PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

**MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH**

ENGINEERING EDUCATION OFFER

HIGHER SCHOOL OF BIOLOGICAL SCIENCES OF ORAN

Field: NATURAL AND LIFE SCIENCES

Section: BIOTECHNOLOGY

Speciality: ENZYMATIC ENGINEERING

Sommaire

I– Training identity card

Section: BIOTECHNOLOGY

Speciality: ENZYMATIC ENGINEERING

1. Location of the training:

HIGHER SCHOOL IN BIOLOGICAL SCIENCES OF ORAN

2. Partners:

Other academic institutions:

• University of Science and Technology of Oran – Mohamed Boudiaf

• Oran 1 Ahmed Ben Bella University

1. Context and objectives

A. Conditions of access

- 1st year: On average of the baccalaureate defined each year by the ministry of higher education And scientific research.
- 3rd year: By national competition for access to higher schools.

A. Objectifs de la formation

The promotion of the biotechnology sector occupies an important place in the political agenda of Algeria. Biotechnology is recognized as one of the key priority sectors in the economic development of several countries as it is one of the sectors expected to contribute to business creation, innovation and sustainable economy..

In this context, enzyme engineering is one of the most promising tools in the development of products with economic interest. Enzymes play an important role due to their specific and efficient catalytic action. Nowadays, microbial enzymes are developed to meet various human needs, such as enzymatic conversion, diagnosis and treatment of diseases, production of drugs, removal of environmental pollutants, etc. Enzyme engineering is a discipline that uses the methods and techniques of genetic engineering and protein engineering to improve the characteristics of the enzymes produced.

The purpose of this speciality is to develop human resources in the field of enzymatic engineering. Students will be able to manipulate microorganisms in order to produce, purify and characterize enzymes with interesting properties for the industrial sector. This training is oriented towards industrial biotechnology with the aim of providing students with solid theoretical and practical knowledge that will allow them to work in different industries or even create their own companies.

B. Targeted Profiles and skills :

At the end of this training, graduates of the Enzymatic Engineering specialty of the Higher School of Biological Sciences of Oran will be provided with a high-level theoretical and practical education. Students will have acquired the following skills:

- Scientific and technical knowledge in enzymology and enzymatic engineering. Students will develop the necessary skills to produce, purify and characterize enzymes of biotechnological interest as well as improving the characteristics of the enzymes studied and their applications in biotechnology.
- Scientific and technical knowledge in genetics, molecular biology, genetic engineering and bioinformatics.
- Ability to work on various issues affecting key sectors (environment, industry, bioenergy, etc.) and ability to lead projects in order to propose solutions for these various issues.
- Thanks to entrepreneurship workshops, as well as various courses such as enzyme engineering applied in pharmaceutical and agro-food industries, intellectual property law, biosafety and bioethics and professional integration internships, students will have the necessary skills for business creation.
- Ability to work on a research project, as well as the writing of scientific documents (manuscripts and scientific articles) and to communicate the results (in French and in English).

C. Regional and national employability potential of graduates

One of the main objectives of the training in enzymatic engineering which is the first of its kind in Algeria is to prepare graduates for the work market. Thanks to the various skills developed, graduates will be able to join any biotechnology, agri-food, detergent company, etc.

Given their training, which is focused on the use of molecular biology techniques, graduates will also be able to integrate any sector requiring skills in genetics, molecular biology and bioinformatics, such as un iversities, hospitals, research laboratories (ex : Algerian Pasteur Institut, forensic science laboratories, etc.).

This education is also an academic training aimed at producing researchers for the various research centers and for doctoral training programs.

Having obtained the necessary knowledge in the field of entrepreneurship, graduates will also have the opportunity to create their own start-ups and businesses.

C. Bridges to other specialties

Students admitted in the 3rd year and not having the average required to continue the 1st year of the second cycle of the school can directly integrate the Natural and Life Sciences university bachelor’s trainings. The common core being similar.

C. Training monitoring indicators

The follow-up of a training course results is the follow-up of ratio-type indicators comparing the "forecast" and the "realized" in terms of the rate of completion of a task, the productivity

of human resources (teachers), consumption of budget and finally of the employability of the product of the training. An indicator is an information which will help the carrier of the training to measure a situation and to take a decision consequently. The decision may be to continue in the same direction or, on the contrary, to adopt corrective measures.

Task completion rate (TCR)

With this indicator we measure whether a task lasted or should last longer or shorter than what was initially planned.

TCR = (Actual Duration - Initial Duration) / Initial Duration

This indicator can be applied to the duration of a subject, to the duration of a teaching unit or to the duration of a semester of the year or to all the years.

