

**PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA**

**MINISTRY OF HIGHER EDUCATION  
AND SCIENTIFIC RESEARCH**

**Compliance framework  
C10**

**TRAINING OFFER  
LMD**

**ACADEMIC LICENSE**

**2022 - 2023**

<b>Establishment</b>	<b>Faculty / Institute</b>	<b>Department</b>
<b>Djilali Bounaama University of Khemis Miliana</b>	<b>Faculty of Natural and Life Sciences and Earth Sciences</b>	<b>Biological Sciences</b>

<b>Domain</b>	<b>Branch</b>	<b>Speciality</b>
<b>Natural Sciences and Life sciences</b>	<b>Food Science</b>	<b>Technology Agri-food and Quality Control</b>

الجمهورية الجزائرية الديمقراطية الشعبية  
وزارة التعليم العالي و البحث العلمي

نموذج مطابقة  
عرض تكوين  
ل . م . د

ليسانس أكاديمية  
2022 – 2023

القسم	الكلية /المعهد	المؤسسة
العلوم البيولوجية	كلية علوم الطبيعة والحياة و علوم الأرض	جامعة الجيلالي بونعامة خميس مليانة

التخصص	الفرع	الميدان
مراقبة و الاغذية تكنولوجيا النوعية	علوم الغذاء	علوم الطبيعة والحياة

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## I – Identity card of the License

## **1 - Location of the training :**

**Faculty (or Institute): Faculty of Natural and Life Sciences and Earth Sciences  
Department :Biological Sciences**

References of the license authorization decree (attach copy of the decree)

## **2- External partners**

### **- Other partner establishments:**

**National Institute of Agronomic Research of Algiers (INRAA)**

**Saad Dahlab University of Blida 1**

**Hassiba Benbouali University - Chlef**

**University of Tlemcen**

**Abderahman Mira University - Bejaia**

**Biotechnology Research Center (CRBT)**

**National Higher School of Biotechnology (ENSB)**

### **- Companies and other socio-economic partners:**

**- Wanis Dairy.**

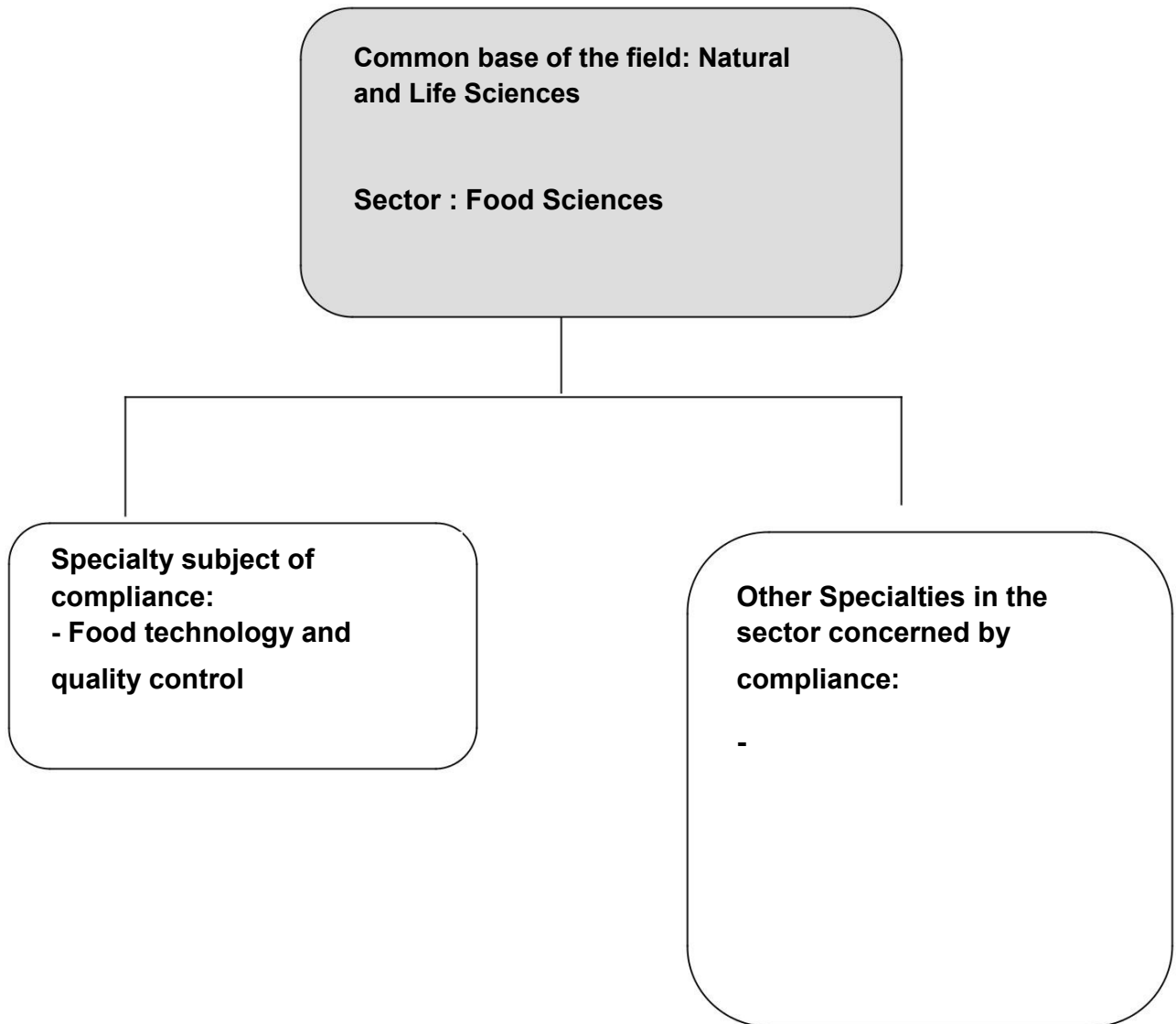
**- Arib Ain defla dairy.**

### **- International partners:**

### 3-Context and objectives of the training

#### A – General organization of the training: position of the project (Required Field)

*If several licenses are offered or already supported at the level of the establishment (same training team or other training teams), indicate in the following diagram, the position of this project in relation to the other courses.*



## **B - Training objectives (Required Field)**

*(Skills targeted, knowledge acquired at the end of the training - maximum 20 lines)*

The bachelor's degree in Agri-food Technology and Quality Control will allow candidates to acquire all scientific knowledge related to foods of animal origin (meat, milk and derivatives, etc.), vegetable (fruits and vegetables, cereals, oils, etc.), or microbial (the proteins or lipids of single-celled organisms) from their production to consumption. During this training, the graduate must be made aware of the general approach to the problem of human food and the agro-food industries in its new conception linked to technological development on a global scale. This training will be based essentially on the nutritional aspect of food products, the processing of foodstuffs (physical, chemical,

The training will focus on:

- The composition and properties of food products of vegetable, animal or microbial origin.
- Components of food quality and techniques for their assessment
  
- Food storage and processing skills
- Industrial food processing and packaging processes
- Hygiene and safety in the food industries
- human nutrition
- New foods or functional foods.

## **C – Target profiles and skills(Required Field)(maximum 20 lines):**

The profile of this training responds well to the requirements of the labor market since the program developed is focusing on the specificities of the food industries requiring skills well appropriate to the industrial activity carried out. The skills targeted are mastering on the quality of raw materials; transformation processes, packaging and marketing of food products. Added to this, the implementation and control of the HACCP system in food production lines.

## **D – Regional and national employability potential(Required Field)**

Thanks to the relevance of this training, the graduates will undoubtedly have the chance to have access to employment within the various units of the food industry, in this case dairies, biscuit factories, butter factories, cheese factories, semolina factories, slaughterhouses, canneries, etc. Possibilities will also be offered to them to work in private or state laboratories for the quality control of food products or the fraud repression of, or to work for companies or organizations managing or storing foodstuffs.

## **E – Gateways to other specialties (Required Field)**

**Possible gateways: Training in biotechnology**

### **Food Safety Training**

**Access to post-graduate academic or professional training: Master's or Doctorate in the field of training.**

## **F – Performance indicators expected from the training(Required Field)**

**(Viability criteria, success rate, employability, monitoring of graduates, skills achieved, etc.)**

- The progress and evaluation of the different teaching units during each semester.**
- The distribution of students according to the choice of specialty.**
- The examination success rate evaluated each semester.**
- Placement (employment) of graduates after graduation.**



C: External teaching team mobilized for the specialty:(Toinform and have approved by the faculty or the institute)

Nom, prénom	Diplôme graduation	Diplôme de spécialité (Magister, doctorat)	Grade	Matière à enseigner	Emargement
AmroucheZoheir	Génie Biologique	Nutrition et transformation des aliments	MCA		
Cheurfa Mohamed	Sciences alimentaires	Nutrition	MCA		
Achek Rachid	Dr Vétérinaire	Mcontrôle qualité & analyse alimentaire	MCA		
GuertarniHassina	Sciences alimentaires	Biologie	MCA		
Sahraoui Hamid	Physiologie animale	Physiologie animale	MCA		
BenouaklilFetouma	Microbiologie	Biotechnologie végétale	MCA		
Saadi Fadhila	Sciences alimentaires	Biotechnologie alimentaire	MCB		
BenshilaSarra	Sciences alimentaires	Nutrition	MCB		
ZaouadiNesrine	Contrôle qualité	Nutrition et transformation des aliments	MCB		
NabtiDjahida	Biologie	Biologie	MCB		
Laissaoui Aicha	Sciences alimentaire	Nutrition	MCB		
Didouh Nassima	Microbiologie	Microbiologie médicale	MCB		
AbdelliWafae	Biotechnologie des micro-organisme	Microbiologie appliquée	MCB		
Lattab Aicha	Biotechnologie des micro-organisme	Microbiologie appliquée	MCB		
BouchibaZoulikha	Reseau Biologique	Biotechnologie Microbienne	MCB		
SasouiDalel	Biologie	Biotechnologie	MCB		
GhomariFaizaNaouel	Microbiologie	Microbiologie	MAA		
HalfaouiZhor	Dr vétérinaire	Microbiologie	MAA		
ChaouedBilel	Biologie	Physiologie animale	MAA		
Bouras Hassem	Microbiologie	Microbiologie	MAA		
Mostefa Sari Fouzia	Génie biologie	Biotechnologie végétale	MAA		
Ladaidi Aicha	Chimie	Génie des procédés	MAA		
Brahimi Samira	Biotechnologie	Biotechnologie microbienne	MAA		
Boukhalfa Nabila	Dr Vétérinaire	Microbiologie	MAA		

**Visa of the department**



**Faculty or institute visa**



#### D: Overall summary of human resources mobilized for the specialty (L3):

Grade	Internal workforce	External Workforce	Total
Professors	00	-	00
Lecturers (A)	06	-	06
Lecturers (B)	10	-	10
Assistant Professor (A)	08	-	08
Assistant Professor (B)	00	-	00
Other (*)	00	-	00
Total	24	-	24

(\*) Technical and support staff

#### 5 – specific Material resources for the specialty

#### A- Educational Laboratories and Equipment: Educational equipment sheet

existing for the practical work of the planned training (1 sheet per laboratory)

