate host (asexual form of the parasite)
- Paratenic host = waiting = not obligatory

Directed work:

- Direct cycle (monoxene parasite)
- Indirect cycle (heteroxene parasite)
- field trip

Personal work:

Each student must give a presentation on a subject related to the course content. If a field trip is carried out, an exit report must be prepared.

This work must be presented in TD.

Evaluation method:

60% final exam,

40% continuous (20% in the form of TD questions + practical exam, practical practical reports, etc.)
+ 20% on personal work (presentation or exit report))

References

- Combs C., (1995). Interaction durable : écologie et évolution du parasitisme. Ed. MASSON. Paris
- Bourée P., (1983). Aide mémoire de parasitologie. Ed. Flammarion, Paris, 289p.
- Bourée P., (1989). Dictionnaire de parasitologie. Ed. Ellipses, France, 126p.
- Cassier P., Brugerolle G., Combes C., Grain J. et Raibaut A., (1998). Le parasitisme un équilibre dynamique. Ed. Masson, Paris, 366p.
- Leventhal R., Cheadle R. F., (2002). Medical parasitology. Ed. DVIS COMPANY, Philadelphia,
- Despomier, Gwads, Hotez, Knirsch, (2006). Parasitic disease. Ed apple trees productions www.Parasitic disease.org
- Thomas F., Renaud F., et Guegan G-F., (2005). Parasitism and ecosystems. Ed. Oxford university press, 221p.
- Villeneuve A., (2003). Les zoonoses parasitaires. Ed. presse de l'université de Montréal, Montréal, 499p.
- Barbault R., (1981). Ecologie des populations et de peuplement. Ed. Masson, Paris
- Blondel J., (1995). Biogéographie approche écologique et évolutive. Ed. Masson. Ed. Masson, 297p.
- Dajoz R., (2000). Précis d'écologie. Ed. Dunod, Paris, 615 p.
- Henry C., (2001). Biologie des Population Animales et Végétales, Ed. Dunod, Paris, 709p.
- Ramade F., (2003). Eléments d'écologie fondamentale. Ed. Dunod, 690p.

Master title: Parasitology

Semester : S2

EU Title : UEM12: Methodological (Obligatory)

SubjectTitle : UEM121 : Parasite Sampling Techniques TEEC-MV25

Credits : 6

Coefficients : 3

Teaching objectives

This module aims to provide students with practical training in sampling techniques for parasites or vectors or hosts in the wild animal environment and ecosystems including humans, wetlands, forests, mountains. Thus, the interactions between domestic and wild animals will be dissected according to the specificity of each animal as a sensitive or refractory reservoir host, and according to the animal breed and species.

Prerequisite knowledge recommended

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, cell biology, animal biology and plant biology. Genetics, Molecular biology

Syllabus

In person:

Part One: Sampling Techniques

Chapter 1: Settlement structure

- Richness
- Abundance
- Density
- Diversity

Chapter 2: Choice and sampling constraints

- The pre-model
- Ecological descriptors
- Perception scale

Chapter 3: Sampling plans

- aleatory sampling
- Stratified sampling
- Systematic sampling
- Sampling quality

Chapter 4: Sampling in cultivated fields

- 1- in the biotic part
 - Plants (different crops)
 - Pests (microorganisms, insects)
- 2- in the abiotic part (soil, air, conduct and irrigation basin)
 - Pests (microorganisms, insects, animals)

Chapter 5: Sampling in natural environments (spontaneous vegetation)

- 1- in the biotic part
 - Plant
 - Pests (microorganisms, insects, animals)
- 2- in the abiotic part (soil, air, water)
 - Pests (microorganisms, insects, animals)

I. Part two: Wildlife and ecosystems

II. Continental types of ecosystems (forest, aquatic, mountain, steppe, etc.)

Types of ecosystems and wildlife in Algeria

1. Composition and dispersal of wild animal fauna in Algeria
2. Management and restoration of wildlife in Algeria

III. Wild animal trapping and inventory method

1. Trapping and capture
2. Spatial analysis and remote detection
3. Legal and illegal hunting

III. Zoonoses caused by wild animals

1. Zoonoses caused by Rodentia / Muridae
2. Zoonoses caused by Chiroptera
3. Zoonoses caused by Artiodactyla (Bovidae, Suidae, Cervidae)
4. Zoonoses caused by Carnivora (Canidae, Felidae, Ursidae)
5. Zoonoses caused by native and migratory birds
6. Interactions between livestock and wild animals (competition, diseases, hybridization)

Practical work :

- Observation and anatomy of some insect vectors of emerging diseases
- Field trips will be necessary to better explain the techniques
- The practical work will be organized in the form of field trips
- Outing to cultivated fields of different crops (nearest)
- Outing (March. April) in natural environments in an area rich in vegetation

- Exit in a humid zone.
- Visit to livestock sites (pastoralism, stables)

Personal work :

Each student must prepare a short presentation on each outing carried out (the work must be exhibited in the laboratory)

Evaluation method :

60% thematic,

40% formative test (20% in the form of practical examination, practical work reports or outings...etc)
+ 20% on personal work (exhibition).