Human Resource Productivity (HRP)

This is an indicator for measuring the productivity of members of the training team. In real time, we measure the number of hours spent with regard to the percentage of completion of the task.

PRH = number of hours actually spent * TCR

And we compare this ratio to the number of hours planned to achieve this same % of completion of the task. This will make it possible to evaluate either a delay or an advance on the schedule or compliance with the schedule.

Similarly, other indicators can be monitored. Thanks to these indicators, we can quickly assess any deviations from the objective and communicate effectively and quickly with all training stakeholders.

C. Supervisory capacity:

20 Students.

4. Available human ressources

A. Teachers of the school interfering in the speciality

Last name	First name	Speciality	Grade	Type of intervention
Saidi	Djamel	Physiologie	Pr.	**Course/tutorial/practical work**.
Tbahriti	Hadja Fatima	Nutrition Clinique et Métabolique	MCA	**Course/tutorial/practical work**
Gabed	Noujoud	Biologie moléculaire	MCA	**Course/tutorial/practical work**
Felidj	Menel	Ecologie Végétale	MCA	**Course/tutorial/practical work**

Boughrara	Wefa	Biologie moléculaire et Génétique	MCA	**Course/tutorial/practical work**
Marzoug	Mohamed	Ecosystèmes microbiens complexes	MCA	**Course/tutorial/practical work**
Mahammi	Fatima Zohra	Biologie moléculaire et Génétique	MCA	**Course/tutorial/practical work**
Boukhari Benahmed Daidj	Nabila	Nutrition Intérêts et risques sur la santé	MCA	**Course/tutorial/practical work**
Kechar	Kheira	Biodiversité Végétale et Valorisation	MCA	**Course/tutorial/practical work**
Rahli	Fouzia	Microbiologie appliquée	MCA	**Course/tutorial/practical work**
Khelil	Omar	Biotechnologie Végétale	MCA	**Course/tutorial/practical work**
Choubane	Slimane	Biotechnologie	MCA	**Course/tutorial/practical work**
Mahdjour	Soumicha	Productions Végétales et Microbiennes	MCA	**Course/tutorial/practical work**
Chekroun	Chahinez	Physiologie Végétale	MCB	**Course/tutorial/practical work**
El-Kebir	Aslya	Chimie des Polymères	MCB	**Course/tutorial/practical work**
Fodil	Mostefa	Biologie moléculaire	MCB	**Course/tutorial/practical work**
Medjdoub	Lahouaria	Chimie des Polymères	MCB	**Course/tutorial/practical work**
Bouderbala	Hadjer Soumia	Physiologie Animale	MCB	**Course/tutorial/practical work**
Boukadoum	Ali	Nutrition Clinique et Métabolique	MCB	**Course/tutorial/practical work**
Haddi	Abir	Physiologie Animale	MCB	**Course/tutorial/practical work**
Guendouz	Malika	Physiologie Animale	MCB	**Course/tutorial/practical work**
Redouane	Dalal	Physiologie Animale de la Nutrition et Sécurité alimentaire	MCB	**Course/tutorial/practical work**
Benayad	Sarah	Chimie organique minérale et industrielle	MCB	**Course/tutorial/practical work**
Benyettou	Imene	Biochimie Appliquée -Bio toxicologie	MCB	**Course/tutorial/practical work**
Ilias	Wassila	Immunologie	MCB	**Course/tutorial/practical work**

Boughoufala	Mohamed	Les systèmes photovoltaïques	MCB	**Course/tutorial/practical work**
Yakoubi	Fatima	Physiologie Végétale	MAA	**Course/tutorial/practical work**
Dehiba	Faiza	Nutrition Clinique et Métabolique	MAA	**Course/tutorial/practical work**
Belbouri	Khadra	Traitement des Surfaces et Science des Matériaux	MAA	**Course/tutorial/practical work**
Henni	Ibrahim	Informatique	MAA	**Course/tutorial/practical work**
Lahcene	Batoul Sofya	Civilisation Américaine	MAA	**Course/tutorial/practical work**
Mahmoudi	Bahia	Nutrition Clinique et Métabolique	MAA	**Course/tutorial/practical work**
Mimoun	Asmaa	Biologie Végétale	MAA	**Course/tutorial/practical work**
Nasser	Soraya	INFORMATIQUE	MAA	**Course/tutorial/practical work**
Seddikioui	Leila	Production Animale et Contrôle de Qualité	MAA	**Course/tutorial/practical work**