Title of the laboratory: Biochemistry

Capacity of students: 20 students

No.	Equipment title	Number	Comments
1	Microscope	02	Good condition
2	Hotplate	01	Good condition
3	Precision scale	02	Good condition
4	pH meter	05	Good condition
5	Chromatography tank	03	Good condition
6	Horizontal electrophoresis tanks	01	Good condition
7	Centrifuge	03	Good condition
8	Water bath	02	Good condition
9	BioRad thermocycler	01	Good condition
10	Optical spectrophotometer	01	Good condition
11	Steamroom	01	Good condition
12	Fridge	01	Good condition
13	Freezer (-20)	01	Good condition
14	Hotplate	04	Good condition
15	Heating magnetic stirrer	04	Good condition
16	Vortex mixer	02	Good condition
17	300V generators	02	Good condition

**Title of the laboratory : Micrbiology**

**Capacity of students : 20 students**

<b>No.</b>	<b>Equipment title</b>	<b>Number</b>	<b>Comments</b>
<b>1</b>	<b>autoclave</b>	<b>02</b>	Good condition
<b>2</b>	<b>Automatic autoclave</b>	<b>01</b>	Good condition
<b>3</b>	incubator	<b>02</b>	Good condition
<b>4</b>	loop	<b>05</b>	Good condition
<b>5</b>	microscope	<b>03</b>	Good condition
<b>6</b>	loupe	<b>01</b>	Good condition
<b>7</b>	Bunsen burner	<b>03</b>	Good condition
<b>8</b>	Sterelizer oven	<b>02</b>	Good condition
<b>9</b>	Colony counter	<b>01</b>	Good condition
<b>10</b>	refrigerator	<b>01</b>	Good condition
<b>11</b>	Analytic scale	<b>01</b>	Good condition
<b>12</b>	Water bath	<b>01</b>	Good condition
<b>13</b>	Vertical laminar flow hood	<b>01</b>	Good condition
<b>14</b>	spectrophotometer	<b>04</b>	Good condition
<b>15</b>	Agitator	<b>04</b>	Good condition

**B- internship pitches and company training (see agreements section / agreements)**

**NB. University is equipped with an SNDL database which contains documents highly focused on the requested specialty.**

**D- Spaces for personal work and ICT available at department and faculty level:**

**The various laboratories of the SNV faculty & Research Laboratory ;**

**The libraries of the faculty and the university;**

**The computer room & distance learning;**

**Internet rooms.**

**II – biannual organization sheet for the teaching of the specialty  
(S1, S2, S3, S4, S5 and S6)  
(including the annexes to the decrees of the common bases of the field and the sector)**

**Semester 1**

Teaching Units	Subjects		Credits	Coefficients	Hourly volume (Weekly)			SHV (15 weeks)	Other*	Assessment method			
	Code	Title			Course	Tut	PW			CC*		Examination	
<b>Fundamental TU</b> Code: UEF 1.1 Credits: 18 Coefficients: 9	F 1.1.1	General and organic chemistry	6	3	1h30	1h30	1h30	67:30	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	Statistical Mathematics	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
<b>Methodology TU</b> Code: EMU 1.1 Credits: 9 Coefficients: 5	M 1.1.1	Geology	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
	M 1.1.2	Communication and Expression Techniques 1 (in French)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
<b>Discovery Teaching Unit</b> Code: UED 1.1 Credits: 2 Coefficients: 2	D 1.1.1	Working Method and Terminology 1	2	2	1h30	1h30		45h00	5h00 a.m.	x	40%	x	60%
<b>Transversal TU</b> Code: UET 1.1 Credits: 2 Coefficients: 1	T 1.1.1	Universal History of Biological Sciences	1	1	1h30	-	-	10h30	2h30	-	-	x	100
<b>Total Semester 1</b>			<b>30</b>	<b>17</b>	<b>10h30</b>	<b>9h00</b>	<b>5h30</b>	<b>375h00</b>	<b>375h00</b>				

Other\* = Additional work in semi-annual consultation; CC\* = Continuous control ; Tut=tutorials ; PW=Practical Work.

**Semester 2**

Units teaching	Subjects		Credits	Coefficients	Hourly volume (weekly)			SHV	Other*	Assessment method			
	Code	title			Course	DW	PW			CC*	Examination		
Fundamental TU Code: UEF 2.1 Credits: 18 Coefficients: 9	F 2.1.1	Thermodynamics and chemistry of solutions	6	3	1h30	1h30	1h30	67:30	82:30	x	40%	x	60%
	F 2.1.2	Plant's 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%
Methodology TU Codeh EMU 2.1 Credits: 9 Coefficients: 5	M 2.1.1	Physics	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
	M 2.1.2	Communication and Expression Techniques 2	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
Discovery TU Code: UED 2.1 Credits: 2 Coefficients: 2	D 2.1.1	Life sciences and socioeconomic impacts	2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
Transversal TU Code: UET 2.1 Credits: 1 Coefficients: 1	T 2.1.1	Working Method and Terminology 2	1	1	1h30	-	-	10h30	2h30	-	-	x	100%
<b>Total Semester 2</b>			<b>30</b>	<b>17</b>	<b>10h30</b>	<b>6h00</b>	<b>8h30</b>	<b>375h00</b>	<b>375h00</b>				

Other\* = Additional work in semi-annual consultation; CC = Continuous Control ; Tut=tutorials ; PW=Practical Work.



**Semester 3**

Units teaching	Subjects	Credits	Coefficients	Hourly volume (weekly)			SHV	Other*	Assessment method			
	Title			Course	DW	PW			CC*		Examination	
<b>Fundamental TU</b> Code: UEF 3.1 Credits: 6 Coefficients: 3	Vegetal physiology	4	2	1h30	1h30	1h30	45h00	55h00	x	40%	x	60%
	Food system and alimentation	2	1	1h30	-	-	22h00	27h00	x	x	x	100%
<b>Fundamental EU</b> Code: UEF 3.2 Credits: 12 Coefficients: 6	Biochemistry	6	3	1h30	1h30	-	67h30	82h30	x	40%	x	60%
	Genetics	6	3	1h30	1h30	-	67h30	80h30	x	40%	x	60%
<b>EU Methodology</b> Code: EMU 3.1 Credits: 4 Coefficients: 2	Expression and communication techniques (in English)	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
<b>TU Methodology</b> Code: EMU 3.2 Credits: 5 Coefficients: 3	biophysics	1	1	1h30	-	-	10h30	2h30	-	-	x	100%
<b>TU Methodology</b> Code: EMU 3.2 Credits: 5 Coefficients: 3	University ethics and deontology	1	1	1h30	-	-	22h30	2h30	-	-	x	100%
<b>Total semster 3</b>		<b>30</b>	<b>17</b>	<b>15h00</b>	<b>7h30</b>	<b>02h30</b>	<b>375h00</b>	<b>375h00</b>				

**Semester 4**

Teaching units	Subjects	Credits	Coefficients	Hourly volume (Weekly)			SHV (15 weeks)	Other*	Assessment method			
	Entitled			Course	DW	PW			CC*		Examination	
Fundamental EU Code: UEF 4.1 Credits: 6 Coefficients: 3	Animal physiology	6	3	3h00	-	1h30	67h30	82h30	x	40%	x	60%
Fundamental EU Code: UEF 4.2 Credits: 12 Coefficients: 6	Microbiology	8	4	3h00	1h30	1h30	90h00	110h30	x	40%	x	60%
	Food and Technology Base eating	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
EU Methodology Code: EMU 4.1 Credits: 4 Coefficients: 2	Applied Immunology	4	2	1h30	1h30	-	45h00	55h00	x	40%	x	60%
EU Methodology Code: EMU 4.1 Credits: 5 Coefficients: 3	Biostatistics	5	3	1h30	1h30	1h00	60h00	65h00	x	40%	x	60%
Discovery Teaching Unit Code: UED 4.1 Credits: 2 Coefficients: 2	Plants and Environment	2	2	1h30	1h30	-	45h00	5h00	x	40%	x	60%
Transversal UE Code: UET 4.1 Credits: 1 Coefficients: 1	IT tools	1	1	1h30	-	-	10h30	2h30	x	X	x	100%
<b>Total Semester 4</b>		<b>30</b>	<b>17</b>	<b>1:30 p.m.</b>	<b>7:30 a.m.</b>	<b>4:00</b>	<b>375h00</b>	<b>375h00</b>				

Other\* = Additional work in semi-annual consultation; CC\* = Continuous control ; Tut=tutorials ; PW=Practical Work..

**Semester 5:**

Teaching unit	SHV	weekly HV				coefficient	Credits	Assessment method	
	15 weeks	SV	DW	PW	Others			CC	Examination
<b>fundamental teaching units</b>								<b>40%</b>	<b>60%</b>
<b>UEF 3.1.1 (O/P)</b>									
<b>Material 1:Food microbiology</b>	45h00	1h30	-	1h30	55h00	2	4	x	x
<b>Material 2:Food biochemistry</b>	45h00	1h30	-	1h30	55h00	2	4	x	x
<b>UEF 3.1.2 (O/P)</b>									
<b>Material 1:LPN Technology 1</b>	67h30	1h30	1h30	1h30*	82h30	3	6	x	x
<b>Material 2:Food hygiene and safety</b>	45h00	1h30	-	1h30*	55h00	2	4	x	x
<b>EU methodology</b>									
<b>EMU 1 (O/P)</b>									
<b>Subject 1: statistics and informatics</b>	60h00	1h30	1h30	1h00	65h00	3	5	x	x
<b>Topic 2: Healthy Foods</b>	45h00	1h30		1h30	55h00	2	4	x	x
<b>EU discovery</b>									
<b>DEU 1 (O/P)</b>									
<b>Subject: Metrology</b>	45h00	1h30		1h30	5h00	2	2	x	x
<b>transversal teaching units</b>									
<b>UET1(O/P)</b>									
<b>Subject: English</b>	10h30	1h30			2h30	1	1	-	X (100%)
<b>Total Semester 5</b>	<b>375h00</b>	<b>12h00</b>	<b>3h00</b>	<b>10h00</b>	<b>375h00</b>	<b>17</b>	<b>30</b>		

\* and educational outing

**Semester 6:**

Teaching unit	SHV	weekly HV				coefficient	Credits	Assessment method	
	15 weeks	SV	Tut	PW	Others			CC (40%)	Examination (60%)
<b>fundamental teaching units</b>									
<b>UEF 3.2.1(O/P)</b>									
<b>Material 1: Food toxicology</b>	45h00	1h30	-	1h30	55:00	2	4	x	x
<b>Material 2: Analysis techniques</b>	67h30	3h00	-	1h30	82:30	3	6	x	x
<b>UEF 3.2.2(O/P)</b>								x	x
<b>Material 1: LPN Technology 2</b>	90h00	3h00	1h30	1h30	110h00	4	8	x	x
<b>EU methodology</b>									
<b>EMU 1(O/P)</b>									
<b>Subject 1: Food Preservation</b>	60h00	1h30	1h00	1h30	65h00	3	5	x	x
<b>EMU 2(O/P)</b>									
<b>Subject: Process Engineering</b>	45h00	1h30	1h30		55h00	2	4	x	x
<b>EU discovery</b>									
<b>DSU 1(O/P)</b>									
<b>Subject 1: Hygiene in food industries</b>	45h30	1h30	1h30		5h00	2	2	x	x
<b>transversal teaching units</b>									
<b>UET 1 (O/P)</b>									
<b>Material 1:Entrepreneurship</b>	10h30	1h30	-		2h30	1	1	-	X (100%)
<b>Total Semester 6</b>	<b>375h</b>	<b>1h30</b>	<b>5h30</b>	<b>6h00</b>	<b>375h</b>	<b>17</b>	<b>30</b>		

