PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH

HARMONIZATION OF THE TRAINING OFFER IN

MASTER : Academic

Establishment	Faculty / Institute	Department
Hassiba Benbouali University - Chlef	**Faculty of Natural and Life Sciences**	**Biology**

Field: Natural and life sciences

Sector: Biological Sciences

Speciality: Biology and Physiology of Reproduction

I- Semester organization chart

(Please present all 4 semester cards)

1- Semester 1:

Teaching units	Half-yearly hourly volume	Weekly Hourly Volume				Coeff.	Credits	Evaluation	
	14-16 weeks	Courses	Tutorial	Practical works	Other works			Continuous 40%	Exam 60%
fundamental teaching unit									
FTU1:	**202.5 h**					**09**	**18**		
FTU11 : Physiology of reproduction	**67h30**	**1h30**	**1h30**	**3h30**	**82h50**	**3**	**6**	X	X
FTU12 : Molecular immunology	**67h30**	**1h30**	**1h30**	**1h30**	**82h50**	**3**	**6**	X	X
FTU2:									
FTU21 : Environment, toxicology and reproduction	**67h30**	**3h00**		**1h30**	**82h50**	**3**	**6**	x	X
Methodologic teaching unit									
MTU1:	**105 h**					**05**	**09**		
MTU11: Animal experimentation	**60h00**	**1h30**		**2h30**	**60h00**	**3**	**5**	x	x
MTU12: Applied biostatistics	**45h00**	**1h30**	**1h30**		**55h00**	**2**	**4**	X	x
Discovery teaching unit									
DTU1:	**45h**					**2**	**2**		
DTU11: Cellules souches et différenciation	**45H00**	**1h30**		**1h30**	**5h**	**2**	**2**	X	X
transverse teaching unit									
TTU1:	**22h30**					**1**	**1**		
TTU11: Communication	**22h30**	**1h30**			**2h30**	**1**	**1**	/	100%
						1	1		
Total Semester 1	**375**	**12h00**	**4h30**	**8h30**	**375h**	**17**	**30**		

82h30

2- Semester 2:

Teaching units	Half-yearly hourly volume	Weekly Hourly Volume				Coeff.	Credits	Evaluation	
	14-16 weeks	Courses	Tutorial	Practical works	Other works			Continuous 40%	Exam 60%
fundamental teaching unit									
FTU1:	**202.5 h**					**09**	**18**		
FTU11: Reproductive neuroendocrinology	**67h30**	**1h30**	**1h30**	**1h30**	**82h50**	**3**	**6**	**X**	**X**
FTU12 : Molecular endocrinology	**67h30**	**1h30**	**1h30**	**1h30**	**82h50**	**3**	**6**	**X**	**X**
FTU2									
FTU21 : Developmental biology	**67h30**	**3h00**		**1h30**	**82h50**	**3**	**6**	**X**	**X**
Methodologic teaching unit									
MTU1:	**105 h**					**05**	**09**		
MTU11: Experimental embryology	**60h00**	**1h30**		**2h30**	**65h00**	**3**	**5**	**X**	**X**
MTU12 : Clinical Biochemistry	**45h00**	**1h30**		**1h30**	**55h00**	**2**	**4**		
Discovery teaching unit									
DTU1:	**45h**					**2**	**2**		
DTU11: Scientific English	**45h00**	**1h30**	**1h30**		**5h00**	**2**	**2**	**X**	**X**
transverse teaching unit									
TTU1:	**22h30**					**1**	**1**		
TTU11: Legislation and Bioethics	**22h30**	**1h30**			**2h30**	**1**	**1**	**/**	**100%**
Total Semester 2	**375h**	**12h00**	**4h30**	**8h30**	**375h**	**17**	**30**		

3- Semester 3:

Teaching units	Half-yearly hourly volume	Weekly Hourly Volume				Coeff.	Credits	Evaluation	
	14-16 weeks	Courses	Tutorial	Practical works	Other works			Continuous 40%	Exam 60%
fundamental teaching unit									
FTU1:	**202.5**				**247.5**	**09**	**18**		
FTU11 : Reproductive biotechnology	**67h30**	**3h00**		**1h30**	**82h50**	**3**	**6**	**X**	**X**
FTU12 : Population genetics and genetic improvement	**67h30**	**3h00**	**1h30**		**82h50**	**3**	**6**	**X**	**X**
FTU2:								**X**	**X**
FTU21 : Reproductive pathology	**67h30**	**3h00**	**1h30**		**82h50**	**3**	**6**	**X**	**X**
Methodologic teaching unit									
MTU1:	**105 h**				**120**	**5**	**09**		
MTU11: Methods and techniques of analysis	**60h00**	**1h30**		**2h30**	**65h00**	**3**	**5**	**X**	**X**
MTU12: Bioinformatics	**45h00**	**1h30**		**1h30**	**55h**	**2**	**4**	**X**	**X**
Discovery teaching unit									
DTU1:	**45h**					**2**	**2**		
DTU11 : Reproductive pharmacology	**45h00**	**1h30**	**1h30**		**5h00**	**2**	**2**	**X**	**X**
transverse teaching unit									
TTU1:	**22h30**					**1**	**1**		
TTU11 : Entrepreneurship	**22h30**	**1h30**			**2h50**	**1**	**1**	**X**	**X**
:								***/***	**100%**

Total Semester 3	**375 h**	**15h00**	**4h30**	**5h30**	**375**	**17**	**30**		

4- Semester 4:

Field: Natural and life sciences
Sector: Biological Sciences
Speciality: Biology and Physiology of Reproduction

The student must complete a final project (FP) within the department or through a company internship culminating in a thesis and a defense, either remotely or in person.