References

- Barbault R., (1981). Ecologie des populations et de peuplement. Ed. Masson, Paris
- Blondel J., (1995). Biogéographie approche écologique et évolutive. Ed. Masson, Collection écologie N° 27. Ed. Masson, 297p.
- Frontier S., (1983). Stratégies d'échantillonnage en écologie. Ed. masson, Paris
- Giraudoux P., (1990). L'échantillonnage en écologie (cours post-graduation d'écologie). Université de Dijon .INRA Faune sauvage. 45 p.
- Lamot J., Bourlier A., (1969). Problème d'écologie : échantillonnage des peuplements d'animaux des milieux terrestres. Ed. Masson. 151p.

Master title: Parasitology

Semester : S2

EU Title : UEM12: Methodological (Obligatory)

SubjectTitle : UEM122 : Biostatistics BSTA-MB26

Credits : 3

Coefficients : 2

Teaching objectives

This module will allow the student to complete their mastery of the statistical tool necessary for digital analyzes of readings.

This subject will be used to teach the student how to use the multi-variate analysis software (PCA, AFC) that he would need to prepare his end-of-cycle dissertation, how to organize his data and later process them statistically in order to prioritize the factors analyzed. Examples are given in the computer room as well as exercises. Also, it aims to teach the student how to keep the various data collected during research, or from institutions (the number of reported cases of a given disease over several months or years), in order to use them at the appropriate time. .

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Genetics, Molecular biology, maths, statistics and computer science

Course Content

In-person:

Chapter I : Definitions of concepts:

- *Descriptive Statistic.*
- *Characteristics parameters.*

Chapter II: Interferential statistics

- Introduction to distribution laws: normal law
- Principle of testing: conformity testing
- Comparison of multiple means: one-way analysis of variance –
Two ways analysis of variance ANOVA2

Two ways analysis of variance with repetition.

Two ways analysis of variance without repetition.

Chapter IV : Correlation of two variables

- Regression with an explanatory variable
- Determination of the correlation coefficient
- Determination of the slope of the line

Chapter V : Statistical tests

-Homogeneous test of variation

*Kolmogorov test.

*Shapiro-Wilk test.

Chapter IX:

-Application with SPSS, and the use of calculator.

-Application examples in biology science.

Practical work:

Applications on biostatistics analysis software in the computer room

We must choose examples from animal biology, animal ecology, parasitology, etc.

Personal work:

For this subject and given the significant loads on the student, it is recommended to leave the decision during the first meeting of the educational committee and discuss whether it is necessary to request and evaluate personal work from the student?

Evaluation method:

60% final exam,

40% continuous (20% in the form of practical examination, 20% Participation, handling and reporting of practical work)

References

- Amazallag E., Piccioli N., et Bry F., (1978). Introduction à la statistique. Ed. Hermann, Paris ? 339p.
- Bernier, J. (2000). Statistique pour l'environnement : traitement bayésien de l'incertitude, Tec et Doc.
- Chauvat, G. (2002). Statistiques descriptives : résumés des cours, 85 exercices corrigés, 40 problèmes, Armand Colin.
- Falissard, B. (1998). Comprendre et utiliser les statistiques dans les sciences de la vie, Masson.
- Grais, B., (2003), Méthodes statistiques, Dunod.
- Huguier M, Flahault A., (2003). Biostatistiques au quotidien. Ed. Elsevier, Paris, 206p.
- Lecoutre, J-P., (2006), Statistique et probabilités : manuel et exercices corrigés, Dunod
- Milhau, X (2001). Statistique. Ed. Belin
- Schwartz D., (1992). Méthodes statistiques à l'usage des médecins et biologistes. Flammarion, Paris, 306p.
- Valleron A. Z. et Lazard P., (1995). Exercices programmés de statistiques à l'usage des médecins et biologistes. Flammarion, Paris, 247p.