\* and educational outing

**Overall summary of the training:(indicate the separate global VH in progress, TD, TP... for the 06 teaching semesters, for the different types of TU)**

<b>VH</b>	<b>TU</b>	<b>UEF</b>	<b>MTU</b>	<b>DTU</b>	<b>TTU</b>	<b>Total</b>
<b>Course</b>		<b>585</b>	<b>292h30</b>	<b>135</b>	<b>135</b>	<b>1147h30</b>
<b>DW</b>		<b>225</b>	<b>240</b>	<b>112.5</b>	<b>/</b>	<b>577h30</b>
<b>PW</b>		<b>405</b>	<b>97:30</b>	<b>22.5</b>	<b>/</b>	<b>525</b>
<b>Personal work</b>		<b>1485</b>	<b>720</b>	<b>30</b>	<b>15</b>	<b>2250</b>
<b>other (explain, list,)</b>						
<b>Total</b>		<b>2700</b>	<b>1350</b>	<b>300</b>	<b>150</b>	<b>4500</b>
<b>Credits</b>		<b>108</b>	<b>54</b>	<b>12</b>	<b>6</b>	<b>180</b>
<b>% in credits for each teaching unit</b>		<b>60</b>	<b>30</b>	<b>6.67</b>	<b>3.33</b>	<b>100</b>

## Practical work

PW N°1: Principles of experimental chemistry

Objective: To assess 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: To determine the quantity of Subject (expressed in number of moles) contained in a sample and to prepare a sample containing a fixed quantity of Subject

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

Objective: This is to prepare a solution of sodium chloride (NaCl) of normality 0.1N. and to prepare a hydrochloric acid (HCl) solution of normality 0.1N by diluting a solution of HCl of normality 1N.

PW N°4: Measurement of the density of a few....

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 checks and half-yearly examinations**

## References

1. Jacques Maddaluno, Véronique Bellosta, Isabelle Chataigner, François Couty, et al., 2013. Chimie organique. Ed. Dunod, Paris, 576 p.
2. Jean-François Lambert, Thomas Georgelin, Maguy Jaber, 2014. Mini manuel de Chimie inorganique. Ed. Dunod, Paris, 272 p.
3. Elisabeth Bardez, 2014. Mini Manuel de Chimie générale : Chimie des Solutions. Ed. Dunod, Paris, 256 p.
4. Paula Yurkanis Bruice, 2012. Chimie organique. Ed. Pearson, 720 p.
5. Jean-Louis Migot, 2014. Chimie organique analytique. Ed. Hermann, 180 p.

**Semester :1<sup>st</sup> Semester**

**TU:Fundamental Teaching Unit**

**Subject 2:cellular biology**

### **Teaching objectives**

The objectives of this teaching is 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 components. These objectives are reinforced by practical sessions in the laboratory.

**Recommended prior knowledge:** The student must have knowledge in General Biology.

### **Subject content:**

#### **1.Generalities**

- 1.1.Classification and relative importance of the living kingdoms
- 1.2.Cell and cell theory
- 1.3.Origin and evolution
- 1.4.Cell types (Prokaryote, Eukaryote, Acaryote)

#### **2. Studying cell Methods**

- 2.1.Optic 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 cellular wall**

### **Tutorials / Practical work:**

#### **1.Methods of studying cells**

- 1.1.Separation of cell components
- 1.2.Observation of cellular components
- 1.3.Identification of cellular components
- 1.4.Plant wall

#### **2.Cell cultures**

#### **3.Tests of physiological functions**

- 3.1.Reconstruction of the function from the isolated components
- 3.2.Anatomical tests: autoradiography, fluorescence markings, green fluorescent proteins.
- 3.3.Physiological tests: control of the expression of a protein, mutation, Overexpression.

#### **Assessment method**

Continuous control and semester examinations

#### **References**

1. B. Albert, A. Johnson, J. Lewis, M. Raff, K. Roberts et P. Walter, 2011. Biologie moléculaire de la cellule. Ed. Lavoisier, Paris, 1601p.
2. Abraham L. Kierszenbaum, 2006. Histologie et biologie cellulaire: Ed De Boeck, 619p.
3. Thomas Dean Pollard et William C. Earnshaw, 2004. Biologie cellulaire. Ed. Elsevier Masson, Paris, 853p.
4. Marc Maillet, 2006. Biologie cellulaire. Ed. Elsevier Masson, Paris, 618p.



**Semester :1<sup>st</sup> Semester**

**TU:Fundamental Teaching Unit**

**Subject 3 : Mathematics, Statistics**

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.

**Recommended prior knowledge:** The student must have knowledge of functions, integrals and random variables.

**Subject content:**

### **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

### **Assessment method**

Continuous control and semester exam

## References

1. Jean Bouyer, 2000. Méthodes statistiques : médecine-biologie. Ed. Estem.
2. Gilles Stoltz et Vincent Rivoirard, 2012. Statistique mathématique en action. Ed. Vuibert, Paris, 448p.
3. Maurice Lethielleux, 2013. Statistique descriptive. Ed. Dunod, Paris, 160p.
4. Maurice Lethielleux et Céline Chevalier, 2013. Probabilités : Estimation statistique. Ed. Dunod, Paris, 160p.

**Semester :1<sup>er</sup>Semester**

**TU:Methodological Teaching Unit 1**

**Subject :Geology**

Teaching objectives: Subject allows students to see the components and structure of the terrestrial globe, the interactions between these components, the external and internal geodynamics.

Recommended prior knowledge: No prerequisites

**Subject content:**

### **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 work**

PW N°1 : Topography  
PW N°2 : Geology (Cuts)  
PW N°3 : Rocks and minerals

## **Assessment method**

Continuous control and semester examination

## **References**

1. Jean Dercourt, 1999. Géologie : cours et exercices. Ed. Dunod, Paris,
2. Denis Sorel et Pierre Vergely, 2010. Initiation aux cartes et aux coupes géologiques. Ed. Dunod, Paris, 115p.
3. Jean Tricart, 1965. Principes et méthodes de la géomorphologie. Ed. Masson, Paris, 496p.



**Semester** : 1<sup>st</sup> Semester

**TU:**Methodology Teaching Unit

**Subject 2:** Communication and expression techniques 1 (in French)

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

**Recommended prior knowledge** : No prerequisites

**Subject content:**

- 1.Scientific Terminology
- 2.Text study and comprehension
- 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.

**Assessment method**

Continuous control and semester examination

**References**

Scientific articles and dissertations

**Semester** :1st Semester

**TU**: Discovery Teaching Unit:

Subject : Working Method and Terminology 1

**Teaching objectives**:Helping students to design research the methods of and synthesis work according to scientific rules.

**Recommended prior knowledge**: The student is supposed to have basic notions about bibliographic research.

**Subject content:**

- Introduction to bibliographic
- research Writing a scientific report
- Introduction to reading and understanding a scientific article

**Assessment method**

Continuous control and semi-annual review

**References:**

Books, websites, etc.

**Semester : 1<sup>st</sup> Semester**

**TU: Transversal Teaching Unit**

**Subject : Universal history of biological sciences**

**Teaching objectives:** This program must emphasize on the history of biology, and the question of life through eras and civilizations. It must highlight the place of technical progress that led to the evolution of biology.

**Recommended prior knowledge:No prerequisites.**

**Material content:**

- 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

**Assessment method**

Semester examination

**Reference**

1. Denis Buican, 2008. Darwin dans l'histoire de la pensée biologique. Ed. Ellipses, 232p.
2. Christophe Ronsin, 2005. Histoire de la biologie moléculaire. Ed. De Boeck, 106p.
3. Jean Théodoridès, 2000. Histoire de la biologie. Ed. Puf, 127p.



**Semester : 2<sup>nd</sup> Semester**

**TU: Fundamental Teaching Unit**

**Subject 1: Thermodynamics and chemistry of mineral solutions**

**Teaching objectives:** This course provides a certain understanding of the principles governing the transformations and interactions of Subject, the principle of thermodynamics, energy balance, and the kinetics of chemical reactions.

**Recommended prior knowledge :** The student must have knowledge of oxidation-reduction reactions.

### **Subject content:**

#### 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

1.1.3. 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

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. Mineral chemistry

#### **Tutorials :**

Exercise N°1 : Chemical kinetics

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

Exercise N°3 : Redox balances

Exercise N°4: Thermodynamics and thermochemistry

Exercise N°5 : Organic Chemistry (Reaction Mechanisms)

#### **Practical work**

Practical work 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 initial velocities method.

Part 2 : Influence of temperature on reaction rate

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

### **Practical work N°2: Titrimetric analysis method in acid-base. Acid-base neutralization**

#### **Part 1: Dosage by colorimetry**

##### Objective :

- Dosage of a strong acid solution (HCl) with a strong base (NaOH).
- Determination of the concentration of a weak acid solution (CH<sub>3</sub>COOH) with a strong base solution (NaOH).

#### **Part 2 : Dosage by pH meter**

Objective : Dosage of a weak acid solution (CH<sub>3</sub>COOH) with a strong base (NaOH).

### **Practical work N°3: Titration by the oxidation-reduction method. Manganometric determination of Fe<sup>2+</sup>**

##### Objective :

- Determination of the normality of a given solution of KMnO<sub>4</sub>
- Determination of Fe concentration<sup>2+</sup>contained in a solution of FeSO<sub>4</sub>.

### **Practical work 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 precipitation reactions
- Express the relationship between equilibrium constant and solubility.

#### **Assessment method**

Continuos control and half-yearly examination

#### **References**

1. John C. Kotz et Paul M. Treichel, 2006. Chimie des solutions. Ed. De Boeck, 376p.
2. René Gaborriaud et al., Thermodynamique appliquée à la chimie des solutions. Ed. Ellipses, 335p.

**Semester : 2<sup>nd</sup> Semester**

## TU:Fundamental Teaching Unit

### Subject 2:General plant biology

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

Recommended prior knowledge: The student must have certain notions about the different parts of a plant.