	Semester hourly volume	Coeff.	Credits
Personal work (thesis)	450	9	18
Internship	225	5	09
Seminars	75	3	3
Other (please specify)	/	/	/
Total Semester 4	750	17	30

5- Overall summary of training: (indicate the overall hourly volume separated into courses, Tutorial and pratical works for the 04 teaching semesters, for the different types of UE)

TU Half-yearly Hourly Volume (HHV)	**FTU**	**MTU**	**DTU**	**TTU**	**Total**
Courses	315h00	135h00	67h30	67h30	585h00
Tutorial	135h00	22h30	45h00	-	202h30
Pratical works	157h30	157h30	22h30	-	337h30
Personal work	742h30	360h00	15h00	7h30	1125h00
FP	750h00	-	-	-	750h00
Total	1800	900	200	100	3000
Credits	84	27	6.0	3.0	**120**
% in credits for each TU	70.00%	22.50%	5.00%	2.50%	100.00

II - Detailed program by subject

(1 detailed sheet per subject)

Title module: Physiology of reproduction

Semeeter: 1 Title of TU: FTU11

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit: This component deals with the physiology of reproduction in the animal world.

Recommended prior knowledge:

Animal physiology, general endocrinology, cell biology.

Contents:

I. Functional anatomy of the male and female reproductive systems (animal and human models)
II. Gonad Physiology
III. Fertilization-implantation
IV. Gestation and Physiology of the Pregnant Female
V. Parturition
VI. Fetal Physiology and Endocrinology
VII. Genetic and Endocrine Basis of Sexual Differentiation
VIII. Lactation
IX. Reproductive Rhythms
X. Exploration of Reproductive
XI. Contraception
XII. Immunopharmacology of Reproduction

Tutorial and/or practical work:

Analysis of current scientific articles on all the subjects covered in the course program, educational outings and laboratory studies.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.):

1) Reproduction 2001, Barry J Everitt, Martin H Johnson, 2emeEd. Boeck universitaire
2) L. SHERWOOD, 2006- Physiologie humaine. 2emeEd. Boeck universitaire
3) R. D. JURD, 2000- L'essentiel en Biologie Animale. Ed Berti
4) LE MOIGNE et J. FOUCRIER, 2009- Biologie du développement. 9eme Ed. Dunod

Title module: Molecular immunology

Semester*:* 1 Title of TU: FTU12

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit: Deepen knowledge of molecular immunity related to reproductive physiology.

Recommended prior knowledge:

Molecular biology, biochemistry and general immunology.

Contents:

I. Organs of the Immune System
II. Molecular and Cellular Players Involved in Innate and Adaptive Immune Responses
III. Recognition of Microorganisms by Immune System Molecules and Cells
IV. The Inflammatory Response
V. Mechanisms of Anti-Infective Immunity
VI. Immune System Dysfunctions
VII. The Structural Basis of Maternal-Fetal Immune Interactions
VIII. Control of Trophoblastic Invasion
IX. Protection Against Cell-Mediated Rejection
X. Immunosuppressive Role of Steroid Hormones During Pregnancy
XI. Immunopathology of Recurrent Abortion
XII. Transfer of Maternal Leukocytes to the Infant via Breast Milk

Tutorial work:

- Description of the various techniques used in immunology
- Practice exercises
- Analysis of current scientific articles on all the topics covered in the course program

Practical work:

- Observation of immune cells
- Classical complement activation and hemolysis
- Double immunodiffusion: Ouchterlony technique
- Ring test
- Pregnancy test by detecting hCG by agglutination
- Electrophoresis of immunized and non-immunized sera
- Serodiagnosis by ELISA: Enzyme-linked Immunosorbent Assay

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The

nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.):

1) Lichtman AH, Masson PL, Abbas AK, Pillai S, Co JS&. Les bases de l'immunologie fondamentale et clinique CAMPUS. Elsevier Health Sciences; 2020.
2) Murphy K, Weaver C. Janeway Immunologie. Springer-Verlag; 2018.
3) Guide Des Analyses En Immunologie. Elsevier Masson; 2014.

Title module: Environment, toxicology and reproduction

Semester*:* 1 Title of TU: FTU21

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit: The student will use his knowledge of reproductive physiology to analyze and understand the variations in activity of this function according to the environment under natural or toxic conditions, or even harmful conditions, for reproduction.

Recommended prior knowledge:

Biology and physiology of reproduction – nutrition – neurobiology

Contents:

I. Environment and reproduction

1. Environmental Factors Affecting Reproductive Function
    1.1. Photoperiodic Control of Reproduction
    1.2.Nutritional Status and Reproduction
2. Reproductive Strategies Depending on the Nature of the EnvironmentII.

II. Toxicology and reproduction

1. General Toxicology
2. Toxicological Targets of Reproduction and Development
3. Mechanisms of Toxicity in the Male and Female Reproductive System
4. Embryotoxicity
5. Endocrine Disruptors
6. Xenobiotics
7. Ionizing Radiation and the Risk of Genetic Mutations
8. Toxicology Tests and Regulations

Practical work:

Educational outings and laboratory studies.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work,

presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.):

1) Bocquier F., Bonnet M., Faulconnier Y., Guerre-Millo M., Martin P., Chilliard Y., 1998. Effects of photoperiod and feeding level on adipose tissue metabolic activity and leptin synthesis in the ovariectomized ewe. Reprod. Nutr. Dev., 38, 489-498.
2) Chilliard Y., Bocquier F., Doreau M., 1998b. Digestive and metabolic adpatations of ruminants to undernutrition, and consequences on reproduction: a review. Reprod. Nutr. Dev., 38, 131-152.
3) Desbiolles A. et Gaillot J., 2019. Perturbateurs endocriniens : état des lieux et des connaissances. Fiches repères, Institut national du cancer en France (INCa), 12p.
4) Inserm. Expertise Collective, 2011. Reproduction et environnement. 89p.
5) Demeneix B. et Slama R., 2019. Endocrine Disruptors: fromScientific Evidence to HumanHealth Protection. Ed. : European Union, 132p.