Master title: Parasitology

Semester : S2

EU Title : UED12: Discovery (Obligatory)

Subject Title : UED121 : Entomology Applied to Zoonotic Agents AAAZ-MP27

Credits : 2

Coefficients : 2

Teaching objectives

The aim of this subject is to provide students with theoretical and practical training in the biology of the vectors of the main infectious and parasitic agents, their classification, biotopes, harmful or beneficial roles in nature, etc.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Genetics, molecular Biology.

Course Content

In-person:

I- Functional and evolutionary entomology

1. Functional and evolutionary entomology of the main vectors involved in emerging animal diseases
2. Techniques for trapping and diagnosing insect vectors of emerging diseases

II- Medical and veterinary arachno-entomology

1. Vector-borne bacterial zoonoses
2. Vector-borne viral zoonoses
3. Vector-borne parasitic zoonoses

III- Tick collection using the flag technique

IV- Means of controlling zoonotic vectors

1. Chemical and biological means
2. Setting up epidemio-surveillance networks

Practical work:

- Observation and anatomy of some insect vectors of emerging diseases

Personal work:

Each student must prepare a short presentation on the anatomy of an insect vector of a zoonosis. (The work must be presented in the laboratory in 10 minutes maximum).

Evaluation methods:

60% final exam, 40% continuous (20% in the form of TP exams, TP reports, etc.) + 20% on personal work (presentation + manuscript).

References

- Julien Dumas 1953. Les animaux de laboratoire: anatomie, particularités physiologiques, hématologie, maladies naturelles, expérimentation. Flammarion
- M. J. Laroche, François Rousselet. 1990. Les animaux de laboratoire: éthique et bonnes pratiques. Masson.
- Kohn, D. F., Wixson, S. K., White, W. J., & Benson, G. J. (Eds.). (1997). *Anesthesia and analgesia in laboratory animals*. Academic Press.
- Institute of Laboratory Animal Resources (US). Committee on Care, Use of Laboratory Animals, & National Institutes of Health (US). Division of Research Resources. (1985). *Guide for the care and use of laboratory animals*. National Academies.

Master title: Parasitology

Semester : S2

EU Title : UET12: Transversal (Obligatory)

Subject Title : UET121 : Legislation LEGI-MB28

Credits : 1

Coefficients : 1

Teaching objectives

Introduce the learner to regulatory concepts, the definitions and origins of legal texts and knowledge of criminal consequences.

Recommended prior knowledge

Set of training contents

Course Content

In-person:

Part I :

- General concepts of law (introduction to law, criminal law).
- Presentation of Algerian legislation (www.joradp.dz, references to texts).

- General regulations (consumer protection law, hygiene, labeling and information, food additives, packaging, brand, safety, preservation).
- Specific regulations (individual work, presentations).
- Control organizations (CPD, ACCQUE, The municipal hygiene office, NOLM).
- Standardization and accreditation (IANOR, ALGERAC).
- International standards (ISO, Codex Alimentarius, NA, AFNOR).

Part II : General information on Principles of good laboratory practice and ethical standards of the profession.

I. Place of experimentation in society

1. Legitimacy of animal experimentation
2. Animal protection
3. Design of experimental procedures and projects

II. Ethics in animal testing

1. Reasons for using animals in experiments
2. Rule of 3 Rs
3. Ethics Committee
4. Duties of animal users

III. Food safety.

Hazard analysis and control.

Quantitative risk analysis.

Regulatory and normative aspects.

Psycho-sociological aspects of food security, trust and crisis

IV. The main texts on radiation protection

Personal work:

For this subject and given the significant loads on the student, it is recommended to leave the decision during the first meeting of the educational committee and discuss whether it is necessary to request and evaluate personal work from the student?

Evaluation method:

100% final exam,

References

- Bondolfi, A. (1995). *L'homme et l'animal: dimensions éthiques de leur relation*. Saint-Paul.
- Marguénaud, J. P. (2011). *L'expérimentation animale: entre droit et liberté*. Editions Quæ.
- ED Olfert, BM Cross, AA McWilliam. 1993. MANUEL SUR LE SOIN ET L'UTILISATION DES ANIMAUX D'EXPÉRIMENTATION. ccac.ca

Master title: Parasitology

Semester : S3

EU Title : UEF13: Fundamental (Obligatory)

SubjectTitle : UEF131 : Prophylaxis and Control of Parasitoses PRTP-MP31

Credits : 4

Coefficients : 2

Teaching objectives

This teaching focuses on prevention and treatment of parasitic pathologies in wild animal populations and domestics. This subject aims to provide students with practical training and theory on the main hosts and reservoirs of infectious and parasitic agents, as well as that the different modalities of contamination or infestation between groups or of animal species and between humans and animals. Thus, the students go on to conclude the prophylactic measures that man should take into consideration to avoid any kind of contamination, as well as the protection of domestic animals and wild more or less receptive or sensitive.