#### **Subject content:**

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 dicots

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.  
Poll  
en

5.2.  
Ovu

m and embryo sac

6.Fertilization

6.1.egg and embryo

6.2.Concept of development cycle

**Practical work :**

**Practical work N°1 :** Morphological study of Angiosperms (roots-stems-leaves-flowers)

**Practical work N°2 :** Morphological study of Gymnosperms (roots-stems-leaves-flowers)

**Practical work N°3 :** Primary meristems (root and stem)

**Practical work N°4 :** Covering fabrics: epidermis – piliferous layer – corky layer - suberoid

**Practical work N°5 :** Parenchyma (chlorophyllian-reserve-aeriferous-aquifer)

**Practical work N°6 :** Supporting tissues (collenchyma-sclerenchyma)

**Practical work N°7 :** Secretory tissues (hairs-glands-tannins-laticifer cells)

**Practical work N°8 :** Primary conductive tissues (phloem-xylem)

### **Assessment method**

Continuos control and half-yearly examination

### **Reference**

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

**Semester : 2<sup>nd</sup> Semester**

**TU:Fundamental Teaching Unit**

**Subject 3:General animal biology**

**Teaching objectives:** This module consists of introducing students to the particularities of the developmental biology of certain animal species.

**Recommended prior knowledge :** No prerequisites.

**Material content:**

**First part: Embryology**

- 1.Introduction
- 2.Gametogenesis
- 3.Fertilization
- 4.Segmentation
- 5.Gastrulation
- 6.Neurulation: becoming sheets
- 7.Delimitation: appendages of birds
- 8.Particularities of human embryology (Cycle, nidation, development of annexes, 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

**Titles : Practical Works-Tutorials**

- |                                   |  |
|-----------------------------------|--|
| No. 1:Gametogenesis               | No. 2:Fertilization segmentation in the sea urchin |
| No. 3:bird amphibian gastrulation | No. 4:Exercises on gastrulation and neurulation    |
| 5:neurulation appendages birds    | No. 6:Human embryology                             |

**Assessment method**

Continuous control and semi-annual examination

**References**

Paul Richard W. Histologie fonctionnelle

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**Establishment: U. Khemis Miliana Title of the license: Agrifood Technology and Quality Control**

**Academic year: 2022 - 2023**

**Semester : 2<sup>nd</sup> Semester**

**EU:Methodology Teaching Unit**

**Subject 1:Physics**

**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.

**Recommended prior knowledge :** Students must have basic notions in mathematics and mechanics.

**Material content:**

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.Optical

2.1.1.Introduction (lens of optics)

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

2.2.Geometrical optics

2.2.1.Principles of geometrical optics and propagation of light.

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

2.2.2.1.Plane diopters, conjugation formula, Blade with parallel faces and Prism.

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

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

2.2.3.Reflection

2.2.3.1.Plane mirror (image construction)

2.2.3.2 Spherical mirror (image construction, conjugation formula)

2.2.4.Optical instruments

2.2.4.1.The eye

2.2.4.1. 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 :**

- N°. 1.Exercises on dimensional analysis and the calculation of errors.
- N°. 2.Exercises on the propagation of light, plane diopters and the prism
- N°. 3.Exercises on spherical diopters and thin lenses.
- N°. 4.Exercises on plane and spherical mirrors and the reduced eye.
- N°. 5.Exercises on Pascal's law and Archimedes' thrust. (Hydrostatic)
- N°. 6.Exercises on Bernoulli's law (hydrodynamics)

#### **Assessment method**

Continuous checks (presentation + test) and Semester examination.

#### **References**

- 1. Christophe Texier, 2015. Mécanique quantique. Ed. Dunod, Paris.
- 2. Eugene Hecht, 1998. Physique. Ed. De Boeck, 1304p.
- 3. Michel Blay, 2015. Optique. Ed. Dunod, Paris, 452p.



**Semester : 2<sup>nd</sup> Semester**

**TU:Methodology Teaching Unit**

**Subject 2:Communication and Expression Techniques 2 (in English)**

**Goals Education :** This subject complete learning of the understanding and writing scientific documents in English.

**Recommended prior knowledge:** No prerequisites.

**Material content:**

- 1.Scientific Terminology
- 2.Text study and comprehension
- 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.

**Assessment method**

Continuos control and half-yearly examination.

**References**

Scientific papers

**Semester** : 2<sup>nd</sup> Semester

**TU**: Discovery Teaching Unit

**Subject** : Life sciences and socio-economic impacts

**Teaching objectives** : Helping students to conceive of professions indirectly directly or linked to the various specialties of the natural and life sciences.

Recommended prior knowledge: No prerequisites.

**Subject content:**

1. Animal and plant production (breeding, processing, production, etc.)
2. Toxicology and environmental health (effect of pollutants on plant and animal life and on human health)
3. Biology and health (talk about the interest of biology in the diagnosis of animal and plant diseases),
4. Biotechnology and molecules of interest (pharmaceutical and food industry),
5. Biology and criminalistics
6. Terrestrial and marine ecosystems (management of parks, etc.)
7. Technical-commercial biology (ex: commercial delegate).

**Assessment method**

Continuous control and semi-annual review

References :

Books, websites, etc.

**Semester** : 2<sup>nd</sup> Semester

**TU:** Transversal Teaching Unit

**Subject:** Working method and terminology 2

**Teaching objectives:** Helping students to design research the methods of and synthesis work according to scientific rules.

**Recommended prior knowledge** : The student is supposed to have notions in bibliographic research.

**Material content:**

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

#### **Assessment method**

Semester examination

#### **References**

Scientific papers

**Semester: 3<sup>rd</sup> Semester**

**TU: Fundamental Teaching Unit 1**

**Subject 1: Plant Physiology**

### **Teaching objectives**

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

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

***The student must master concepts in Botany and Plant Physiology.***

### **Content of the subject**

#### **Part 1 Nutrition**

1. Reminder of the basic concepts
  - 1.1. Organization of a plant
  - 1.2. Organization of a plant cell
- 4 Water nutrition (mechanism of water absorption and transit)
- 4 Sweating 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 2: Development**

1. Seed formation
2. Sprouting
3. Growth
4. Flowering
5. Fruiting

## **Practical work**

### **A. Water nutrition**

PW N°1 : Osmolarity (spectrophotometry)

PW N°2 : transpiration

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 : Total protein electrophoresis

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 : Seeds germination

## **Assessment method**

Continuous control and semi-annual review

## References

- 1- Béraud J., 2001- Le technicien d'analyses biologiques. Guide théorique et pratique. Ed. Tec et Doc, Paris, 208p.
- 2- Dupont G., Zonszain F. et Audigié C., 1999- Principes des méthodes d'analyse biochimiques. Ed. Doin, Paris, 207p.
- 3- Burgot G., Burgot J.L., 2002- Méthodes instrumentales d'analyse chimique et applications : Méthodes chromatographiques, électrophorèses et méthodes spectrales. Ed. Tec et Doc, Paris, 306p.
- 4- Heller R., Esnault R. et Lance C., 2005- Physiologie végétale : Tome 1, Nutrition. Ed. Dunod, Paris, 209p.
- 5- Morot-Gaudry J.F., Moreau F. et Prat R., 2009- Biologie végétale : Nutrition et métabolisme. Ed. Dunod, Paris, 224p.

**Semester:** 3<sup>rd</sup> Semester

**TU :** Fundamental Teaching Unit 1

**Subject 2 :** Food and food system

### **Teaching objectives**

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

***No prerequisites***

### **Content of the subject**

1. History and evolution of food
2. Food security
3. Conventional food system (conventional sources of nutrients)
4. Unconventional food systems (recovered proteins, biomass recovery, etc.)

### **Assessment method**

**Continuous control and semi-annual examination.**

### **References**

**Semester** : 3<sup>rd</sup> Semester

**TU** : Fundamental Teaching Unit 2

**Subject 1** : Biochemistry

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

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

### Content of the subject

1. Chemical bonds
  - 1.1. Strong links
  - 1.2. Weak bonds
2. Structure and physico-chemical properties of carbohydrates
  - 2.1. simple dars
  - 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. action Mechanisms
  - 5.3. Active website
  - 5.4. Enzyme kinetics and types of representation
  - 5.5. Enzymatic inhibition
  - 5.6. Allosteric phenomena
6. Notion



ons of bioenergetics

6.1. Types of chemical reaction

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

10. 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

## **Assessment method**

Continuous control and semi-annual review

## **References**

1. Cathérine Baratti-Elbaz and Pierre Le Maréchal, 2015- Biochemistry. Ed. Dunod, Paris, 160p.
2. Norbert Latruffe, Françoise Bleicher-Bardelett, Bertrand DucloS and Joseph Vamecq, 2014- Biochemistry. Ed. Dunod, Paris.
3. Serge Weinman and Pierre Méhul, All biochemistry. Ed. Dunod, Paris, 464p.
4. Françoise Lafont and Christian Plas, 2013- Biochemistry exercises. Ed. Doin, Paris, 410p.

**Semester** : 3<sup>rd</sup> Semester

**TU** : Fundamental Teaching Unit 2

**Subject 2** : Genetics

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

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

### **Content of the subject**

#### **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
- 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:

Tut N°1: Genetic material

Tut N°2: Transmission of characters

Tut N°3: Mono and di hybridism (Special cases)

Tut N°3: Related genes

Tut N°4: Genetic maps

Tut N°5: Protein Synthesis (Genetic Code)

Tut N°6: Fine structure of the gene (intragenic recombination)

Tut N°7: Conjugation and factorial map

Tut N°8: Population genetics

Tut N°9: DNA extraction

Tut No. 10: DNA assay

Tut No. 11: BARR corpuscle

### **Assessment method**

Continuous control and semi-annual examination

## References

- 1- Pasternak J.J., 2003- Génétique moléculaire humaine. Ed. De Boek, 522 p.
- 2- Harry M., 2008- Génétique moléculaire et évolutive. Ed. Maloine.
- 3- Watson J., Baker T., Bell S., Gann A., Levine M. et Losick R., 2010- Biologie moléculaire du gène. Ed. Pearson.
4. Henry J.P. et Gouyon P.H., 2003- Précis de Génétique des Populations. Ed. Dunod.

**Semester** : 3<sup>rd</sup> Semester

**TU** : Methodological Teaching Unit 1

**Subject** : Communication and Expression Techniques

**Teaching objectives** (*Describe what skills the student is supposed to have acquired after passing this subject – maximum 3 lines*).

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

*Certain notions of terminology and research methodology acquired in L1.*

#### **Content of the subject**

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

#### **Assessment method**

Semester examination

#### **References**

*(Books and handouts, websites, etc.)*, Research article.

**Semester** : 3<sup>rd</sup> Semester

**TU** : Methodology Teaching Unit 2

**Subject** : Biophysics

### Teaching objectives

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

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

### Content of Subject

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

V.3 Sedimentation

## VI. Sound and ultrasonic waves

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

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

VI.3. Ultrasound: definition, measurements and biological applications.

### **Practical work:** (do at least 3 practical exercises)

Practical work N°1 : Surface tension

Practical work N°2 : Conductometric titration

Practical work N°3 : Titration by PH meter

Practical work N°4 : Viscosity measurement

Practical work N°5 : Spectrophotometer

Practical work N°6 : Refractometer

### **Assessment method**

Continuous checks (presentation + test) and Semester examination.