Title module: Animal experimentation

Semester*:* 1 Title of TU: MTU11

Credits: 5 Coefficients: 3

Objectives of the Teaching Unit: Know how to handle an animal and know the general rules and safety conditions, as well as good practice in animal experimentation.

Recommended prior knowledge:

General physiology, anatomy

Contents:

I. Introduction to the use of experimental animals.
II. Moral and ethical aspects
III. Classification of laboratory animals and choice of animal models
IV. Concept of animal welfare: behaviors and visible signs
V. General physiology and sexing of laboratory animals
VI. Restraint, force-feeding, and essential tools
VII. Types of injections and blood sampling
VIII. Pain management
IX. Analgesia, anesthesia, euthanasia
X. Animal facility facilities
XI. Health and safety in the animal facility
XII. Pathologies, transmissible diseases, and management in the animal facility
XIII. Waste management

XIV. Global and Algerian regulations

Practical work:

- Animal Models and Animal Husbandry (Videos Shown)
- Types of Animal Facilities (Videos Shown)
- Mouse: Sexing, Restraint, Force-Feeding, Injections, Sampling
- Rat: Sexing, Restraint, Force-Feeding, Injections, Sampling
- Rabbit: Sexing, Restraint, Force-Feeding, Injections, Sampling
- Good Practices for Analgesia, Anesthesia, and Euthanasia in Animal Models
- Animal Dissection Protocol and Organ Sampling
- Ovariectomy and Castration Protocols in Animal Models
- Good Practices in Animal Experimentation: Carrying Out an Animal Experiment Protocol and Monitoring the Results (e.g., Effect of a Treatment - Case and Control): Group Work to Compare and Understand the Interpretation of Results

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.):

1) Verwaerde P., 2021. Gestion de la douleur aigue et chronique en expérimentation animale. Bulletin de l'Académie Vétérinaire de France , 174 : 43-45
2) Ministère de l'agriculture et de la souveraineté alimentaire en France, 2023. Animaux utilisés à des fins scientifiques. Source : https://agriculture.gouv.fr/animaux-utilises-des-fins-scientifiques

Title module: Applied biostatistics

Semester*:* 1 Title of TU: MTU12

Credits: 4 Coefficients: 2

Objectives of the Teaching Unit:

Is to familiarize the student with a scientific and technical tool for analyzing and interpreting research data in the field of biology.

Recommended prior knowledge:

Informatic – statistics

Contents:

I. Random Variables and Probability Laws
II. Sampling and Estimation
III. Hypothesis Testing
IV. Correlation and Regression
V. Multivariate Analysis

Tutorial work:

Series of exercises on all the titles covered in the course.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.):

1) Schwartz D., Lazar P., 2001 : Statistique médicale et biologique Ed Flammarion
2) Dagnelie P., 1999 : Statistique théorique et appliquée Ed De Boek
3) Noguès X., Garenne A., Fiévet V. et Bouteiller X., 2018. Le cours en biostatistique. 2eme Ed. Dunod,

Title module: Stem cells and differentiation

Semester*:* 1 Title of TU: DTU11

Credits: 2 Coefficients: 2

Objectives of the Teaching Unit:

This course covers the concept of stem cells and different aspects of cell differentiation, in particular embryonic tissue models and their application in cell therapy.

Recommended prior knowledge:

Cell biology.

Contents:

I. Introduction to Stem Cells
II. The Different Types of Stem Cells
III. Stem Cell Research Methods
IX. Therapeutic Applications of Stem Cells
X. Ethics Related to Stem Cell Research

Pratical work: Includes video presentations on:

- The main models of developmental biology.
- In vitro cell differentiation.
- Types and characteristics of stem cells.
- Applications of stem cell research.
- Fundamentals of stem cell culture.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.):

1) Bernard David B., 2015. Cellules souches : ontogénie, caractéristiques, intérêt thérapeutique en pathologie tissulaire. 38e journée du GAICRM-Groupement d'allergologie et d'immunologie clinique du Rhône Moyen, Rochegude, France. ffpasteur-01348136
2) Valderrama A.V., 2020. Différenciation des cellules souches pluripotentes humaines en cellules endothéliales et cellules hématopoïétiques via une population du type hémangioblastique. Thèse en Médecine humaine et pathologie. Université Paris-Saclay,.

Title module: Communication

Semester*:* 1 Title of TU: TTU11

Credits: 1 Coefficients: 1

Objectives of the Teaching Unit: Master the methodology of experimental research in biology. Know how to write a scientific article and format a presentation, thesis, or dissertation.

Recommended prior knowledge:

All the scientific knowledge acquired.

Contents:

1. General Information on the Scientific Approach
2. Pre-Scientific Methods
3. Objective of the Scientific Method
4. Basic Postulate of the Scientific Approach
5. Main Stages of the Scientific Approach
6. Good and Bad Research Problems
7. Analysis of Scientific Texts
8. Demonstration of a Problem
9. Defense of a Point of View on a Problem
10. Literature Review, Databases
11. Protocol Implementation
12. Ethics: Main Points
13. Example of a Scientific Approach (Establishment of the Concept Under Study, Causal Relationships, Determinations, Statistics)
14. Dissemination of Results (Scientific Publication, Oral Presentation, Dissertation)

Personal work:

Oral presentations and posters on examples of scientific topics

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.).

Title module: Reproductive neuroendocrinology

Semester*:* 2 Title of TU: FTU11

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit: recognize neuroendocrine coordination in the control of reproductive function.