Recommended prior knowledge

Immunology and vaccinology, microbiology, parasitology, food microbiology.

Course Content

In-person:

Important: you must see the content of the general parasitology material in S1 and S2 to avoid repetitions.

General: about parasitic disease

- Geographic distribution and prevalence.
- Ecological and economic importance.
- Epidemiology.
- Symptoms.
- Injuries.

Diagnostic :

- Clinical and epidemiological diagnosis.
- Pathological diagnosis.
- Experimental (or laboratory) diagnosis: microscopic, serological, etc.

Prophylaxis:

➤ **Medical: preventive medical measures against animal infestation:**

- vaccination,
- prevention or systematic treatment,
- chemical prevention
- physiological struggle
- biological control (using medicinal plant extracts)
- Integrated control (IPM)

➤ **Sanitary:** measures to ensure the prevention of infestation of animals :

- epidemiological monitoring
 - fight against intermediate hosts,
 - destruction of corpses,
 - hygiene measures...
 - Limitations of means of prophylaxis against parasitoses in humans.
 - Limitations of means of prophylaxis against parasitoses in domestic animals.
 - Limits of means of prophylaxis against parasitoses in wildlife.
 - Specific prophylaxis measures against vector-borne parasitoses
- #### ➤ **Treatment:** curative treatment
- main drugs that can be used,
 - active substances,
 - dosage,
 - administration mode...

Practical work :

On the different techniques for fighting animal parasites and testing application in the laboratory of some methods to combat these parasites and hosts. In the form of a field visit or to a prophylaxis laboratory

Personal work :

Each student must prepare a presentation on the strategy or general diagram drawn by the health department of the Wilaya of Biskra for the fight against parasitoses dominant in the region.

Method of evaluation:

60% final exam,

40% continues (20% in the form of questions, practical work reports...etc. + 20% on the personal work (presentation))

References :

- Frédéric Darriet. La lutte contre les moustiques nuisants et vecteurs de maladies. Ed. Khartala, 1998.

- Lydie Suty. La lutte biologique: Vers de nouveaux équilibres écologiques. Ed. Isabelle Seck.
- 2010. 321 p Christian R. (1996). Épidémiologie des maladies parasitaires. Editions médicales internationales, France.
- Euzeby J. (1984). Les parasitoses humaines d'origine animale, caractères épidémiologiques. Edition Flammarion, France, - ISBN: 2-275-10432-3.
- Euzeby J. (1998). Les parasites des viandes, épidémiologie, physiopathologie, incidences zoonotiques. Editions médicales internationales et édition TEC & DOC Lavoisier, France.
- Euzeby J. (2003). Les dermatoses parasitaires d'origine zoonosique dans les environnements de l'homme. Editions médicales internationales, France.
- Fantaine M. (1993). Vade-mecum du vétérinaire. Quinzième édition, Office des publications universitaires, Algérie.
- Lefevre P C, Blancou J, Chermette R. (2003). Principales maladies infectieuses et parasitaires du bétail, Europe et régions chaudes. Editions médicales internationales et TEC & DOC Lavoisier, France, - ISBN: 2-7430-0495-9.

Master title: Parasitology

Semester : S3

EU Title : UEF13: Fundamental (Obligatory)

Subject Title : UEF132 : Parasitic Immunology and vaccinology IMVA-MP32

Credits : 6

Coefficients : 3

Teaching objectives

The aim of this course is to provide students with theoretical and practical training in the fundamentals of immunology and vaccinology, as well as the limits of the techniques used in these two fields.

Recommended prerequisite knowledge

Immunology. molecular biology. microbiology. parasitology.

Course Content

In-person:

Important: to avoid repetition, the contents of the Molecular Biology Tools and Methodology subject in S1 and the Parasitosis Prophylaxis and Control subject in this semester must be seen.

Part 1. Immunology

1. Reminder of the immune response.

- Cellular response.
- Humoral response.
- cytokines.
- Anatomical structure and genesis of the mammalian immune system.
- Mechanism of immune responses against bacterial infections: studies of several examples.
- Mechanisms of immune reactions against viral infections: studies of several examples.
- Mechanisms of immune reactions against parasitic infections: to be detailed in section III.
- Abnormalities and disorders of the immune response.