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

- F. Grémy et J. Perin. *Eléments de Biophysique*. Tome 1 et 2. Flammarion. Paris.
- C. Bénézech et J. Llory. *Physique et Biophysique*. Masson et Cie. Paris, 1973.
- Y.THOMAS, 2000, *Biophysique à l'usage des étudiants en sciences biologique*, Bréal, Paris.
- A. Bertrand, D. Ducassou et JC. Healy. *Biophysique. Utilisation médicale des rayonnements – Vision – Audition*.



**Semester** : 3<sup>rd</sup> Semester

**TU** : Discovery Teaching Unit

**Subject 1** : Environment and sustainable development

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

*No prerequisites*

### **Content of the subject**

1. Definitions: Environment, components of an environment, sustainable development.
2. Meaning of development?
  - 2.1. The main dimensions of the environmental crisis: human demography, global warming, fossil fuels (non-renewable), depletion of natural resources, drinking water, biodiversity and agriculture
  - 2.2. 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 healthcare (societal).

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

### **Program for personal work**

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

### **Assessment method**

Continuous control and semi-annual examination

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

**Semester** : 3<sup>rd</sup> Semester  
**TU** : Transversal Teaching Unit  
**Subject** : University Ethics and Deontology

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

### Content of the Subject

- 1.INTRODUCTION: Contexts of the Algerian university
- 2.CONCEPTS
  - 2.1 Morale
  - 2.2 Ethics
  - 2.3 Ethics
  - 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 Fundamentals
  - 3.2 Rights
  - 3.3 Obligations and duties
4. APPLICATIONS
  - 4.1 Teaching: courses, evaluation of knowledge and behavior .....
  - 4.2 Scientific research: research methodology, plagiarism, copyright, scientific writing.....

### Assessment method

Semester examination

### References

- Bergadaà, M., Dell'Ambrogio, P., Falquet, G., Mc Adam, D., Peraya, D., & Scariati, R. (2008). La relation éthique-plagiat dans la réalisation des travaux personnels par les étudiants.
- Charte de l'éthique et de la déontologie universitaires, Alger, mai 2010 [www.mesrs.dz](http://www.mesrs.dz)
- Gilbert Tsafak, Ethique et déontologie de l'éducation *Collection Sciences de l'éducation* Presses universitaires d'Afrique, 1998
- Gohier, C., & Jeffrey, D. (2005). *Enseigner et former à l'éthique*. Presses Université Laval.
- Jaunait, A. (2010). Éthique, morale et déontologie. *Poche-Espace éthique*, 107-120.

**Semester** : 4<sup>th</sup>Semester

**TU:** Fundamental Teaching Unit 1

**Subject** : animal physiology

### **Educational objectives of the course**

animal physiology is a basic teaching of the understanding of the physiological phenomena intervening during the human food.

- a. .Knowledge of the physiology of digestion and tissue and cell nutrition and its position in all major functions: role and interactions.
- b. Physiological phenomenon within the biological matrices source of foods of animal origin: Tissue and cellular phenomena within the raw materials of foods of animal origin (meat, fish and meat products, egg and egg products).

At the end of this teaching, the student will be able to explain physiological phenomena and to understand their origin, the process and their results.

Prior knowledge recommended Knowledge of animal biology and physiology.

### **Content of the subject**

1. Physiology of Breathing
2. Nervous system
3. Cardiovascular system
4. Circulatory system
5. Elimination and secretion

### **Staff :**

- Compulsory and optional reading of resources and course materials indicated by the teacher
- Preparation of practical work topos and writing of reports

### **Practical work proposal:**

- Histology practical work : realization of histological sections, observation, comparison between healthy tissues and/or subject to a pathology
- Practical work on the study of blood parameters: the membrane permeability of animal cells (red blood cells)... -

**Assessment method:**

Continuous assessment, examination, etc...(The weighting is left to the appreciation of the training team)

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

- MARIEB Elaine Nicpon : Anatomie et Physiologie humaines, (2016), édition De Boeck Université.
- SILBERNAGL et DESPOPOULOS : Atlas de poche de physiologie, (2011) 3e édition, Flammarion.
- Travaux pratiques de physiologie animale, (2009) Université de Bretagne Nord

**Semester** : 4<sup>th</sup> Semester

**TU** : Fundamental Teaching Unit 2

**Subject 1** : Microbiology

### Teaching objective

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

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

*The student must have a global notion of pathogenic agents.*

### Content of the Subject

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
    - 2.6.2. Composition
    - 2.6.3. Chemical replication

- 2.6.4. Structure
- 2.7. Plasmids
  - 2.7.1. Structure
  - 2.7.2. Replication
  - 2.7.3. Properties
- 2.8. Pilli
  - 2.8.1. Structure
  - 2.8.2. Function
- 2.9. The capsule
  - 2.9.1. Morphology
  - 2.9.2. Chemical composition
  - 2.9.3. Functions
- 2.10. Cilia and flagella
  - 2.10.1. Highlighting
  - 2.10.2. Structure
  - 2.10.3. Functions
- 2.11. the spore
  - 2.11.1. Morphology
  - 2.11.2. Structure
  - 2.11.3. Sporulation phenomena
  - 2.11.4. Properties
  - 2.11.5. Sprouting3.
- 3. Bacterial classification
  - 3.1. Phenetic classification
  - 3.2. Phylogenic classification
  - 3.3. Bergey classification
- Bacterial Nutrition
  - 4.1. Basic needs
  - 4.2. Growth factors
  - 4.3. Trophic types
  - 4.4. Physico-chemical parameters (temperature, pH, O<sub>2</sub> and aW)
- 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 :**

PW N°1 : Introduction to the microbiology laboratory

PW N°2 : Method of studying microorganisms and the different sterilization processes

PW N°3 : Seeding methods;

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

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

PW N°6 : Gram staining

PW N°7 : Culture media

PW N°8 : Study of bacterial growth

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

PW No. 10 : Yeasts and cyanobacteria

PW N°11 : Growth inhibitors, antibiogram

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

**Assessment method**

Continuous control and semi-annual review

**References**

1. Henri Leclerc, Jean-Louis Gaillard et Michel Simonet, 1999- Microbiologie générale. Ed. Doin, Paris, 535p.
2. Jerome Perry, James Staley et Stephen Lory, 2004- Microbiologie-Cours et questions de révision. Ed. Dunod, Paris, 889p.
3. Jean-Pierre Dedet, 2007- La microbiologie, de ses origines aux maladies émergentes. Ed. Dunod, Paris, 262p.



**Semester:** 4th Semester

**TU :** Fundamental Teaching Unit 2

**Subject 2:** Foods and Food Technology Basics

**Teaching objective**

Introduction to the basic definitions of food and the multitude of food groups and the degrees and processes of transformation. At the end of this course, the student will be able to differentiate the food groups and to know their characteristics as well as the bases of their manufacture and transformation of agricultural raw materials.

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

*The student must have basic knowledge of the immune system.*

**Content of Subject**

1. Food groups
2. General food characteristics
3. Introduction to food processing and production technologies
4. Unit operations of food processes
5. Effect of processing on food quality

**Staff :**

Compulsory and optional reading of resources and course materials indicated by the teacher

**Proposal for field trips :** Food production unit visit.

**Assessment method:**

Continuous assessment, examination, etc...(The weighting is left to the appreciation of the training team)

**References :**

- Benjamin K. Simpson & collaborators: Food biochemistry and food processing. Wiley-Blackwell. 2012.
- Arnold Bender : Food processing and nutrition. Academic press. 1978.

**Semester:4thSemester**

**TU : Methodological Teaching Unit 1**

**Subject : Applied Immunology**

**Teaching objective**

*Introduction to basic definitions of terms and methods used in immunological analysis.*

*At the end of this teaching, the student will be able to differentiate the techniques of immunology and to know their principle.*

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

*No prerequisites*

**Content of Subject**

I – Generalities

I-1 Antigen-antibody reaction

- Antigen
- Immunogenicity
- Antigenicity
- Antibody
- Isotypes

I-2 Supplement

II- Immunology techniques

II-1-Precipitation reaction

II-1-1 Precipitation in liquid medium, Precipitation in gelled

medium II-1-2 Immunodiffusion

II-1-3 Single immunodiffusion, Double immunodiffusion, Radial immunodiffusion

II-1-4 Immuno-electrophoresis

II-1-5 Electro-immunodiffusion or electrosyneresis

II-2- Agglutination and hemagglutination reaction: Coombs test

II-3- Neutralization reaction

II-4- Complement fixation reaction and hemolysis II-5-

Techniques using enzyme-labeled reagents II-5-1 Enzyme

immunoassay technique (ELISA)

II-5-2 Direct ELISA, indirect ELISA, sandwich ELISA

II- 6- Techniques using reagents labeled with fluorochromes II-

6-1 Immunofluorescence technique

II-6-2 Direct immunofluorescence, Indirect immunofluorescence

II-7-Techniques using radiolabeled reagents: Radioimmunoassay (RIA) II-8-

Vaccination and serotherapy

II-9-Technique of monoclonal antibodies

II-10- Diagnosis of pathologies affecting the immune system:

II-10-1 Hypersensitivity,

II-10-2 Autoimmune diseases,

II-10-3 Organ transplantation,

II-10-4 Immune deficiencies

### **Assessment method**

Continuous control and semi-annual review

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

**Semester** : 4<sup>th</sup>Semester

**TU** : Methodology Teaching Unit 2

**Subject** : Bio Statistics

### **Teaching objective**

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

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

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

### **Content of the subject**

#### **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 : distributions: 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

**Assessment method**

Continuous control and semi-annual examination

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

1. BENZEON J.P., 1984- L'analyse des données. Ed. Bordas, Tomes I et II.
2. HUET S., JOLIVET E. et MESSEON A., 1992- La régression non linéaire : méthodes et applications en biologie. Ed. INRA.
3. TROUDE C., LENOUR R. et PASSOUANT M., 1993- Méthodes statistiques sous Lisa - statistiques multi variées. CIRAD-SAR, Paris, PP : 69-160.

**Semester** : 4<sup>th</sup> Semester

**TU** : Discovery Teaching Unit

**Subject** : Plants and Environment

### Teaching objective

This subject aims to initiate the classification and anatomical characterization of the major groups of the plant kingdom.

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

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

### Subject Content

Definitions, concepts and classification criteria.