Recommended prior knowledge:

Reproductive physiology, neurology, general endocrinology

Contents:

1. Gonadotropic Axis: General Diagram
2. Pulsatile Activity of GnRH Neurons and the Concept of GnRH Sensitization/Desensitization
3. Pituitary Gonadotropins
4. Sex Steroid Hormones, Central Receptors, and the Concept of Neurosteroids
5. Evolution of Gonadotropic Axis Activity
6. Neuroendocrinology of Puberty
7. Cerebral Dimorphism
8. Neurohormonal Control of Reproductive Behavior
9. Photoperiodic Control of Reproduction
10. Central Action of Nutritional Status on Reproduction
11. Stress and Reproduction
12. Neuroendocrinology of Reproduction and Aging

Tutorial and practical work:

Analysis of current scientific articles on all the subjects covered in the course program, educational outings and laboratory studies.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team

References (books and handouts, website, etc.):

1) BEAUVILLAIN J.-C., 2008- Le cerveau et la reproduction : le réseau neuronal à GnRH. Médio-mt Médecine de la Reproduction, Gynécologie Endocrinologie ; 10 (2) : 94-104

2) BROCK O., 2001- Rôle des œstrogènes dans le développement du cerveau et du comportement. Thèse rédigée en vue de l'obtention du titre de DOCTEUR en Sciences de l'UNIVERSITE DE LIEGE ; 243p.

3) CHEMINEAU P., MALPAUX B., GUERIN Y., MAURICE F., DAVEAU A., 1992- Lumière et mélatonine pour la maitrise de la reproduction des ovins et des caprins. Annales de zootechnie, INRA/EDP Sciences ; 41 (3-4), pp.247-261.
4) PASQUIER J., 2012- Evolution du contrôle neuroendocrinien de la reproduction : origine et rôle du système kisspeptine?. Thèse rédigée pour obtenir le grade de DOCTEUR de l'UNIVERSITÉ PIERRE ET MARIE CURIE ; 190p.

Title module: Molecular oendocrinology

Semester*:* 2 Title of TU: FTU12
Credits: 6 Coefficients: 3

Objectives of the Teaching Unit: Have in-depth knowledge of the cellular and molecular aspects of the function of reproductive hormones and examine pathological situations

Recommended prior knowledge:

General physiology, biochemistry, cell biology

Contents:

I. Reproductive hormones
II. Hormones de l'axe gonadotropes
    a. GnRH: Biosynthesis, regulation, secretion rate, transport, metabolism, mechanism of action and biological function
    b. Pituitary gonadotropins: Biosynthesis, regulation, transport, metabolism, mechanism of action and biological functions
    c. Sex steroid hormones
        i. Androgen – Estrogen – Progesterone (classification, origins, transport, metabolism, receptor structure and distribution, mechanism of action and biological functions; for each)
        ii. Biosynthesis scheme of steroid hormones at the gonadal and adrenal levels, concepts of the biosynthetic family and unit, concept of peripheral conversion and its mechanisms, regulation.
        iii. Origin of transport proteins, importance of the free and bound fractions of the steroid hormone, regulation, dosage.
        iv. Specific features of the non-genomic signaling pathway of steroid hormones

v. Medical applications: carcinogenic activity of sex steroids and hormone therapy, therapy by blocking conversion pathways (e.g., prostate tumors), AAS, etc.

III. Lactation hormones (PRL and OT), Inhibins, Activins, AMH, Prostaglandins and Placental Hormones: origins, biosynthesis, regulations, transport, metabolism, receptor structures and distributions, mechanisms of action and biological functions.

Tutorial and practical work:

Analysis of current scientific articles on all the subjects covered in the course program, educational outings and laboratory studies:

- Animal dissection and sampling of endocrine glands related to reproduction
- Histological analysis of HT, HP, the ovary at its various stages, and the testicle (and other available)
- Hormone assay techniques (ELISA and RIA) – antibody specificity and interpretation of results
- IHC technique for detecting hormonal receptors and reading of histological slides.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team

References (books and handouts, website, etc.):.

1) IDELMAN S. ET VERDETTI J., 2000- Endocrinologie et communications cellulaires. Edition d'EDP Sciences, 587p.
2) JURD R. D., 2000- L'essentiel en Biologie animale. Edition de BERTI, 329p.
3) TORTORAT G. J. ET GRABOWSKI S. R., 1995- Biologie humaine : Cytogénétique – Régulation - Reproduction. Edition de CEC, 466p.
4) FAVRO C. ET NICOLLE F., 2011- Biologie Cellulaire. Edition de hachette supérieure, 340p.
5) TOSTAIN J., ROSSI D., MARTIN P. M., 2004- Physiologie des androgènes chez l'homme adulte. ProgUrol, 14:639-660.

Title module: Developmental biology

Semester*: 2* Title of TU: FTU21

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit:

Refers to the acquisition of general ideas on questions of developmental biology from the formation of gametes to the developing individual in which the acquisition of its reproductive functions is considered.

Recommended prior knowledge:

Animal biology, cell biology, general endocrinology, genetics

Contents:

I. Introduction

II. Fertilization and Segmentation Initiate Embryonic Development

1. The Events of Fertilization
    2. Segmentation
    3. Morphogenesis in Animals
    4. Organogenesis

III. Cell Determination and Differentiation
    1. Cell Fates
    2. The Territorial Map
    3. Axis Formation
    4. The Weakening of Each Cell's Developmental Potential
    5. Limb Formation in Vertebrates
    6. The Role of Cilia in Cell Fate
    7. Genetic Support for Early Development of the Drosophila Embryo

Practical work: Reading of histological slides and protection of videos explaining the cellular and molecular phenomena related to the following:

1. Fertilization
2. Segmentation
3. Activation of egg metabolism
4. Gastrulation
5. Neurulation
6. Organogenesis in the general embryology phase
7. Organogenesis in the special embryology phase

8. Morphogenesis abnormalities

Assessment:
A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team

References (books and handouts, website, etc.):

1) LE MOIGNE et J. FOUCRIER, 2009- Biologie du développement. 9eme Ed. Dunod,
2) 3. DAVIDSON (EH), 1986-Gene activity in early development. (3ème edition). Academic Press, New York-London.

