Identity card from the training: Master Genetics

Field: Natural and Life Sciences
Sector: Biological Sciences
Specialty: Genetics
Cycle: Master
Type: Academic
Reporting structure: BMC Department - SNV Faculty - UALK

1.Training context

The mastery of genetic information and the development of new molecular biology and biotechnology tools have opened up new and diverse areas of research and applications in **genetics** . This field has therefore become one of the driving forces of discoveries in biology and medicine as well as in socio-economic development, developing the potential of genetics in various socio-economic areas such as health, agriculture, livestock breeding in terms of improving yields and tolerance to environmental conditions of cultivation and breeding.

Through innovative and adapted training, the university will not only be able to address obvious and urgent problems and respond to the challenges that modern genetics has not failed to raise, in all areas where it has a significant impact; but also to open the horizons of the socio-economic sector and allow qualitative leaps in production, diagnostic and selection strategies and technologies.

The courses offered in this Master's degree course aim to master the fundamental concepts and methods of genetics and molecular biology, but also the new notions of genetic engineering, genomics, transcriptomics and proteomics , which are tools of choice not only in diagnostics, bioindustry and agriculture, but also in fundamental and applied research.

2. Conditions of access

This national training is aimed at students holding a degree in biological sciences in the following specialties:

- Genetic,
- Microbiology;
- Biochemistry;
- Molecular and Cellular Biology;

or training deemed equivalent in biotechnology, bioinformatics or medical or veterinary sciences.

3. Training objectives

The objective of this master's degree is to provide students with training in molecular biology and genetics in order to master the theoretical and practical bases of this discipline.

The decoding of genetic information and genotypic diagnosis can only be achieved through the development of new approaches and molecular analysis tools.

This discipline therefore allows the development of study strategies at the DNA level according to a given problem. The domestication and exploitation of the potential of molecular biology in various socio-economic fields such as health, agriculture and bio-

industries. Thanks to innovative and adapted training, the university can take charge of obvious and immediate problems but also open up perspectives for the socio-economic sector and allow a qualitative leap for our strategies and techniques of production, diagnosis, selection, preservation.

The courses offered in this master's degree aim to master the concepts and methodologies in molecular biology, with a deepening of knowledge in genetics.

This comprehensive and integrated specialized training on the theoretical and practical levels (through practical work and the completion of a final study project) in the various fields of application of molecular biology and genetics will prepare the student both for continuing their studies within the framework of the Doctoral School and for entering professional life.

4. Profiles and skills targeted

All the skills acquired enable the training of graduates who will enter the fields of research and development, but will also subsequently be able to prepare a doctorate leading to recruitment as a researcher or teacher-researcher in the public service.

This molecular biology and genetics course therefore aims to train specialists who have acquired an understanding of the scientific approach, who are destined for the teaching and research sector. It therefore opens up opportunities:

- In national education (middle and secondary education) and in research through the integration of doctoral schools;
- In health through the contribution to diagnosis and genetic counseling, as well as screening for genetic diseases;
- In the field of public health for the cytogenetic diagnosis of infertility in couples in relation to chromosomal abnormalities;
- In the agronomic sector for the study of biodiversity, the conservation and improvement of livestock such as sheep and cattle, to meet the increased demand of the national market for red and white meat and in dairy production and processing;
- In the agricultural sector to study genetic markers, selection and plant improvement for better crop yields .
- In the environmental sector by carrying out a genetic evaluation of microorganisms in different environmental environments with the aim of exploiting this biodiversity for the selection of microorganisms in the purification and restoration of environments;
- In the genetic characterization of microorganisms in extreme environments such as thermal spas;
- In pharmaceutical bioindustries after a better knowledge of our genetic heritage and polymorphism with regard to enzymatic and medicinal detoxification.

5. Regional and national employability potential

At the end of their training, graduates will be able to work in areas belonging to both the public and private sectors for the following applications:

a) Diagnosis and screening of genetic diseases in molecular biology and genetics laboratories in the health sector, as well as in various hospital consultation services belonging to different specialties: pediatrics, hematology, oncology, and neurology. As well as in the context of organ transplantation by HLA system typing.

b) Quality control laboratories for agri-food products.

c) Study of the genetic variability of livestock and implementation of strategies for the conservation and improvement of indigenous animal genetic resources (sheep, cattle).

d) In the agricultural field by studying the genetic variability of plant species and implementing strategies for the conservation and improvement of their genetic resources.

e) In the field of Biosecurity: genetic detection (GMOs, microorganisms in food and water)

6. Bridges to other specialties

This master's degree is open to other specialties such as:

- fundamental and applied microbiology;
- biochemistry
- Plant biotechnologies

7. Training partners

7.1. External partners

❖ **Other partner universities:**

- Mentouri Brothers University Constantine I (Faculty of Natural and Life Sciences);
- Khenchela Forests ;
- ENS Constantine;
- ENS Biotechnologies Constantine
- CNRBT Constantine

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

➢ **Health sector:**

- The health department at the level of the wilaya of Khenchela : Public establishments (hospitals, clinics and analysis laboratories) (co -supervision, practical training, research);
- Private analysis laboratories and clinics (co -supervision and practical training);
- Support, through bachelor's and master's theses, for hereditary diseases : the wilaya of Khenchela being a region characterized by high coefficients of consanguinity