B. External supervision:

Attached institution: UNIVERSITY ORAN 1- USTO

Name, First name	Grade	Research laboratory	Type of intervention
Abiayad S.M.E.A.	Pr	Aquabior	Course/ practical work/ supervision
Ali Mehidi S.	Pr	Aquabior	Course/ practical work/ supervision
Hamaizi H.	Pr		Course
Lamara S-A.C.	Pr	Aquabior	Course/ practical work/ supervision
Kadhum E.A.	Pr		Course
Benbayeur Z.	Pr		Course/ practical work/ supervision
Fatmi L.	MA	Aquabior	tutorial/practical work
Benyamina M.	MA	Aquabior	tutorial/practical work
Lechehab S	MA	Aquabior	tutorial/practical work
Bekada I.	MCA	Aquabior	tutorial/practical work

Ameziane E.-H.	MA	Aquabior	tutorial/practical work
Attab K.	MA	Aquabior	tutorial/practical work
Amrani E.	MCA	Biologie moléculaire	tutorial/practical work
Dergal N.	MCB	Aquabior	Course
Aoues Aek	Pr	Toxicologie	Course
Zemani Fodil Faouzia	Pr	Biologie moléculaire	Course

C. Support Research Laboratories: AQUABIOR

Head of laboratory ABIAYAD SIDI MOHAMED EL AMINE
N° Approval of laboratory
Date : approved in 2011 code 071 Head of laboratoty notice : Favorable

D. Support research projects :

Title	Code	Start	End
PROJET CEE	2016_00892 - - Projet H2020 MSCA-RISE 2016	2016	2020

E. Personal work spaces and TIC:

Library of the Higher School of Biological Sciences of Oran

Semester organization card of teachings

6 semesters (1st, 2nd and 3rd year)

1. SEMESTER 1

Teaching unit TU	Weeks	Number of hours/week				Coeff	Credits	Evaluation mode	
	14-16	Course	Tutorial	Practical work	Other*volume hours			Continuous	Exam
Fundamental TU						**9**	**18**		
FTU 1 (O/P)									
Mass and energy transfer	67h30	3h00	1h30	-	82h30	3	6	40 %	60 %
Fundamental enzymology	45h00	1h30	1h30	-	55h	2	4	40 %	60 %
FTU2 (O/P)									
Molecular biology	45h00	1h30	1h30	-	55h	2	4	40 %	60 %
Analytical biochemistry methods	45h00	1h30	1h30	-	55h	2	4	40 %	60 %
Methodology TU						**5**	**9**		
MTU1 (O/P)									
workshop of Applied microbiology	60h00	-	-	4h00	60h00	3	5	100 %	-
MTU2 (O/P)									
Workshop of Chemistry of solution	45h00	-	-	3h00	55h00	2	4	100 %	-
Discovery TU						**2**	**2**		
Biostatistics	45h00	-	-	3h00	10h00	2	2	100 %	-
Transversal TU						**1**	**1**		
English for Biologists - Starter	22h30	1h30	-	-	2h30	1	1	40 %	60 %
Total Semester 1	**375h00**	**135h00**	**90h00**	**150h00**	**375h00**	**17**	**30**		

2. SEMESTER 2

Teaching unit TU	Weeks	Number of hours/week				Coeff	Credits	Evaluation mode	
	14-16	Course	Tutorial	Practical work	Other*volume hours			Continuous	Exam
Fundamental TU						**9**	**18**		
FTU1(O/P)									
Momentum transfer	67h30	3h00	1h30	-	82h30	3	6	40 %	60 %
Enzyme engineering : Applications in food industries	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
FTU2 (O/P)									
Microbial genetics	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
Experimental design	45h00	1h30	-	1h30	55h00	2	4	40 %	60 %
Methodology TU						**5**	**9**		
MTU1 (O/P)									
Workshop of Molecular biology	60h00	-	-	4h00	60h00	3	5	100 %	-
MTU2 (O/P)									
Workshop of agro-industrial residues Valorisation	45h00	-	-	3h00	55h00	2	4	100 %	-
Discovery TU						**2**	**2**		
Valorisation of agro-industrial residues	22h30	1h30	-	-	5h00	1	1	40 %	60 %
Bioremediation	22h30	1h30	-	-	5h00	1	1	40 %	60 %
Transversal TU						**1**	**1**		
English for Biologists - Elementary	22h30	1h30	-	-	2h30	1	1	40 %	60 %
Total Semester 2	**375h00**	**180h00**	**67h30**	**127h30**	**375h00**	**17**	**30**		