Title module: Experimental embryology

Semester*:* 2 Title of TU: MTU11

Credits: 5 Coefficients: 3

Objectives of the Teaching Unit:
To review recent knowledge on the molecular mechanisms involved in the morphogenetic movements of embryonic cells, epigenetic regulation, and induction. The course will focus primarily on mammals.

Recommended prior knowledge:

General embryology - genetics - Molecular biology - Cell biology

Contents:

I. Performist and Epigenetic Theories
II. The Major Stages of Embryonic Development
III. Models and Methodologies of Experimental Embryology
IV. Morphogenetic Movements and Embryonic Regulatory Capabilities
V. Polyembryony and Natural Regulation
VI. Embryonic Induction Mechanisms
VII. Congenital Malformations and Experimental Models

Practical work:

1. 1st Technique in Experimental Embryology: Cutting (Figures and Videos)
2. 2nd Technique in Experimental Embryology: Gluing (Figures and Videos)
3. 3rd Technique in Experimental Embryology: Staining (Figures and Videos)
4. Manipulating Bird Embryos: Example of Denaturation of the Clear Zone of a Blastula II
5. Manipulating Bird Embryos: Example of Denaturation of the Opaque Zone of a Blastula II

6. Manipulating Bird Embryos: Cutting, Gluing, and Staining
7. Other Embryonic Manipulations Depending on the Objectives and Available Equipment.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team

References (books and handouts, website, etc.):

1) Bodart J.F., 2015. Embryologie expérimentale. 1er Ed. De Boeck, 142p.
2) Ballard, William w., « Problems of gastrulation: real and verbal » BioScience 26 (1976) pp. 36-39.
3) BALLY-CUIF (L), 1995-Les genes du développement. Collection Enseignement de Dunod, Paris
4) DAVIDSON (EH), 1986-Gene activity in early development. (3ème edition). Academic Press, New York-London.
5) Elinson, R. P. change in Develpmental Patterns : Embryos of Amphibians with Large Eggs. In Travaux pratiquesDevelopment as an Evolutionary Process, ed. R. A. Raff and E. C. Raff, Vol 8, pp 1-21.
6) GURDON (J.B), 1974.-The control of gene expression in animal development. Clarendon Press, Oxford

Title module: Clinical Biochemistry

Semester*:* 2 Title of TU: MTU12

Credits: 4 Coefficients: 2

Objectives of the Teaching Unit:

Know the techniques for analyzing molecules contained in bodily fluids (blood, cerebrospinal fluid, urine, etc.) and characterize the natural physiological state and the pathophysiological origin of diseases in relation to the physiology of reproduction.

Recommended prior knowledge:

Biochemistry, chemistry, general biology.

Contents:

1. Introduction to Clinical Biochemistry
2. Biochemical Exploration of Hydroelectrolyte and Acid-Base Balance
    2.1. Study of sodium, potassium, and chloride ions in blood, urine, CSF, and sweat.
    2.2. Study of blood bicarbonate: alkaline reserve, acid-base disorders. Exploration of phosphocalcic metabolism.
    2.3. Study of plasma and erythrocyte magnesium.
3. Biochemical Study of Proteins, Amino Acids, and Immunoglobulins
    3.1. Study of proteins in blood, urine, and CSF.
    3.2. Study of specific serum proteins.
    3.3. Study of immunoglobulins
    3.4. Study of amino acids
4. Study of serum enzymes
    4.1. Transaminases - relevance in cardiac and hepatic disorders
    4.2. Lactate dehydrogenase - isoenzyme - semiological relevance
    4.3. Creatine phosphokinase - isoenzyme - semiological relevance
    4.4. Gamma-glutamyltransferase - relevance in hepatology
    4.5. Alkaline phosphatases and acid phosphatases
    4.6. Ornithine carbamyl transferase
    4.7. 5' Nucleotidase
    4.8. Amylase and lipase
5. Study of non-protein nitrogen compounds
    5.1. Exploration of ammonium ion metabolism
    5.2. Exploration of urea metabolism
    5.3. Study of creatine and creatinine: semiological relevance
    5.4. Study of uric acid - classification of hyperuricemia