Systematics of major plant groups

#### 1. Algae

1.1. Prokaryotic Algae (Cyanophytes / Cyanobacteria)

1.2. Eukaryotic Algae, systematics and particularities of the main groups

- Glaucophyta, Rhodophyta, Chlorophyta and Streptophyta

- The Haptophyta, Ochrophyta, Dinophyta, Euglenozoa, Cryptophyta, Cercozoa

#### 2. Fungi and lichens

2.1. Systematics and peculiarities of the main groups of fungi

- Myxomycota and Oomycota

- Eumycota (Chytridiomycota, Zygomycota, Glomeromycota, Ascomycota,

Basidiomycota)

2.2. A particular algae-fungus association: lichens

#### 3. Embryophytes

3.1. Bryophytes

- Marchantiophytes, Anthocerotophytes and Bryophytes. *str.*

### 3.2. Pteridophytes

- Lycophytes, Sphenophytes and Filicophytes

### 3.3. Gymnosperm *sensu lato*

- Cycadophytes, Ginkgophytes, Coniferophytes and Gnetophytes

### 3.4. Angiosperms

- Vegetative apparatus, Morphology and Floral Biology
- Notion of modern systematics and Diversity of Angiosperms
- Primitive Angiosperms, Monocotyledons, Eu-Dicotyledons
- Main families of angiosperms

### 4 Relations of plants with the environment

- Relationships of plants with organisms in an ecosystem,
- Plant adaptations to the environment

### **Assessment method**

Continuous control and semi-annual review

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

**Semester : 4<sup>th</sup> Semester**

**EU:Transversal Teaching Unit**

**Subject : Computer tools**

**Teaching objective**

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

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**Content of Subject**

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

**Assessment method:**

Semester examination



**Semester:** 5 the Semester

**TU :** Fundamental unit (FU 3.1.1)

**Subject 1:** Food microbiology

**Credits:** 4

**Coefficient:** 2

### **Objectives**

The purpose of teaching food microbiology is to provide the necessary information on the main microorganisms of interest in the food industry, to evaluate the sanitary and hygienic qualities of foodstuffs and to show that the development of these microorganisms can have health-related incidents in the case of pathogenic germs. From a technological point of view, it is also a question of showing the properties and capacities of microorganisms to produce useful substances for the food industry and Bio-industries.

### **Recommended prerequisites**

General microbiology, biochemistry, microbiological analysis, chemistry, etc.

### **Content:**

Introduction

Section 1: The major bacteria

1. The major microbial groups of interest to food microbiology

1.1 Background

1.2. Enterobacteria

1.3. Pseudomonas

1.4. Acetic acid bacteria

1.5. Vibrio

1.6. Brucella

1.7. Micrococci

1.8. Streptococci

1.9. Lactobacilli

1.10. Actinobacteria

1.11. Aerobic Sporulating Bacteria

1.12. Anaerobic Sporulating Bacteria

2. Fungi

2.1. Moulds

2.2. Yeasts

2.2.1. Alcoholic fermentation

2.2.2. Respiratory metabolism

2.2.3. Physiologic nutrition

### **Section 2: Influence of Production Techniques on Microbes**

1. Destruction of the manufacturing flora on microbes

2. Chemical factors (antiseptics, fungicides, antibiotics)

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3. Stabilization of the flora
  - 3.1 Physical factors (cold, freezing, lyophilization)
  - 3.2 Chemical factors (fungistatic, bacteriostatic)
4. Activation and orientation of the flora
5. Search for optimal environmental conditions for the development of the flora

### **Section 3: Microbiological problems in a food industry**

1. Contamination by air, personnel, raw materials etc.
2. Manufacturing accidents

### **Section 4: Biotechnological processing**

1. Preparation of amino acids,
2. Preparation of organic acids,
3. Preparation of vitamins,
4. Preparation of proteins from unicellular organisms

### **Section 5: Poisoning and Toxi-infections**

1. Botulism
2. Salmonellosis
3. Staphylococci
4. Mycotoxins
5. Marine food poisons

### **Practical work**

#### **Microbiological analysis of foods**

1. Water
2. Milk
3. Fermented milks and cheeses
4. Butter and fat
5. Meat and meat products
6. Fish and seafood
7. Alcoholic and non-alcoholic beverages
8. Plant products and derivatives
9. Canned goods
10. Various foods (creams, prepared dishes, etc.)

### **Assessment method:** (type of assessment and weighting)

Continuous assessment and semester examination

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

**Semester : 5**

**Fundamental Unit (FU 3.1.1)**

**Subject 2: Food biochemistry**

**Credits : 4**

**Coefficient : 2**

**Objectives**

The teaching of food biochemistry aims at describing to the students the main food constituents, their importance in technological and functional properties. This subject also aims at introducing students to the main biochemical evolutions (or modifications) of major constituents during technological processes.

**Recommended prerequisites**

Biochemistry, chemistry, physics, thermodynamics, etc.

**Content:**

**Section 1:Water**

- General information

1. Structure of water
2. Physical Properties
3. Water activity
4. Behaviour of water in solutions during freezing
5. Adsorption isotherms
6. Hysteresis phenomena of isotherms
7. Sorption isotherms in the food industry.

**Section 2: Protein systems**

1. Physical properties of proteins
2. Extraction of food proteins (methods, properties and use of protein concentrations and isolates)
3. Egg proteins: properties and use
4. Functional properties of milk proteins and improvement
5. Protein ingredients

**Section 3: Fats**

1. Chemical and physical properties of lipids
2. Functional properties of some fatty substances
3. Nutritional requirements of fats
4. Preservation and alteration

**Section 4: Study of polysaccharides**

1. Cellulose and its derivatives
2. Starch
  - 2.1. Gelling and retrogradation phenomena
  - 2.2 Rheological behaviour

3. Functional properties of native and modified starches
4. Amylolytic enzymes and their use
5. Dietary fibres
- 5.1. The Case of Pectins
- 5.2. Gelation

### **Section 5: Food Systems**

1. General aspects
2. Plant-based food systems
- 2.1. Primary and secondary metabolites
- 2.2 Cereals, legumes, fruits and vegetables, algae
3. Animal food system 3.1.
- 3.1 Muscles
- 3.2. Eggs
- 3.3. Milk
4. Non-conventional food system (I.F.S.)
- 4.1. Protein
- 4.2. Fats
- 4.3. Biomass

### **Section 6: Food Alterations**

1. Role of water
2. Potential sources of spoilage
3. Microbiological, enzymatic and chemical spoilage

**Assessment method:** (type of assessment and weighting)

Report and Semester examination.

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

Cite at least 3 to 4 classical and important references.

**Semester** : 5

**Fundamental Unit** (FU 3.1.2)

**Subject** 1: Food Industry Technology 1

**Credits** : 6

**Coefficient** : 3

**Objectives**

This subject enables students to master the techniques and processes of milk, sugar and fat processing.

**Recommended prerequisites**

Chemistry, Biochemistry, Microbiology, physics, thermodynamics, energetics...etc.

**Content:**

**Part 1: Milk and dairy products**

1. MILK: definition, structure, biochemical composition, factors of variation of the composition
2. DAIRY TECHNIQUES
3. BUTTER-MAKING TECHNIQUES
4. CHEESE-MAKING TECHNIQUES
5. ICE CREAM MAKING TECHNIQUES
6. TREATMENT AND USE OF BY-PRODUCTS OF MILK PROCESSING

**Part 2: Sugar processing**

1. INTRODUCTION
2. BEET SUGAR FACTORY
  - 2.1. Preparation of the beet
  - 2.2 Extraction of beet sugar
  - 2.3 Purification of diffusion juice
  - 2.4. Evaporation
  - 2.5. Crystallization
3. SUGAR REFINING
  - 3.1. Definition of brown sugar
  - 3.2. Refining
  - 3.3. Recasting and clarification
  - 3.4. Concentration and crystallization
  - 3.5. Packaging

**Part 3: Fats and oils industry**

Introduction

1. Raw material: background information on lipids
2. Main fractions of the chemistry of fats
  - 2.1. Hydrolysis
  - 2.2. Neutralization -saponification

- 2.3 Esterification
- 3. Technology of fats: OIL
  - 3.1 Trituration
  - 3.2 Solvent extraction
  - 3.3. Refining
- 4. Margarine production
- 5. Microbiological aspect
- 6. Legislation
- 7. Olive oil manufacturing technology

#### **Part 4: Beverages**

##### I. ECONOMIC OVERVIEW OF THE FRUIT JUICE INDUSTRY

##### II. CLASSIC MANUFACTURING STEPS

- 1. Definition of a juice
- 2. Production line
- 3. Fruit preparation
- 4. Extraction
- 5. Juice processing
- 6. The material
- 7. Continuous unit operations
- 8. Heat and enzymatic treatment of juice
- 9. Physical treatment
- 10. Pasteurization

##### III. SOFT DRINKS

- 1. Composition
- 2. The different treatments
- 3. Packaging

#### **Practical work :**

Visit to a processing unit (dairy, sugar refinery, etc.)

#### **Evaluation method :**

Report and semester examination.

#### **References**

(Books and handouts, websites, etc)

**Semester** : 5

**Fundamental Unit** (FU 3.1.2)

**Subject 2:**Food Hygiene and Safety

**Credits:** 4

**Coefficient** : 2

**Teaching objectives**

This subject deals with the respect of hygiene and quality requirements of foodstuffs in order to protect the health of the consumer on the one hand. On the other hand, it gives the necessary tools to master the notion of quality seen by consumers or users as well as by professionals.

Recommended prerequisites

Microbiology, Food microbiology, Biochemistry, Food biochemistry

**Content:**

**Section 1: What is quality?**

**Section 2: Components of quality**

1. Signs of quality
2. Quality tools
3. Good hygiene practices
4. HACCP
5. ISO 22000

**Practical work:**

Visits to units that have implemented the HACCP system and/or are ISO 22000 certified for the assessment on good hygiene practices and CCP and PRPO monitoring.

**Assessment method:**

Report and Semester Examination

**References**

**Semester** : 5

**Methodological Unit** 1 (MU 1)

**Subject** 1: Statistics and computer science

**Credits** : 5

**Coefficient** : 3

**Objectives**

To teach the students how to carry out a correct sampling, to describe the set of data by their distribution and their statistics, to identify the scientific instrument or the statistical method which is suitable for the purpose. Distribution and statistics identify the appropriate scientific instrument or statistical method for the analysis to the analysis; use the computer tool for statistical analysis.

Recommended Prerequisites

Mathematics, Statistics, Computer Science

**Content** :

COURSE 1: STATISTICS

Reminder of theoretical probabilities

Statistical estimation - estimation by point and by confidence interval of different parameters (percentage, mean, variance)

Hypothesis testing - principles and generalities

Test of conformity

Comparison testing

Tests of fit and independence

COURSE 2: BIOMETRICS

Sampling methods

Validity of tests: notions of sensitivity, specificity, roc curves

Analysis of variance

Generalized linear model

COURSE 3: COMPUTER SCIENCE

Use of spreadsheets for data processing

Use of statistical software

**Assessment method:**

Continuous assessment and semester exam

**References:**

Gévillo, Georges - Génie des procédés / dir. Georges Grévilot. - Paris: Tec et Doc, 1993. - 256 p.

Jeantet, Romain - Génie des procédés appliqué à l'industrie laitière / Romain Jeantet, Michel Roignant, Gérard Brulé. - Paris : Tec et Doc, 2001. - XI- 164 p.



Loncin, Marcel - Génie industriel alimentaire : aspects fondamentaux / Marcel Loncin. - Paris : Masson, 1991. - 304 p  
Simato JD et al La lyophilisation principe et applications collection A.N.R.T 1974

**Semester** : 5

**Methodological Unit** 1 (MU 1)

**Subject** 2: Food and health

**Credits** : 4

**Coefficient** : 2

**Objectives**

Introduce students to new foods called alicaments (functional foods and nutraceuticals) which have the property of not only feeding but also preventing or curing certain human pathologies.

Recommended Prerequisites

This **Subject** requires knowledge of nutrition, physiology, structural and metabolic biochemistry and microbiology.