II. Parasitic antigenicity.

III. Immune response against intracellular parasites

1. Th1-type response

2. Some examples of antiprotozoal responses.

- I. Anti-leishmania response.
- II. Anti-trypanosome response.
- III. Anti-toxoplasmosis response.
- IV. Immune response against helminths

1. Th2-type response.

- I. ADCC mechanism: anti body dependent cellular cytotoxicity.

- II. Role of mast cells.
- V. Mechanism by which parasites escape the immune response.
 1. Resistance to complement.
 2. antigenic variation.
 3. Molecular mimicry.

Part II. Vaccinology.

1. History of vaccinology.
2. Different patterns of vaccine immune response: example studies.
3. Factors influencing the efficacy and duration of the vaccine immune response.
4. Advantages and disadvantages of different types of vaccine: case studies.
5. Use of molecular biology for vaccine preparation.

Different parasite vaccines:

- A. Anthelmintics: classification and mode of action.
- B. Antiprotozoals: classification and mode of action.
- C. Anti-mite and insecticides.
- D. Antiparasitic resistance.
- E. Antifungals.

Directed work:

Detailed explanations of some immune response patterns in relation to parasitic infections.

Practical work TP

On immunological tests applicable to parasitology.

- Immunoelectrophoresis.
- Immunoenzymology: case of ELISA.
- Immunofluorescence.
- Cytokines immunochemistry.

Personal work:

Each student is asked to analyze a recent scientific article on an immunological technique and to prepare a short summary and present it in class: duration 10 min max, or on parasite vaccines.

Method of evaluation:

60% final exam.

40% continuous (20% in the form of questions, practical work reports...etc. + 20% on personal work (oral presentation only))

References :

- Bach J-P., Chatenoud L., (2002). Immunologie. Flammarion, Paris, 369p.
- Burmester G-R., Pezzoutto A., (2000). Atlas de poche d'immunologie. Ed. Flammarion Médecine-science, Paris
- Coudet F., (1993). Avian Immunology in progress. Ed. INRA. Paris, 351p.
- Lydyard P. M., Whelan A. et Fanger M. W., (2002). L'essentiel en immunologie. Ed. Berti, Paris, 384p.
- Roitt I.M., (1979). Immunologie mécanismes essentiels. Ed. simeps,
- Voisin G. A., Edelman P., Genetet N., Bach J-P., Surreau C., (1990). Immunologie de la reproduction. Ed. Flammarion Médecine-science, Paris, 458p.

Master title: Parasitology

Semester : S3

EU Title : UEF23: Fundamental (Obligatory)

SubjectTitle : UEF231: Applied and Molecular Epidemiology EPAM-MP33

Credits : 4

Coefficients : 2

Teaching objectives:

This subject aims to provide students with theoretical and practical training on the fundamental bases of human and animal epidemiology. This training is necessary to know the indicators for monitoring a declared disease and thus to predict possible epidemics in the human population. Also, it allows you to know the fundamental molecular biology techniques used in epidemiology and the conclusions that can be expected, as well as the relationships between epidemiology and statistics.

Recommended prior knowledge

Microbiology, parasitology, biostatistics, research methodology, molecular biology.

Course Content

In-person:

I. Basic notions in epidemiology: definition, history, laws of Charlle Nicolle, disease monitoring indicators.

II. Areas of use of epidemiology

1. Descriptive epidemiology
2. Analytical epidemiology
3. Synthetic epidemiology
4. Prospective epidemiology

III. Relationships between epidemiology and statistics

1. Limits of using statistics in epidemiology
2. Calculation of the confidence interval or significance threshold
3. Criteria for choosing statistical tests in epidemiology (examples)

IV. Epidemiology modeling

1. Definition and uses
2. Examples of modeling in human epidemiology
3. Examples of modeling in animal epidemiology

V. Molecular epidemiology

1. Molecular biology tools: advantages and constraints
2. Molecular characterization of strains of infectious agents

VI. Emerging diseases and re-emergences 1. Phenomenon of emergence of new infectious diseases (examples)

2. Phenomenon of re-emergence of new infectious diseases (examples)
3. Role of climate change and global warming in the emergence and re-emergence of new infectious diseases.

