

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

**THIRD-CYCLE TRAINING OFFER LEADING TO A DOCTORATE
FOR THE 2024/2025 ACADEMIC YEAR**

Institution	Faculty/Institute	Department
Hassiba Ben Bouali University of Chlef	Faculty of Sciences	Biotechnology

Field	Program	Specialization
Natural and Life Sciences	Biotechnology	Microbial Biotechnology Vegetal Biotchnology

1. Program Title

Third-Cycle Degree Program Leading to a Ph.D. in Biotechnology
(Academic Year: 2024/2025)

2. Language of Instruction

French / English

3-Program Overview: Objectives and Mission

Biotechnology is a dynamic field born from revolutions in **Biology, Biochemistry, and Engineering**. This doctoral program focuses on harnessing living organisms and bioprocesses for technological applications—a cornerstone of contemporary research. The **Chlef region**, recognized as a **Biotechnology hub in Algeria**, provides a strategic backdrop for this initiative. Our goal is to train future doctoral-level experts who will, in turn, educate students across all university levels.

As biotechnological sciences advance rapidly, bridging **innovation** with **industrial production** is critical. **Innovation** thrives through rigorous scientific research, driven by highly skilled candidates, while **production processes** demand collaboration between universities and the bio-industrial sector.

Through **advanced coursework (lectures, conferences, seminars, workshops)** and **cutting-edge research** in accredited laboratories, this program specializes in:

- **Biotechnology and Health**
- **Molecular Pathology Biotechnology**
- **Microbial Biotechnology**
- **Environmental Bioremediation and Protection**

These disciplines align with **national and international development priorities** and reflect growing global interest.

This initiative aims to:

- Build a **critical mass of skilled researchers** capable of driving innovation in applied biotechnology (living organisms and metabolites).
- Support **start-up creation** through the development of **high-value processes and products**.

4-Principal Instruction Components: Foundational Subjects and Adopted Methodologies

(Detailed in the appended table)

Activities	Semester 1	Semester 2
Specialization Reinforcement Courses related to the Doctoral Program	Course Title and Credit Hours 1. Biostatistics (Microbial & Plant Biotechnology) (10 contact hours) 2. Advanced Instrumental Analysis (Microbial & Plant Biotechnology) (10 contact hours) 3. Formulation Sciences (Microbial & Plant Biotechnology) (4 contact hours) 4. Bioresource Utilization (Plant & Microbial Biotechnology) (6 contact hours)	Course Title and Credit Hours 1. Microbial Biotechnology (Microbial Biotechnology) (10 contact hours) 2. Plant Biotechnology (Plant Biotechnology) (10 contact hours) 3. Scientific English & Article Analysis (Microbial & Plant Biotechnology) (10 contact hours)
Research Methodology Course Introduction to Literature Research Course	20 contact hours	20 contact hours
Reference Management Software: Zotero & EndNote	20 contact hours	20 contact hours
Seminar	PhD Candidate Research Presentations: Literature Review Synthesis. 30 contact hours	PhD Candidates' Research Presentations (Research Problem, Literature Review, Progress Status) 30 contact hours

5. Admission Information: Entry Requirements and Selection Criteria

The third-cycle (doctoral) program corresponds to a unified track encompassing all specializations within the same discipline - both pre- and post-harmonization - as taught nationally.

6. Core Courses: Essential Modules for Foundational Skill Acquisition

The fundamental modules in this program ensure mastery of technical, methodological, and

transferable skills critical for biotechnological research. The curriculum covers:

1. Microbial Biotechnology

Mastery of microorganisms (bacteria, yeasts) for industrial, environmental, or medical applications (fermentations, metabolite production, bioremediation).

2. Plant Biotechnology

In vitro culture techniques, plant genetic engineering (GMOs, CRISPR), and plant valorization for sustainable agriculture or biomolecule production.

3. Biostatistics

Quantitative analysis of biological data (hypothesis testing, modeling) to validate experimental results and optimize protocols.

4. Advanced Instrumental Analysis

High-end instrumentation (HPLC, mass spectrometry, confocal microscopy) for biomolecule and biological system characterization.

5. Bioproduct Formulation

Development of stable biotech products (vaccines, probiotics, biosensors) through excipient studies, vectors, and encapsulation processes.

6. Bioresource Utilization

Ethical and technical challenges in biological resource valorization (biodiversity, intellectual property, circular bioeconomy).

7. Scientific English & Literature Analysis

Critical reading and writing skills for scientific publications, essential for research dissemination.

These courses provide a robust foundation for advanced topics (innovative therapies, synthetic biology, etc.) and successful completion of doctoral research at the life sciences-technology interface.

7. Advanced Topics: Specialized Knowledge and Research Concentrations

The following advanced focus areas provide in-depth specialization in biotechnology, aligned with current scientific trends and challenges:

1. Medical Biotechnology & Innovative Therapies

- Gene therapies and genome editing (CRISPR-Cas9, base editing, prime editing)
- Cancer immunotherapies (CAR-T cells, therapeutic vaccines)
- RNA biotechnology (mRNA therapeutics, RNA interference)

2. Industrial & Environmental Biotechnology

- Bioremediation (pollution mitigation using microorganisms/plants)
- Bioplastics and biomaterials synthesis (PHA, PLA from renewable feedstocks)
- 3rd-generation biofuels (microalgae, lignocellulosic waste valorization)
- Industrial enzymes (protein engineering for green catalysis)

3. Food & Agricultural Biotechnology

- Precision agriculture (GMOs, genome-edited resilient crops)
- Alternative proteins (cultivated meat, precision fermentation)
- Food safety (biosensors for pathogen detection)
- Gut microbiome (tailored probiotics, functional foods)

4. Nanobiotechnology & Biomedical Devices

- Nanovectors for targeted drug delivery
- Wearable biosensors (early diagnostics, real-time monitoring)

8- Host Research Laboratory

Laboratory of Local Natural Bioresources: **Director: Prof. Malika Meziane.**

9-Research Team: Doctoral Supervision Committee

Overview of research groups mentoring and supervising PhD projects

Last Name, First Name	Rank	Field	Specialization	Affiliated Institution
Rahmani, Soraya	Associate Professor	Biotechnology	Molecular Microbiology & Proteomics	Hassiba Benbouali University of Chlef
Saadi, Abdelkader	Professor	Biotechnology	Plant Biotechnology & Physiology	Hassiba Benbouali University of Chlef
El Hameur, Hacene	Associate Professor	Biotechnology	Agronomic Sciences	Hassiba Benbouali University of Chlef
Nehal, Fatima	Associate Professor	Biotechnology	Agronomic Sciences	Hassiba Benbouali University of Chlef
Benelhadj, Djelloul Saadia	Associate Professor	Biotechnology	Plant-Microorganism Interaction Biotechnology	University of Temouchent
Mohamed Mahmoud, Fadhela	Associate Professor	Biotechnology	Phytopathology, Microbial Biotechnology, Microbiology	Blida 1 University