**Content:**

Introduction

I. Functional foods

I.1 The concept of functional food

I.2 Functional foods and claims

II Functional foods: products

II.1 Probiotics

II.2 Prebiotics

II.3 Synbiotics

II.4 Phytosterols

II.5 Dietary sources of omega n-3 and omega n-6 PUFAs

II.6 Dietary antioxidants

II.7 Phyto-oestrogens

II.7 Nutraceuticals

III. Target functions

III.1 Nutritional modulation of the immune response

III.2 Alkalisising functionality

III.3 Major mineral functionality

IV. Functional foods and disease risk

IV.1 Functional foods and cardiovascular disease

IV.2 Functional foods and intestinal inflammation

IV.3 Functional foods reducing cancer risk

**Assessment mode** :

Semester examination

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**Establishment:** U. Khemis Miliana **Title of the license:** Agrifood Technology and Quality Control  
**Academic year:** 2022 - 2023

**References :**

Roberfroid, Marcel - Les Aliments fonctionnels / Marcel Roberfroid. - Paris: Tec et Doc, 2002. -  
Roudot, Alain-Claude - Rheology and texture analysis of foods / Alain-Claude Roudot. - Paris:  
Tecet Doc, 2001. - XIV-199 p.  
Linden, Guy - Agro-industrial biochemistry: food valorization of agricultural production /  
GuyLinden, Denis Lorient. - Paris : Masson, 1994. - 392 p

**Semester :** 5

**Discovery Unit 1 (DU1)**

**Subject 1:** Metrology

**Credits :** 2

**Coefficient :** 2

**Objectives**

Acquisition of the knowledge relating to the measurement processes by the installation of instruments and measurement plan of measurement. To know how to express the results in numerical form by integrating the notion of uncertainty.

Optimized use of the characteristics of the instruments during the measurement.

Recommended Prerequisites

Mathematics, Statistics, Physics

**Content:**

Introduction to metrology

Organization of metrology

Measuring instruments

Static characteristics: sensitivity, resolution, range, linearity, hysteresis, accuracy, precision, etc.

Dynamic characteristics: frequency response, response time.

Calibration - verification - traceability.

Characterization of the measurement process: Measuring standard (definition), method (validation), material resources.

Instrument performance.

Analysis of the measurement process (identification of causes of error, application of elementary corrections)

Brief establishment of an uncertainty balance. Evaluation of the uncertainty of the result

Expressing the result in the form of a numerical value, a unit and the associated uncertainty.

**Practical work :**

Practical work1: Calibration of measuring instruments: thermometer, balance, ph meter....

Practical work 2: Verification of the metrological characteristics of laboratory equipment

**Assessment method:**

Report and semester examination

**References :**

Practical papers on the analysis of the constituents of food products.

Practical work documents for the analysis of organic compounds

Practical work documents for the analysis of fats

Deymie B., Multon JP. (1981). Techniques d'analyses et contrôle dans les IAA. T4, Editeur Tec et Doc, 409 p.

**Semester:** 5

**Transversal unit 1 (TU 1)**

**Subject 1:** English

**Credits:** 1

**Coefficient :** 1

**Objectives:**

Consolidation of knowledge in English language.

**Required Prerequisites:**

The knowledge of English acquired during the course of the degree.

**Content:**

1. The scientific text: The Food Industry

- History
- Loss of function of agriculture
- Function and characteristics of the food industry
- The basic raw material (milk, fats and oils, starch, sugar)
- Food processing
- Agro-food industry
- Benefits of processing
- Prospects

2. Use of the language

- Pronunciation exercises
- Comparisons (equality, superiority, inferiority)
- Superlatives
- Irregular superlatives
- Idiomatic verbal constructions (Get, Make, Set, etc.)
- Prepositions
- Possessive pronouns and adjectives
- Adjectives
- Reflexive pronouns
- Adverbs
- Apostrophe
- The verb: tense, negation, defective, form
- The conditional
- Research into the multiple meanings of monemes and application

**Assessment method:**

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Semester examination

## References

Books, websites ...

**Semester** : 6

**Fundamental Unit** 1 (FU 3.2.1)

**Subject** 1: Food Toxicology

**Credits** : 4

**Coefficient** : 2

### Objectives:

The aim of this subject is not only to explain the elaboration of a protocol evaluating the safety of substances that can be used in food, but also to explain the approach of the substances that may enter food, but also the biochemical approach of the various phases of the toxic-organism relationships. It therefore aims to explain the mechanisms of toxicity. Thus, when faced with a diet of xenobiotic substances, explaining the double aspect of the toxic-organism relations in aspect of the toxic-organism relationship by introducing the notions of toxicokinetic and toxicodynamic phases of the toxic effect.

### Recommended prerequisites

Physiology, chemistry, biochemistry, microbiology

### Content:

General introduction

#### Section 1: Basics of toxicology

1. Definitions
2. Modes of penetration of toxic substances
  - 2.1. Respiratory route
  - 2.2. Transtegumentary route
  - 2.3 Trophic route
3. Different phases of action of a toxic substance
  - 3.1. Exposure phase
  - 3.2. Toxicokinetic phase
  - 3.3. Toxicodynamic phase
4. Biochemical interpretations of the different phases
  - 4.1. Biochemical aspects of the exposure phase (so-called pharmaceutical phase), qualitative and quantitative knowledge of the constituents of the food, physicochemical form of the contaminant and others)
  - 4.2. Biochemical aspects of the toxicokinetic phase
    - 4.1.1. Transport and distribution processes
    - 4.1.2. Bio-transformation processes
    - 4.1.3. Biochemical aspects of the toxicodynamic phase

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4.1.3.1. Analysis of the effects of compounds on the organism

4.1.3.2 Identifying target organs

4.1.4. Mechanisms of action: toxicodynamic phase

4.1.4.1. Toxic-receptor interaction

4.1.4.2. Classification of effects

4.1.4.3. Measurement of enzymatic activities

## **Section 2: Manifestation and assessment of toxicity**

1. Different types of toxicity

1.1 Acute toxicity

1.2. Taxonomic variation

1.3 Influence of the individual's condition

2. Extrinsic factors

2.1. Bioactivation of toxic substances

2.2. Synergistic and antagonistic action

## **Section 3: Modulation of toxic actions**

- Introduction

- Principle of modulation

1. Introduction of restrictive groupings

1.1 The case of food additives

1.2 The case of plant protection products (residues)

1.3 Case of drugs

2. Bioactivation and inactivation phenomena (Case study of insecticides)

3. Compartmental models and hydrophobic interactions

3.1 Thermodynamic reminders

3.2 Partition coefficient

3.3 Compartmental model: water-lipid type

3.3.1. Dispersion

3.3.2. Passive or active absorption (stomach, intestine)

3.3.3. Transport: affinity with blood proteins

4. Action in the liver (bioinactivation by enzymatic systems)

5. Excretion

6. Particular affinity (accumulation in adipose tissue, bone tissue)

7. Conclusion

## **Section 4: Specific Case Studies**

**Assessment mode :**

Report and Semester Examination

**References:**

Pieron, H. - Eating behaviour and appetite / H. Pieron. - Paris : Editions du centre national de la recherche scientifique, 1952. - 152 p.

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**Establishment: U. Khemis Miliana Title of the license: Agrifood Technology and Quality Control  
Academic year: 2022 - 2023**

Trémolières, Jean - Nutrition : physiologie comportement alimentaire / J. Trémolières. - Paris: Dunod,1977. - 618 p.

Trémolières, Jean - Les Bases de l'alimentation tome 2 / Jean Trémolières, Henri Dupin, Yvonne

Serville, Raymond Jacquot / pref. E. Terroine. - 9th ed. rev. and augmented. - Paris: ESF éditeur, 1980. - 553 p.

Fredot, Emilie - Connaissance des aliments : bases alimentaires et nutritionnelles de la diététique /Emilie Fredot. - Paris : Tec et Doc : 2005. - XXXI-397 p

**Semester** : 6

**Fundamental Unit 1** (FU 3.2.1)

**Subject 2:** Analytical techniques

**Credits** : 6

**Coefficient** : 3

**Objectives**

The aim of the subject is to give the students the concepts of the instrumental methods involved in food control. This teaching is based on 3 aspects:

1. Brief theories of the method
2. Description and operation of the equipment
3. Interpretation of results

The instrumental methods being numerous, it will be developed within the framework of this course those, which are very much used in the food industry.

**Recommended prerequisites**

Chemistry, Physics and optics, Instrumentation...etc.

**Content:**

Section 1: Recall of the elementary notions

1. General information on good laboratory practice,
  - 1.1 Organizational measures
  - 1.2. Products (information on the hazards of chemicals, hazards and risks involved, storage and waste),
  - 1.3 Materials
  - 1.4. Standard operations,
  - 1.5. Premises,
  - 1.6. Behavioural
2. General information on solutions
  - 2.1. Definitions (solute, solvent, concentrations)
  - 2.2. Units of concentration
3. Methods of preparing solutions
  - 3.1 Weighing method

3.2 Dilution method

3.3 Cross method

Section 2: Chemical and Physicochemical Methods of Analysis

1. Chemical methods of analysis

1.1 Gravimetry

1.2. Volumetry

2. Physico-chemical methods

2.1. pH-metry

2.2. conductimetry,

2.3. Polarography

Section 3: Physical methods of analysis

1. Spectrophotometric methods: UV- Visible

2. Chromatographic methods: Thin layer, GC and HPLC.

3. Polarimetry

4. Refractometry

5. Flame emission and atomic absorption

6. Electrophoresis

**Assessment method:**

Report and Semester Examination

**References:**

Deymie B., Multon JP. (1981). Techniques d'analyses et contrôle dans les IAA. T4, Editeur Tec et Doc, 409 p.

Linden G. (1981). Techniques d'analyses et contrôle dans les IAA. T2, Ed. Tec et Doc, 436p

Chappuis P. (1995). Techniques d'analyse des oligoéléments chez l'homme. Edition Tec et Doc, 158p.

Audigié C., (1997). Principles of biochemical analysis methods. Tome 1, Nouvelle collection, Edition

Doin, 207p.

**Semester** :6

**Fondamental unit 2** (UF 3.2.2)

**Subject 1:** Food processing technology 2

**Credits** : 8

**Coefficient** : 4

**Teaching objectives**

This subject enables the students to master the techniques and processes of cereal processing, fruits and vegetables, meat and fish.

Recommended prerequisites

Chemistry, Biochemistry, Microbiology, physics, thermodynamics, energetics...etc.