Directed work :

On some examples of modeling in epidemiology Or other parts of the course which may require clarification (the choice of the responsible teacher)

Personal work : Each student must prepare a presentation on

- the history of parasitic epidemics in Algeria, in Biskra, in Africa, in the world...etc

Evaluation method:

60% final exam,

40% continues (20% in the form of questions, the presentation of presentations during TD sessions...etc + 20% on personal work, the manuscript of the presentation)

References :

- Lydie Suty. La lutte biologique: Vers de nouveaux équilibres écologiques. Ed. Isabelle Seck.
- 2010. 321 pChristian R. (1996). Épidémiologie des maladies parasitaires. Editions médicales internationales, France.
- Euzeby J. (1984). Les parasitoses humaines d'origine animale, caractères épidémiologiques. Edition Flammarion, France, - ISBN: 2-275-10432-3.
- Lefevre P C, Blancou J, Chermette R. (2003). Principales maladies infectieuses et parasitaires du bétail, Europe et régions chaudes. Editions médicales internationales et TEC & DOC Lavoisier, France, - ISBN: 2-7430-0495-9.

Master title: Parasitology

Semester : S3

EU Title : UEF23: Fundamental (Obligatory)

SubjectTitle : UEF232 : Parasites of Bees and Fish PAPO-MP34

Credits : 4

Coefficients : 2

Teaching objectives:

The aim of this subject is to provide students with theoretical and practical training on the main parasites of bees and fish, especially those affecting species raised in Algeria, particularly in arid and semi-arid regions.

Recommended background knowledge

Microbiology, parasitology, biostatistics, research methodology, molecular biology.

Course Content

In-person:

I. Bee parasites:

Varroa mites

Athina tumida

Tropilaelap sclareae

Nosema

II. Fish parasites:

Parasites that cause disease in farmed fish can be classified as follows:

1. PROTOZOA

Flagellates

Ciliates

Sporozoa

2. HELMINTHES (Worms)

Plathelminthes (Flatworms)

Digenes (Trematodes)

Monogenes

Cestodes (tapeworms)

Nematodes (Roundworms)

Acanthocephalans (Worms with spiny heads)

3. CRUSTACES (Fish lice)

Branchiura

Copepods

Isopods

4. HIRUDINEA (leeches)

EFFECTS OF PARASITES ON FISH

SKIN AND BRANCH PARASITES (Ectoparasites)

HOW DO PARASITES AFFECT FISH?

1. Through feeding activity

a. On cell cytoplasm, by penetrating cells;

e.g. Ichthyobodosp. uses microtubules.

b. On tissues, by penetrating the epithelium;

ex. Ichthyophthirius multifiliis and Cryptocaryon irritans using histolytic enzymes and cilia.

c. On whole cells, by muscular action;

ex. Monogenea; scratching or piercing, e.g. certain crustaceans.

d. On cell debris, mucus or saprophytic bacteria, by grazing ciliates;

ex. Trichodines, Chilodonella and sessile peritrichous ciliates, e.g. Scyphidia.

e. On blood;

e.g. Certain monogènes, certain crustaceans and leeches.

2. By ATTACHMENT methods

3. By IRRITATION

MUSCULAR AND VISCERAL PARASITES

HOW DO THESE PARASITES AFFECT FISH?

Intestinal parasites

a. Enteritis caused by Hexamita and coccidia.

b. Mechanical blockage, e.g. Bothriocephalus acheilognathi.

Eye parasites

Blood parasites

Directed work :

On some examples of parasites

Field trips can be scheduled

TP instead of TD on fish or bee parasites

Personal work:

Personal work will be on parts of TD or TP.

Evaluation:

60% final exam,

40% continuous (20% in the form of questioning, presentation of papers during TD sessions...etc + 20% on personal work, manuscript of presentation))

References :

- Lydie Suty. La lutte biologique: Vers de nouveaux équilibres écologiques. Ed. Isabelle Seck.
- 2010. 321 p Christian R. (1996). Épidémiologie des maladies parasitaires. Editions médicales internationales, France.
- Euzéby J. (1984). Les parasitoses humaines d'origine animale, caractères épidémiologiques. Edition Flammarion, France, - ISBN: 2-275-10432-3.
- Lefevre P C, Blancou J, Chermette R. (2003). Principales maladies infectieuses et parasitaires du bétail, Europe et régions chaudes. Editions médicales internationales et TEC & DOC Lavoisier, France, - ISBN: 2-7430-0495-9.

Master title: Parasitology

Semester : S3

EU Title : UEM13: Methodological (Obligatory)

Subject Title : UEM131 : Scientific Research Methodology MRSC-MB35

Credits : 6

Coefficients : 3

Teaching objectives

This course is designed to give students a first understanding of what a research work can be. It covers the research process, from laboratory practice (protocol development, technical skills, data analysis) to bibliographic research (search, analysis, synthesis). In addition, the training will enable students to independently approach the presentation of research work in the form of a written report and a structured oral presentation.