5.5. Plasma Bilirubin Study - Classification of Jaundice

6. Biochemical Exploration of Carbohydrate Metabolism

6.1. Determination of Glucose in Biological Media

6.2. Biological Diagnosis of Diabetes Mellitus

6.3. Biological Monitoring of Diabetes

6.4. Biochemical Exploration of Hypoglycemia

6.5. Metabolic Complications of Diabetes Mellitus: Ketoacidotic Comas, Lactic Comas, and Hyperosmolar Comas

6.6. Glycogenoses

6.7. Congenital Galactosemia

6.8. Congenital Fructosemia

6.9. Disaccharide Intolerance in Infants and Adults

7. Biochemical Exploration of Lipid Metabolism

7.1. Lipoproteins

7.2. Classification of Dyslipoproteinemias

7.3. Atherosclerosis

7.4. Abnormalities of Sphingolipid Metabolism: Sphingolipidoses

7.5. Enzyme Deficiencies of Lipid Metabolism

8. Renal Failure

9. Nephrotic Syndrome

10. The Liver

10.1. Acute and Chronic Hepatitis

10.2. Hepatic Cytolysis

10.3. Cirrhosis

10.4. Hepatocellular Insufficiency

10.5. Jaundice

11. Myocardial Infarction

12. Biochemical Exploration of the Thyroid Gland

13. Biochemical Exploration of the Parathyroid Glands

14. Biochemical Exploration of the Adrenal Medulla

15. Biochemical Exploration of the Adrenal Cortex

16. Biochemical Exploration of the Endocrine Testes

17. Biochemical Exploration of the Ovaries:

17.1. Blood and Urinary Estrogen Determination

17.2. Serum Progesterone Determination and Its Main Metabolites

17.3. Biochemical Exploration of the Fetoplacental Unit - Biological Diagnosis of Pregnancy

17.4. Menopause

18. Hemoglobinopathies, Porphyrias, and Diseases Related to Iron Metabolism

19. Inflammatory Syndrome

20. Metabolic Syndrome

21. Oxidative Stress and Clinical Biochemistry of Aging

22. Tumor Markers

23. Copper and Zinc

24. Biochemical Aspects of Medical Toxicology:

24.1. Monitoring Drug Treatments

24.2. Poisoning by Specific Agents

Practical work:.

1. Uric Acid Test
2. Renal Assessment (BUN, Creatinine)
3. Fasting Blood Glucose and OGTT Test
4. Osmolality Test
5. Albumin Test
6. Bilirubin Test

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team

References (books and handouts, website, etc.):

1) Haddad V., Mas R., 2019. Biochimie clinique. VG Editions, 330p.
2) Gaw A., Murphy M.J., Cowan B., 2004. Biochimie clinique. Ed. Elsevier Masson, 169p.

Title module: Scientific English

Semester*:* 2 Title of TU: DTU11

Credits: 2 Coefficients: 2

Objectives of the Teaching Unit:

Reading and writing articles in English

Recommended prior knowledge:

English

Contents:

I. Study of Scientific Texts
II. Scientific and Technical Vocabulary
III. Structure of Grammatical Sentences

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work,

presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc).

Title module: Legislation and Bioethics

Semester*:* 2 Title of TU: TTU11

Credits: 1 Coefficients: 1

Objectives of the Teaching Unit:

This subject should lead the student to reflect on the ethical problems posed by biotechnologies applied to the biology of human and animal reproduction, but also animal experimentation and the study of the embryo.

Recommended prior knowledge:

General concept of reproductive biotechnologies, animal experimentation, experimental embryology.

Contents:

I. Algerian and International Texts and Laws Governing Applied Reproductive Biotechnology

- a. Assisted Reproductive Technology
- b. Contraceptive Methods
- c. Animal Embryo Production
- d. Cloning and Transgenesis
- e. Genetic Improvement

II. Algerian and International Texts and Laws Governing Animal Experimentation

- a. Establishment of Animal Facilities
- b. Waste Management
- c. Animal Experimentation and Pain Management
- d. Creation and Control of Genetically Modified Animals

III. Algerian and International Texts and Laws Governing the Manipulation of Human and Animal Embryos

IV. Algerian and International Texts and Laws Governing the Management of Biological Laboratories

Personal work:

Oral presentations and posters on examples of scientific topics

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc.):

- Borrillo D., 2022. Bioetique. 2eme Ed. Dalloz, 320p.

Title module: Reproductive biotechnology

Semester: 3 Title of TU: FTU11

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit:

The acquisition of current knowledge on biotechnologies applied in the control of human and animal reproduction.

Recommended prior knowledge:

Reproductive physiology, reproductive endocrinology.

Contents:

I. Introduction to Reproductive Biotechnology
II. Human Reproductive Biotechnology
    a. Definition and Objectives
    b. Assisted Reproduction (ART)
        i. IUI (AI)
        ii. IVF
        iii. ICSI, PGD, IVM, Assisted Hatching, etc.
        iv. Sperm Analysis
        v. Cryopreservation Techniques for ART Biological Material
        vi. Ethics
    c. Contraceptive Methods
III. Animal Reproductive Biotechnology
    a. Definition and Objectives
    b. AI (Sperm Examination, Packaging and Freezing, AI Practice; Endpoints)
        i. Cattle
        ii. Rabbits
        iii. Others
    c. Assisted Reproductive Techniques in Fish
    d. Production (In Vivo and In Vitro) and Transfer of Bovine Embryos
    e. Sperm Sexing
    f. Ethics
IV. Technologies Under Study (Definition, Objectives, Protocols, Endpoints, Ethics)
    a. Transgenesis
    b. Cloning
V. Conservation and Development of Wildlife through Biotechnology

Practical work:

1. Assisted Reproduction: Protocols and Ethics (Video Screening)
2. Human Sperm Analysis and Interpretation
3. Contraceptive Methods (see some materials, classification of methods)
4. Bovine Sperm Analysis and Interpretation
5. Aquaculture and Reproductive Control (Video Screening)
6. Identifying Follicular Development Stages by Microscopic Examination
7. Methods of Practicing Reproductive Biotechnology in Large-Scale Livestock Farming Systems and Zoos (Video Screening)

Note: Field training trips are scheduled when possible to meet the objectives of these practical activities.

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc):

1. INRA, 2019. Les biotechnologies de la reproduction chez les Mammifères et l'Homme. Loterre, 62p.
2. AFSSA, 1999. Biotechnologies de la reproduction animale et sécurité sanitaire des aliments. Colloque Scientifique organisé par l'Agence Française de Sécurité Sanitaire des Aliments, 121p.

Title module: Population genetics and genetic improvement

Semester*:* 3 Title of TU: FTU12

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit:

To deepen the student's knowledge of population genetics, the principles of genetic selection and current technology devoted to the field of genetic improvement.

Recommended prior knowledge:

Cytogenetic.