➢ **Agronomic sector:**

- Conservation of forests in the wilaya of Khenchela (field trips, practical training and co -supervision);
- The Directorate of Agricultural Services (**DSA)** at the level of the wilaya of Khenchela (reception of student interns, co -supervision, installation of tests at the level of pilot farms, supply of “sample” biological material);
- Improvement of species of agro-economic interest (plants and animals);

- ITGC Constantine, ITGC Guelma and ITGC Sétif
- Cosider - Agrico (Khenchela): internships as part of final year projects and contribution of young graduates to programs for selecting and improving crops of interest.
- Sagrodev (Sétif **):** Welcoming student interns and co -supervision

➢ **Environment sector:**

- Public and private quality control laboratories (co -supervision, practical training)

7.2. International partners:

➢ El Manar University Tunis (**Tunisia**) "project in progress"

➢ Regional Center for Agronomic Research (CRRA) at the level of the Institute of Agronomic Research (INRA) Rabat **(Morocco)** "project in progress"

➢ Hospices of Lyon Hospital (France)

8. Training monitoring indicators:

The aim of the system is to diversify the methods of control in order to assess students' skills as widely as possible. In this context, the following will be assessed:
(1) student empowerment; (2) regular monitoring of knowledge acquisition;
(3) the acquisition of oral expression; (4) the acquisition of teamwork and synthesis work skills; (5) the control of the student's abilities and not of his knowledge.
The distribution between the different forms of knowledge control is as follows:
Continuous assessment of knowledge: 40%
Final Exam: 60%
Written expression : 20%
Personal work: 20%
Analytical and synthesis capacity: 20%

9. Semester-wise organization of lessons

Semester 1:

Teaching Unit	VHS	VH weekly			
	14-16 weeks	C	TD	TP	Others
EU fundamentals		**1:30 p.m.**			
UEF1		**6h**	**4:30 a.m.**	**3h**	
Genome mapping I	67h30	3	1h30	-	82h30
Applied Molecular Biology	67H30	1h30	1h30	1h30	82h30
UEF2					
Genetics of microorganisms	67h30	1h30	1h30	1h30	82h30
EU methodology		**7h**			
UEM1		**3h**	**1h30**	**2h30**	
Developmental genetics	45	1h30	1h30		55h
Instrumental biochemistry	60	1h30	-	2h30	65h
EU discovery		**VH UED + UET = 4h30**			
UED1		**3h**	**1h30**		
Physiology of major functions	45	1h30	1h30		5:30 a.m.
EU cross-cutting					
UET1					
Communication	22.5	1h30	-	-	2h
Total Semester 1	375h	**12h**	**7:30 a.m.**	**5:30 a.m.**	375h

Assessment method: Continuous assessment (40%) and half-yearly exam (60%) .

Semester 2:

Teaching Unit	VHS	VH weekly			
	14-16 weeks	C	TD	TP	Others
EU fundamentals		**1:30 p.m.**			
UEF1(O/P)		**7:30 a.m.**	**4:30 a.m.**	**1h30**	
Genome Mapping II	67h30	3h	1h30		82h30
Molecular cytogenetics	67h30	1h30	1h30	1h30	82h30
UEF2(O/p)					
Human genetics	67h30	3h	1h30		82h30
EU methodology		**7h**			
UEM1(O/P)					
Oncogenetics	45h	1h30	1h30		55h
Genetic engineering	60h	1h30	1h30	1h	65h
EU Discovery		**VH UED + UET = 4h30**			
UED1(O/P)					
Bioinformatics	10:30 p.m.	1h30			4:30 a.m.
EU cross-cutting					
English	10:30 p.m.	1h30			1h30
Legislation	10:30 p.m.	1h30			1h30
Total Semester 2	375h	**3 p.m.**	**7:30 a.m.**	**2h30**	375h

Assessment method: Continuous assessment (40%) and half-yearly exam (60%) .

Semester 3:

Teaching Unit	VHS	VH weekly			
	14-16 weeks	C	TD	TP	Others
EU fundamentals		**1:30 p.m.**			
UEF1(O/P)		**7:30 a.m.**	**4:30 a.m.**	**1h30**	
Genomics and proteomics	67h30	1h30	1h30	1h30	82.5
Toxicogenetics	67h30	3h	1h30		82.5
UEF2(O/P)					
Quantitative genetics	67h30	3h	1h30		82.5
EU methodology		**7h**			
UEM1(O/P)		**3h**	**3h**	**1h**	
immunopathology	45	1h30	1h30	1h	55h
Biostatistics	60h	1h30	1h30		65h
EU discovery		**VH UED + UET = 4h30**			
UED1(O/P)		**3h**	**1h30**		
Biodiversity and species improvement	45h	1h30	1h30		5:30 a.m.
EU cross-cutting					
Entrepreneurship	10:30 p.m.	1h30			2h
Total Semester 3	375h	**1:30 p.m.**	**9am**	**2h30**	375h

Assessment method: Continuous assessment (40%) and half-yearly exam (60%) .

Semester 4:

Semester S4 is reserved for an internship or introductory research work that is part of a final-year project, assessed by a dissertation and a defense.

	VHS	Coeff	Credits
Personal work	300h	10	20
Internship in a company	75h	5	10
Seminars			
Other (specify)			
Total Semester 4	375h	15	**30**