Recommended prior knowledge

The following courses are recommended as prerequisites for this course:

Biochemistry, Biophysics, Microbiology, Immunology, Organic and inorganic chemistry, Cell biology, Animal biology, Plant biology, Genetics, Molecular biology, Statistics, Computer science, English

Course Content

In-person:

Groups will be formed by the teachers, articles will be chosen and distributed, and the groups will, based on an article published about 5 years prior:

- Conduct a literature review to "historically" contextualize the subject, i.e. find earlier articles on the topic
- Perform literature searches to understand the rationale behind the methods and strategies used in the article
- Look for follow-up literature on the article (confirmation? refutation?)
- Groups should begin preparing their oral presentation, which will consist of a 20 minute presentation followed by questions from teachers and other students.
- Choose a research topic which will be the subject of the final semester thesis.
- Define the experimental strategy.

Practical Work:

- The study of practical examples of research work.
- The design of an experimental setup.
- To this end, students will be grouped in threes or fours to gain experience with teamwork.

Personal Work:

Presentation of a research work in the form of a short document (10 pages max.) and a structured oral presentation.

Evaluation Method:

60% final exam

40% continuous assessment (20% in the form of a practical exam, 20% personal work)

References

- Galiana, D. (2002). *L'approche expérimentale en biologie: améliorer sa pratique d'enseignant*. Educagri Editions.

Master title: Parasitology

Semester : S3

EU Title : UEM13: Methodological (Obligatory)

SubjectTitle : UEM132 : Hematology HEMA-MB36

Credits : 3

Coefficients : 2

Teaching objectives

This course aims to teach students the physiological characteristics of blood tissue, the environment for the multiplication of parasites and the seat of the immune response.

Recommended prior knowledge

Cytology, histology, biochemistry and immunology, Biochemistry, biophysics, microbiology, immunology, organic and mineral chemistry, immunology, cell biology, animal biology and plant biology. Genetics, Molecular biology

Course Content

In-person:

Introduction

1. Plasma

- Definition
- Plasma composition and origin
- Role of plasma

2. Erythrocytes

- Taxonomic diversity
 - Reptiles
 - Birds
 - Mammals
- Morphology
- Physiology and functioning

- Destruction of red blood cells

3. Leukocytes

- Taxonomic diversity
 - Reptiles
 - Birds
 - Mammals
- Granulocytes
 - Neutrophils
 - Eosinophils
 - Basophils
- Agranulocytes
 - Lymphocytes
 - Monocytes
 - Azurophiles

4. Thrombocytes

- Definition
- Hemostasis

5. Hematopoiesis

- Stem cells
- Cell maturation

6. Blood: Parasite multiplication medium

7. Blood: Site of immune response.

8. Apply medical laboratory analytical techniques related to hematology

- Prepare blood smears
- Perform routine staining on blood smears
- Perform leukocyte and reticulocyte count methods
- Perform leukocyte differential counts on normal hemograms and smears representative of hematological abnormalities, including morphological assessment of red blood cells, white blood cells and platelets
 - Interpret smears representative of anemia and leukocyte abnormalities
 - Perform methods to determine hemoglobin, hematocrit, erythrocyte indices and sedimentation rate
 - Calculate erythrocyte indices
 - Perform infectious mononucleosis test
 - Perform maintenance and quality control on analytical equipment
 - Perform various hemostasis analysis processes
 - Perform routine haematological analyses on body fluids Perform cytochemical techniques including differential count on normal bone marrow smears.

Practical work:

- Hematocrit and physiological characteristics of plasma
- Coloring and highlighting of figured elements
- Erythrocyte and leukocyte diversity in animals
- Variation in blood parameters following parasitosis.

Personal work:

Personal work is required on the subjects covered in the course or in the practical work, the nature of this work and the method must be discussed in the first meeting of the educational committee at the start of the semester.

Evaluation method:

60% final exam,

40% continuous (20% in the form of a practical exam, 20% personal work)

References

- Campbell, W. T.1994: Hematology. In: Branson, W.R., Harrison, J.G., Harrison, R.L.: Avian Medicine: principles and application. Wingers, Lake Worth Florida, pp.176-198
- Germain, D., Gentilhomme, O., Broyon, P., A., Coiffier, B. (1981). Physiologie humaine. Cellules sanguines et organes hématopoïétiques. Ed, Simep,
- Kamoun P., Fréjaville J-P., (2002). Guide des examens de laboratoire. Ed. Flammarion Médecine-sciences, Paris, 1438p.
- Munker R., Hiller E., Glass J., et Paquette R., (2007). Modern heamatology. Humana presse, New Jerzy
- Secchi J., Lecaque D., (1981). Atlas d'histologie. Ed. Maloine, Paris,
- Thendl H., Diem H., Haferlach T., (2004). Color atlas of hematology. Ed. Thieme, New York.