Contents:

I. Cytogenetic Review

II. Population Genetics

- a. Genetic Constitution and Hardy-Weinberg Law
- b. Factors of Genetic Change
- c. Genealogy, Inbreeding, and Kinship
- d. Quantitative Traits and Genetic Improvement

III. Molecular Genetics

- a. Molecular Basis of Animal Genetics
- b. Molecular Techniques for Studying Variability
- c. Genetic Markers
- d. Animal Genomics
- e. Structural Genomics: Genetic Maps; Comparative Mapping; Gene Identification; Genome Sequencing

IV. Applied Genetic Improvement

V. Quantitative Genetics I

- a. Variation and Types of Gene Action
- b. Fundamental Concepts and Types of Selection for Additive Value: Individual Selection;
- c. Prediction of Additive Value; Selection Methods; Combined Selection for Multiple Traits

VI. Quantitative Genetics II

- a. Linear Mixed Model
- b. Detection and Use of QTL
- c. Crosses

VII. Quantitative Genetics III

a. Estimation of Variance Components
b. Analysis and Experimental Design in Animal Genetic Improvement
c. Management and Conservation of Genetic Resources

VIII. Breeding Programs: Example of Dairy and Beef Cattle

VIII. Genetic Improvement of Animals Using Reproductive Technologies

Tutorials:

• A series of exercises at the end of each chapter
• Analysis of articles and presentations on:

1. Cytogenetic Techniques: Karyotype, FISH, and CGH
2. Genetic Tests (Prenatal, Predisposing, Paternity Testing)
3. Main Chromosomal Abnormalities in Human Medicine
4. Main Chromosomal Abnormalities in Animals
5. Gene Therapy: Ex Vivo and In Vivo Approaches, Viral and Nonviral Vectors
6. Pharmacogenomics

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc):

1. Jussiau, R., Papet, A., Rigal, J., & Zanchi, E. (2013). Amélioration génétique des animaux d'élevage (édition 2013). Educagri éditions.
2. Rouvier, R., & Wiener, G. (2009). L'amélioration génétique animale. L'amélioration génétique animale, 1-280.
3. Morrissey, M. B., de Villemereuil, P., Doligez, B., & Gimenez, O. (2014). Bayesian approaches to the quantitative genetic analysis of natural populations. Quantitative genetics in the wild, 228-253.
4. Serre, J. L. (2006). Génétique des populations. Dunod.
5. Henry, C. (2001). Biologie des populations animales et végétales. Paris: Dunod.

Title module: Reproductive pathology

Semester*:* 3 Title of TU: FTU21

Credits: 6 Coefficients: 3

Objectives of the Teaching Unit:

This subject aims to understand the pathophysiology of reproductive diseases in animals and humans.

Recommended prior knowledge:

Reproductive physiology, general physiology, general endocrinology

Contents:

I. Main Diseases in Domestic Mammals
- a. In Cattle
- b. In Sheep
- c. Others

II. Main Diseases in Humans
- a. Infertility, in Men and Women
- b. Polycystic Ovary Syndrome
- c. Chromosomal Abnormalities, Such as Turner Syndrome
- d. Primary Ovarian Insufficiency
- e. Congenital or Acquired Hypogonadotropic Hypogonadism
- f. Infectious Diseases

Tutorials :

Analysis of current articles on all the topics covered in the course

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc):

1) Poncelet C. et Sifer C., 2011. Physiologie, pathologie et thérapie de la reproduction chez l'humain. Ed Springer- Verlag, 694p.

2) Joséphine J. et Jeanne T., 2013. Physiologie et pathologie de la reproduction de la vache : élaboration de ressources pédagogiques en ligne à partir d'images échographiques de l'appareil génital. Thèse d'exercice, Médecine vétérinaire, Ecole Nationale Vétérinaire de Toulouse - ENVT, 65 p.

Title module: Methods and techniques of analysis

Semester*:* 3 Title of TU: MTU11

Credits: 5 Coefficients: 3

Objectives of the Teaching Unit:
To introduce the student to the different techniques and methods of biological, biochemical and immuno-enzymatic analysis. Thus, introduce the student to laboratory work, which may be done as part of their final year dissertation.

Recommended prior knowledge:

General biology, biochemistry, chemistry, immunology

Contents:
I. Fractionation Methods
II. Spectral Methods
III. Labeling Methods
IV. Electron Microscopy

Practical work :
1. Extraction and separation by chromatography
2. Determination of a biochemical parameter by spectrophotometry
3. ELISA technique
4. Optical microscopy: preparation and reading of slides (with different histological stains)
5. Electron microscopy (plates and videos)
6. IHC Immunohistochemistry: preparation and reading of slides

Assessment:
A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc):

1) Boukhatem M.N., 2019. Techniques d'Analyses Biologiques : Cours et Exercices Corrigés. Ed. Independently published, 241p.

2) Beraud J., 2021. Le technicien d'analyses biologiques : guide théorique et pratique. Ed. Tec & Doc, 2080p.

Title module: Bioinformatics

Semester*:* 3 Title of TU: MTU12

Credits: 4 Coefficients: 2

Objectives of the Teaching Unit:

Use of new information and communication technologies (processing information technology) in the service of biology.

Recommended prior knowledge:

General biology, mathematics, biostatistics, computer science.