3. SEMESTER 3

Teaching unit TU	Weeks	Number of hours/week	Coeff	Credits	Evaluation mode

	14-16	Course	Tutorial	Practical work	Other*volume hours			Continuous	Exam
Fundamental TU						**9**	**18**		
FTU1 (O/P)									
Reactions and reactors	67h00	3h00	1h30	-	82h30	3	6	40 %	60 %
Enzyme engineering 2: Immobilization of biological systems	45h00	1h30	-	1h30	55h00	2	4	40 %	60 %
FTU2 (O/P)									
Genomics, transcriptomics and proteomics	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
Bioinformatics	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
Methodology TU						**5**	**9**		
MTU1 (O/P)									
Workshop of enzymes purification and characterization	60h00	-	-	4h00	60h00	3	5	100 %	-
MTU2 (O/P)									
Workshop of aquatic bioresources valorisation	45h00	-	-	3h00	55h00	2	4	100 %	-
Discovery TU						**2**	**2**		
Valorisation des Bioressources Aquatiques	22h30	1h30	-	-	5h00	1	1	40 %	60 %
Intellectual property law	22h30	1h30	-	-	5h00	1	1	40 %	60 %
Transversal TU						**1**	**1**		
English for Biologists – Pre-intermediate	22h30	1h30	-	-	2h30	1	1	40 %	60 %
Total Semester 3	**375h00**	**180h00**	**67h30**	**127h30**	**375h00**	**17**	**30**		

4. SEMESTER 4

Teaching unit TU	Weeks	Number of hours/week				Coeff	Credits	Evaluation mode	
	14-16	Course	Tutorial	Practical work	Other*volume hours			Continuous	Exam
Fundamental TU						**9**	**18**		
FTU1 (O/P)									
Unit Operations 1	67h30	3h00	1h30	-	82h30	3	6	40 %	60 %
Enzyme Engineering 3 : Applications pharmaceutical and industrial sectors	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
FTU2 (O/P)									
Bioreactors	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
Genetic engineering	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
Methodology TU						**5**	**9**		
MTU1 (O/P)									
Workshop of Genetic engineering	60h00	-	-	4h00	60h00	3	5	100 %	-
MTU2(O/P)									
Workshop of protein molecular modelisation	45h00	-	-	3h00	55h00	2	4	100 %	-
Discovery TU						**2**	**2**		
Biobased products and biomaterials	45h00	1h30	1h30	-	10h00	2	2	40 %	60 %
Transversal TU						**1**	**1**		
English for Biologists – Intermediate	22h30	1h30	-	-	2h30	1	1	40 %	60 %
Total Semester 4	**375h**	**157h30**	**112h30**	**105h00**	**375h00**	**17**	**30**		

5. SEMESTRE 5

Teaching unit TU	Weeks	Number of hours/week				Coeff	Credits	Evaluation mode	
	14-16	Course	Tutorial	Practical work	Other*volume hours			Continuous	Exam
Fundamental TU						**9**	**18**		

FTU1 (O/P)									
Unit Operations 2	67h30	3h00	1h30	-	82h30	3	6	40 %	60 %
Enzyme engineering 4 : Advances in enzyme technology	45h00	1h30	1h30	-	55h00	2	4	40 %	60 %
FTU2 (O/P)									
Case study and innovation in enzyme technology	45h00	3h00	-	-	55h00	2	4	40 %	60 %
Design of Bioprocesses	45h00	1h30	-	1h30	55h00	2	4	40 %	60 %
Methodology TU						**5**	**9**		
MTU1 (O/P)									
Workshop of enzyme engineering	60h00	-	-	4h00	60h00	3	5	100 %	-
MTU2 (O/P)									
Workshop of Entrepreneurship	45h00	-	-	3h00	55h00	2	4	100 %	-
Discovery TU						**2**	**2**		
Industrial visits	22h30	-	-	1h30	5h00	1	1	100 %	-
Biosafety and bioethics	22h30	1h30	-	-	5h00	1	1	40 %	60 %
Transversal TU						**1**	**1**		
English for Biologists – Advanced	22h30	1h30	-	-	2h30	1	1	40 %	60 %
Total Semester 5	**375h00**	**180h00**	**45h00**	**150h00**	**375h00**	**17**	**30**		

6. SEMESTRE 6

Teaching unit	**Weeks**	**Number of hours/week**				**Coeff**	**Credits**	**Evaluation mode**	
		Seminar	**Internship**	**Personnal work**	**other**			**Continuous**	**Exam thesis defense**
UE Fondamentales									
UEF1 (O/P)									

Matière 1 : Projet de fin d'études	750	75	225	450	-	17	30	50 %	50 %
Total Semestre 6	**750**	**75**	**225**	**450**	**-**	**17**	**30**		