Master title: Parasitology

Semester : S3

EU Title : UED13: Discovery (Obligatory)

SubjectTitle : UED131 : Scientific English II ANG2-MB37

Credits : 2

Coefficients : 2

Teaching objectives

This subject gives students the necessary tools for analyzing and understanding scientific articles in biological sciences, especially in animal biology and parasitology.

Recommended prior knowledge

Biochemistry, biophysics, microbiology, immunology, organic and inorganic chemistry, immunology, cell biology, animal biology and plant biology. Genetics, Molecular biology. language

Course Content

In-person:

Chapter I : Study of scientific texts written in English

Chapter II : Translation of scientific texts from French to English

Chapter III : Use of the computer tool for translation (the web)

Personal work:

For this subject and given the significant loads on the student, it is recommended to leave the decision during the first meeting of the educational committee and discuss whether it is necessary to request and evaluate personal work from the student?

Evaluation method:

100% final exam,

References

- Cargill, M., & O'Connor, P. (2013). *Writing scientific research articles: Strategy and steps*. John Wiley & Sons.
- Svensson, C. J. (2001). Doing Science Design, Analysis and Communication of Scientific Research. *Pacific Conservation Biology*, 7(3), 219-219.
- Martin, B., et Tony, D. E., 1983, Nucleus English for science and technology (General Science part II). Longman.
- Thomson, A. J., et Martinet, A.V., 1993, A practical English Grammar. Low Priced edition.
- Michael, S., 1984, Practical English Usage. Oxford University Press.
- Kristine, B., et Susan, H., 2003, Writing matters. Cambridge.
- <http://www.dictionnaire.com/>
- www.bbclearningenglish.com

Master title: Parasitology

Semester : S3

EU Title : UET13: Transversal (Obligatory)
SubjectTitle : UET131 : Entrepreneuriat ENTR-MB38
Credits : 1
Coefficients : 1

Teaching objectives

Raise biologists' awareness of the business world by providing them with solid knowledge in management, marketing and communication. This subject includes a tutored project called the "Cyber" project which consists of creating a virtual company in the field of biology (plant, animal, human health, agri-food). The completed project is supported before a jury of academics and industrialists. Introduce the learner to project setting up, its launch, its monitoring and its completion.

Recommended prior knowledge

Notions in biological sciences, maths, statistics and computer science and all training contents

Targeted skills:

- o Understanding of the organization and operation of a business
- o Ability to set up a business creation project
- o launch and manage a project
- o Ability to work methodically
- o Ability to plan and meet deadlines
- o Ability to work in a team
- o Ability to be reactive and proactive

Course Content

In-person:

Chapter 1 : The development of entrepreneurial thought

Chapter 2 : Motives towards entrepreneurship

Chapter 3 : Stages of preparing a contracting project

Chapter 4 : Entrepreneurial work situation and factors hindering entrepreneurial activity

Chapter 5 : Institutions and roles supporting entrepreneurial activities

Chapter 6 : The role of universities in establishing entrepreneurial projects

Chapter 7 : Contractor and project owners

Chapter 8 : Business planner

Chapter 9 : Established institutions 1

Chapter 10 : Emerging institutions 2

Chapter 11 : Business and project evaluation

Chapter 12 : The legal aspect of institutions in Algerian law

Personal work:

For this subject and given the significant loads on the student, it is recommended to leave the decision during the first meeting of the educational committee and discuss whether it is necessary to request and evaluate personal work from the student?

Evaluation method:

100% final exam,

References

- Caroline Andréani. 2007. Comment créer son entreprise. Editions l'Etudiant, 219 pages
- . Francois Cazalas. 2011. Diriger une entreprise innovante: Joies et tribulations du métier d'entrepreneur. Eyrolles, 7 juil. 122 pages
- Dominique Pialot. 2006. Créer son entreprise. Groupe Express Editions, 1 janv. 127 pages
- Séverine Le Loarne, Sylvie Blanco. 2012. Management de l'innovation. Pearson Education France, 410 pages

V- Agreements or conventions

Yes