Contents:

I. Introduction to Bioinformatics:
- 1. What is Bioinformatics?
- 2. History and Applications

II. DNA Sequencing Techniques:
- a. First-Generation Sequencing
- b. Second- and Third-Generation Sequencing
- c. Sequencing Using Oxford Nanopore Technology

III. Genome Assembly and Finishing
- a. Assembly Against a Reference Genome
- b. De Novo Assembly
- c. Sequence Formats and Quality Control
- d. FASTA Format, FastQC Format, SAM Format, BAM Format
- e. Introduction to the Linux Programming Language
- a. Basics of the Linux Language
- b. Managing Folders and Files Using Command Lines

IV. Bioinformatics Portals and Biological Databases
- a. NCBI, EBI, and DDBJ Portals
- b. Bibliographic Databases (PubMed and Advanced Search Methods)
- c. General databases (nucleotides and proteins).
- d. Specialized databases

V. Genome annotation
- a. Structural annotation (detection of signatures and sequence motifs)
- b. Functional annotation

VI. Sequence alignment

a. Simple alignment: local and global

b. Multiple alignment (clustalW);

I. Genomic sequence visualization software

II. Detection of genetic variations and construction of phylogenetic trees

Practical work:

1. Introduction to Linux
2. Advanced searches in bibliographic databases.
3. Sequence searches in databases (e.g., GenBank; SwissProt, etc.)
4. Sequence alignment using BLAST
5. Multiple sequence alignment (ACT, ClustalW)
6. Genomic sequence visualization software (Artemis, SeaView, IGV)
7. Sequence signature detection: PROSITE software, phobius, TMHMM, Signal peptide, etc.).

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc):

1. Lesk A., 2019. Introduction to Bioinformatics 5th Edition, ISNB0198794142 , Oxford University Press.
2. Dandekar T. and Kunz M., 2023. Bioinformatics An Introductory Textbook,Springer. DOIhttps://doi.org/10.1007/978-3-662-65036-3.
3. Seel I., 2017. Linux for Beginners: Introduction to Linux Operating System and Essential Command Lines: Computer Programming. Guava Books, ISBN9781386049203.
4. Robinson J.T., Thorvaldsdóttir H., Winckler W., Guttman M., Lander E.S., Getz G., Mesirov J.P., 2011. Integrative Genomics Viewer. Nature Biotechnology 29, 24–26.

Title module: Reproductive pharmacology

Semester*:* 3 Title of TU: DTU11

Credits: 2 Coefficients: 2

Objectives of the Teaching Unit:

Know the essentials of endocrine pharmacology relating to reproductive hormones.

Recommended prior knowledge:

Molecular endocrinology, reproductive physiology.

Contents:

I. Drug Development
II. Drug Trial Methodology
III. Drug Pharmacokinetics and Metabolism
IV. Drug Pharmacodynamics
V. Pregnancy Pharmacology
    a. In the Maternal Compartment
    b. In the Placental Compartment
    c. In the Fetal Compartment
VI. Breastfeeding Pharmacology
    a. Drug Passage in the Mother
    b. Passage from Maternal Plasma into Milk
    c. Passage in the Infant's Gastrointestinal Tract
    d. Metabolism in Infant Plasma
    e. Lactation Drugs
VII. Reproductive System Pharmacology
    a. Drugs of the Hormonal Systems
        1. Hormones Involved in Reproduction
        1.1. Gonadotropin-Releasing Hormone
        1.2. Gonadorelin, Analogues and Antagonists
        1.3. Gonadotropins
        1.4. Dopamine Agonists
        2. Sex Hormones
        2.1. Androgen Hormones and Derivatives

- Testosterone
- Anabolic Steroids

2.2. Antiandrogens
2.3. Estrogen Hormones and Derivatives
• Estradiol
• Ethinylestradiol
• Nonsteroidal Synthetic Estrogens
2.4. Selective Estrogen Receptor Modulators (SERMs)
2.5. Aromatase Inhibitors
2.6. Progestin Hormones and Derivatives
- Progesterone
- Medroxyprogesterone
- 17α-Acetoxyprogesterone Derivatives
- Norethisterone
- Gestodene
- Other 19-Norsteroid Derivatives

2.7. Antiprogestins or Selective Progesterone Receptor Modulators (SPRMs)
2.8. Hormones and Hormone Complexes for Contraception
2.9. Hormones and Hormone Complexes for Hormone Replacement

b. Drugs That Modulate Uterine Contraction

1. Oxytocic Drugs
1.1. Estrogens
1.2. Mifepristone
1.3. Methylergometrine
1.4. Prostaglandins
1.5. Oxytocin
2. Drugs That Inhibit Uterine Contraction or Tocolytics
2.1. Progesterone
2.2. Atosiban
2.3. Calcium Channel Blockers
2.4. Nonsteroidal Anti-inflammatory Drugs (NSAIDs)
2.5. β-Amimetics
2.6. Other Tocolytics

Tutorials:
Application exercises
Analysis of scientific articles

Assessment:
A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc):

1. Pebret F., 2004. Dictionnaire de pharmacologie générale. Heures de France.
2. Dokou-Gaïn L. et Kamtchouing P. 2012. Pharmacologie de la reproduction. Editions Universitaires Européennes.

Title module: Entrepreneurship

Semester*:* 3 Title of TU: TTU11

Credits: 1 Coefficients: 1

Objectives of the Teaching Unit:

Raising student awareness of the professional environment in business and preparing for integration into the company.

Recommended prior knowledge:

No prerequisites are required to follow this teaching unit.

Contents:

I. Types of Business
II. The Business's Integration into the Production System.
III. Power and Decision-Making in Businesses.
IV. Information in Businesses.
V. Decision-Making in Businesses.
VI. Businesses and Finance
    a. Financial Choices
    b. Financing Needs and Solutions.
    c. Financial Balance of Businesses (Introduction to Accounting: Reading Accounts, Income Statements, and Balance Sheets)
VII. Fiscal Policy and Monetary Policy.
VIII. Financing Methods

Assessment:

A single semester-long in-person exam (60%) and continuous assessment (40%) is the average of at least three necessary components: written questions, personal work, presentations, tests, reports, etc. Two of the three components must be in person. The nature of the 3 components and their weighting are left to the discretion of the teaching team.

References (books and handouts, website, etc).