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**Academic year:** 2022 - 2023

**Content:**

**Part 1: Cereal Technology**

INTRODUCTION

Classification

Cereal sectors

Use of cereals in the world

I. CEREAL GRAINS

1. Structure

2. Composition

3. Distribution of constituents in the grain

II. WHEAT

1. Properties of wheat proteins

2. Primary processing of wheat

2.1. Cleaning

2.2. Preparation

2.3. Milling

3. Linear processing of wheat

3.1. Bread making

3.2. Pasta manufacture

3.3. Couscous manufacture

III. METHODS FOR ASSESSING WHEAT QUALITY

1. Assessment of soft wheat

1.1. Bakery value

1.2. Breadmaking test

2. Assessment of hard wheat

2.1. Semolina value

2.2. Pastry value

2.3. Couscous value

IV. The maize industries

1. General

2. Maize processing

V. RICE

1. General

2. Primary processing - milling

3. Secondary processing

4. Culinary quality of cooked rice

**Practical work :**

Visit to flour and semolina mills

**Part 2: Fruit and vegetable technology**

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Establishment: U. Khemis Miliana Title of the license: Agrifood Technology and Quality Control

Academic year: 2022 - 2023



## Introduction

- Reminders on the usefulness of preservation techniques
- The different factors of alteration of fruit and vegetables
- Maturity

### I. Preliminary treatments to appertisation, freezing and dehydration

1. Washing, sorting, blanching

### II. Preservation by heat

1. Appertisation
2. Packaging
3. Filling, juicing
4. Crimping
5. Preheating

### III. Sterilization

1. Reminders
2. Sterilization of acid products
3. Sterilization of non-acidic products
4. Sterilization Equipment
5. Sterilization defects
7. Use of appertised products
8. Microwave treatments

### III. Canning technology

1. Vegetables
2. Fruit

### IV. Cold preservation

1. Reminders
2. Pre-chilling
3. Refrigeration
4. Storage in conditioned atmospheres
5. Freezing
6. Freezing

### V. Dehydration

1. Introduction
2. Relationship between drying parameters and feed characteristics
3. Storage of dehydrated food
4. Drying equipment and processes
5. Freeze-drying

### VI. Chemical treatments

1. Chemical treatments that do not alter the organoleptic characteristics of the food
2. Treatments that alter the organoleptic characteristics of the food

3. Fermentation

VII. Treatments with ionizing radiation

1. Reminders

2. Main effects on food

3. Application

**Practical work :**

Visit to a fruit and vegetable processing, packaging and preservation unit

**Part 3: Meat and fish technology**

CHAPTER I. PROBLEMS OF THE MEAT SECTOR

CHAPTER II. REMINDERS OF THE COMPOSITION AND STRUCTURE OF MEAT

1. General information on the raw material

2. Composition and structure of meat

CHAPTER III. PRIMARY PROCESSING: SLAUGHTER

1. Slaughtering of cattle and sheep

2. Poultry slaughtering operation

CHAPTER VI. PROCESSING OF SLAUGHTER BY-PRODUCTS, VALORISATION OF THE 5TH QUARTER

CHAPTER V. FISH

1. Composition

2. Nature

CHAPTER VI. COLD TREATMENT OF MEAT AND FISH

1. Refrigeration

2. Freezing

3. Freezing

CHAPTER VII. PRODUCTS OF PROCESSING OF MEAT

1. Technologies used in Algeria: cooking, mincing, salting

2. The structuring of fine pastes (pâté, cachir)

CHAPTER VIII. CANNED FISH (SARDINES, TUNA, ETC.)

**Practical work :**

Visit to a meat-processing unit (slaughterhouse) or a sardine factory.

**Evaluation method:**

Report and semester examination

**References:**

Oudot, C.- La transformation des aliments : génie alimentaire, livre de l'élève / C. Oudot. -

Montigny-le-Bretonneux (Yvelines): Techniplus, 1999. - 79 p

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE (1980)- L' INRA et les industries agricoles et food industries / INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE. -

Paris : INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, 1980. - 169 p.

Loncin, Marcel - Génie industriel alimentaire : aspects fondamentaux / Marcel Loncin. - Paris : Masson,

1991. - 304 p

BONNEFOY - GUILLET F - LEYRAL Guy - VERNE E Sciences des aliments tome 5 : microbiologie et qualité dans les industries alimentaires - 2002 - 240p.

**Semester** : 6

**Methodological** unit 1 (M U 1)

**Subject** 1: Food preservation

**Credits** : 5

**Coefficient** : 3

**Objectives**

This Subject is intended to explain to the students the different sources of food spoilage and the methods of methods of inhibiting these alterations.

**Recommended prerequisites**

Chemistry, Microbiology, Biochemistry,

**Content:**

Sources of food spoilage

- Water and food constituents
- Microbial spoilage
- alteration by genetically modified organisms
- lipid oxidation
- non-enzymatic browning
- enzymatic browning

Stabilization treatments

- refrigeration, freezing and deep-freezing
- concentration by evaporation
- dehydration
- chemical inhibition
- separation: decantation and filtration
- thermal treatments
- ionization

Packaging

- general
- packaging and conservation
  - \*active protection
  - \*passive protection
- main packaging materials
  - \*plastic materials

\*metallic materials

\*biological materials (wood, cellulose, modified starches)

Practical work :

PW1: enzymatic browning

PW2: non-enzymatic browning

PW3: lipid oxidation

**Assessment method:**

Continuous assessment and semester examination

**References:**

Ionising treatments and high pressure food / dir. Michel Federighi, Jean-Luc Tholozan. -Paris:

Polytechnica: Diffusion Economica, 2001. - VIII-258

Cheftel, Jean-Claude - Introduction to biochemistry and foodtechnology volume 1 and 2 /

JeanClaude and Henri Cheftel. - Nouv. éd.. - Paris : Tec et Doc, 1992. - 400 p.

Jeantet, Romain - Science des aliments vol.2 : biochimie microbiologie procédés produits /

Romain. Paris: Lavoisier, 2007. - 456 1 and 2 p.

NOUT R - Food: processing, preservation and quality - 2003

SebastienRoustel - Alimentation et process technologique / Ed. EduCagri, France 2007. 293 p.

**Semester** : 6

**Methodological unit 2 (MU 2)**

**Subject 1:** Process engineering

**Credits** : 4

**Coefficient** : 2

**Objectives of the course**

This **Subject** permits the students to learn about heat exchange as well as the different physical methods of eliminating water from food.

Recommended Prerequisites

Chemistry, Biochemistry, Thermodynamics, Physics

**Content:**

Chapter 1: Heat transfer

Chapter 2: Decanting and centrifugation

Chapter 3: Filtration

**Assessment method** :

Continuous assessment and semester examination

**References** :

Gévillo, Georges - Génie des procédés / dir. Georges Grévillot. - Paris: Tec et Doc, 1993. - 256 p.

Jeantet, Romain - Génie des procédés appliqué à l'industrie laitière / Romain Jeantet, Michel

Roignant,Gérard Brulé. - Paris : Tec et Doc, 2001. - XI- 164 p.

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**Establishment:** U. Khemis Miliana **Title of the license:** Agrifood Technology and Quality Control

**Academic year:** 2022 - 2023

Loncin, Marcel - Génie industriel alimentaire : aspects fondamentaux / Marcel Loncin. - Paris : Masson, 1991. - 304 p  
Simato JD et al La lyophilisation principe et applications collection A.N.R.T 1974

**Semester** : 6

**Discovery unit** 1 (DU 1)

**Subject** 1: Hygiene in the food industry

**Credits** : 2

**Coefficient** : 2

**Objectives of the course**

This subject aims at mastering the different techniques and products of cleaning and disinfection applied in the food industries to ensure the cleanliness of the production lines.

Recommended Prerequisites

Chemistry, Biochemistry, Thermodynamics, Physics

**Content:**

Chapter 1: Materials and their surface properties.

1.1 Characterization of material surfaces.

1.2 Adhesion of Microorganism Particles to Solid Surfaces.

1.3 Corrosion and Anti-Corrosion of Metallic Materials.

Chapter 2: Microbial Ecology

2.1 Importance of Microbial Phenomena in Food and Biological Processes

Chapter 3: Deposit Formation and Fouling

3.1 Deposit resistance and growth

3.2 Formation of crystalline salt deposits

3.3 Formation of proteinaceous salt deposits

Chapter 4: Cleaning and disinfection

4.1 Cleaning

4.1 The mechanism of detergency

4.2 Detergent constituents - their role and action

4.1.2.1 Acids

4.1.2.1 Bases

4.1.2.3 Builders

4.1.2.4 Oxidising agents

4.1.2.5 Sequestering agents

4.1.2.6 Dispersants

4.1.2.7 Solvents

4.1.2.8 Enzymes

4.1.2.9 Surfactants

4.2 Disinfectants

4.2.1 Chlorine and chlorine derivatives

4.2.2 Iodine and iodine derivatives

4.2.3 Procreatic acid

4.2.4 Formaldehyde

4.2.5 Glutaraldehyde

4.2.6 Amphoterics

4.2.7 Quaternary ammoniums

4.2.8 Polyhexomethylene hydrochloride

4.2.9 Chlorhexidine

Chapter 5: Cleaning and disinfection technology

5.1 Rinsing

5.2 Cleaning

5.3 Disinfection

5.4 Cleaning in place

5.5 Inspection of cleaning and disinfection

Chapter 6: Control of airborne contamination. Role of air filtration and ventilation

Chapter 7: Bio-contamination of human angina

Chapter 8: Pest control.

**Assessment method:**

Semester examination

**References :**

Food microbiology. 2, Fermenting foods and food fermentations / coordinators C.M.

Bourgeois, J.P. Larpent. - 2e éd.. - Paris : Tec et Doc : APRIA, 1996. - XX-523 p.

Microbiologie et industrie alimentaire tome 3. - Paris : Association pour la promotion industrie agriculture, 1979. - 162p.

J.V Leveau et M. Bouix, microbiologie industrielle, les micro-organismes d'intérêt industriel. édition Tech et doc, 1993. 611p

J. Rivière, les applications industrielles de la microbiologie, édition Masson, 1975, 203p

## **Semester 6**

**Transversal unit (TU):** Entrepreneurship

**Subject :** Entrepreneurship

**Credit :** 1

**Coefficient :** 1

### **Objectives**

Sufficient knowledge of economics, management and administration.

- To learn the basic principles of the business creation process;
- To give the basic elements of advice in the different phases of business creation;
- The different types of financing for a micro enterprise in the Algerian context;
- The different types of financing for a microenterprise in the Algerian context; Concrete realisation of a business plan and the financing file

### **Content of the course**

1. The types of business
2. The insertion of the company in the productive system.
3. Power and decision in the enterprise.
4. Information in the company.
5. Decision-making in the enterprise.
6. The company and finance
7. Fiscal and monetary policy.
8. Financing methods

### **References**

Züger RM. 2005. Business management. Basics of management. CompendioBildungsmedien AG, 134 p.

Milgrom P, Roberts J. 1997. Economics, organisation and management. Presses universitaires de Grenoble, 829 p.

Dispensed at:

The university declares its desire to manifest its support for this training as a potential user of the product.

To this end, we confirm our support for this project and our role will be to:

- Give our point of view in the development and updating of teaching programs,
- Participate in seminars organized for this purpose,
- Participate in defense juries,
- Facilitate as much as possible the reception of trainees either within the framework of end-of-studies dissertations, or within the framework of supervised projects.

The means necessary for the execution of the tasks incumbent on us for the achievement of these objectives will be implemented on the material and human level.

Mr (or Mrs)\*.....is designated as external coordinator of this project.

SIGNATURE of the legally authorized person :

FUNCTION :

Date :

OFFICIAL STAMP or COMPANY SEAL