

Biotechnology Engineer in 5 years | Graduate

Full-time study
SCIENCES AND HEALTH

Join ESTBB's engineering program to build the skills needed for high-responsibility roles in biotechnology and beyond. You'll develop **expertise in biotechnology** supported by a strong foundation in engineering sciences, complemented by essential skills in economics, social sciences, and management.

This degree is accredited by the French Commission for Engineering Diplomas (CTI)



5
years of study

12
months of
internship at least

1
international
experience
mandatory

DISCOVER OUR

BIOTECHNOLOGY ENGINEER PROGRAMME

OVERVIEW

6 good reasons to choose this programme

- A common core year to choose your specialist programme
 - A strong focus on entrepreneurship and innovation
 - A choice of 5 programmes to meet the challenges ahead
 - A solid foundation in engineering sciences
 - Hands-on learning with a range of real-life situations
 - The opportunity to take part in community engagement initiatives
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Become a Biotechnology Engineer with ESTBB

You will gain access to senior positions, thanks to your **biotechnology expertise** combined with a solid foundation in engineering sciences and economic, social and managerial skills.

The course prepares you for a wide variety of careers in the pharmaceutical, veterinary, cosmetics, biotechnology and other industries. The 4 programmes offered in 4th and 5th years allow you to choose between highly scientific careers (research and development engineer, industrialisation engineer, etc.) or cross-disciplinary careers involving leadership and project management.

Degree Delivered

- Title: **“Engineering Degree - Biotechnology Major”**
- Accredited by the French **CTI**
- Equivalent to a **Master’s Degree**



Research Opportunities

This program is supported by the [Biosciences, Technologies & Ethics research cluster \(#7\)](#).

Work experience in companies

The course includes at least 12 months in business:

- Year 1: 1 month internship in an English-speaking situation (optional)
- Year 2: 1 to 2 months of internship in a production organization within life sciences
- Year 4: 4 months of internship
- Year 5: 6 months internship

Word-linked training

Years 3, 4 and 5 can be followed on a work-study program.

INTERNATIONAL

International opportunities

Students must complete at least 6 months abroad through:

- An academic semester at a partner university (1st year of the Engineering Cycle).
- An internship in an international company.
- A gap year dedicated to an international project.

PROGRAM

Program

Each semester is structured around core modules:

- Biosciences
- Engineering Sciences and Techniques
- Fundamental Sciences
- Humanities : Management and Society
- Language courses.

You also gain practical experience through internships at key points during your studies.

Preparatory Cycle

In Years 1 and 2, the **Preparatory Cycle** builds a solid foundation in scientific and engineering principles, helping you develop essential skills while gradually moving toward greater autonomy in your studies. These preparatory years introduce methods designed to foster independent learning and establish a strong academic base in biotechnology and engineering sciences.

Engineering Cycle

The **Engineering Cycle** offers specialized coursework and flexibility in study options. You can choose to complete the program under a traditional student status or through a work-study format as apprentices.

The curriculum under the student status covers diverse topics, and starting in your 4th year, you can choose from 4 specialized tracks:

INFECTIOLOGY

- Develop expertise in infectious diseases (viruses, bacteria, parasites).
- Create innovative solutions to combat diseases in humans, animals, and plants.
- Design products like vaccines, drugs, and medical devices.
- Lead international research projects to fight infectious agents.

DIGITAL TRANSFORMATION AND E-HEALTH TRACK

- Use AI and big data to optimize living material production.
- Leverage digital technologies to improve healthcare systems.
- Implement digital transformations in biotech processes.
- Consider ethical and social responsibilities in digital health solutions.

INNOVATION MANAGEMENT IN BIOTECHNOLOGY TRACK

- Identify opportunities to develop new biotech products.
- Design innovative methods to optimize biotech processes.
- Lead projects in complex environments to create economic value.
- Integrate ethical, economic, and sustainability considerations.

PROCESS ENGINEERING APPLIED TO LIVING SYSTEMS TRACK

- Master large-scale cell and microorganism culture processes.
- Use mathematics and computer science to model production units.
- Optimize processes and yields for automated cell cultures.
- Master separation and purification techniques.

CAREER OUTCOMES

Graduates are prepared for diverse roles in life science industries (biotech, pharma, veterinary,

cosmetics, etc.). Depending on the chosen specialization, typical positions include:

- **Infectious Diseases:** Research Scientist, Development Engineer, Validation Engineer.
- **Innovation Management:** Biotechnology Project Manager, Innovation Engineer, Consultant.
- **Bioprocess Engineering:** Bioproduction Manager, Industrialization Engineer, Quality Manager.
- **Digital Transformation & e-Health:** Data Scientist, Digital Project Manager, AI Engineer.

QUALITY ASSURANCE

[Avis de la Commission des Titres d'Ingénieur](#)

DISCOVER THE PROGRAM DETAILED

INTEGRATED PREPARATORY CYCLE

YEAR 1

BIOSCIENCES

- Functional organization of biomolecules
- Structural organization and cellular functioning
- Structural and functional genomics
- Living organisms: animals and plants / Ecology
- Animal and plant physiology
- Microbiology

ENGINEERING SCIENCES AND TECHNIQUES

- Computer science
- Statistics
- Physical analysis techniques

FUNDAMENTAL SCIENCES

- Chemistry of matter, analytical and organic chemistry
- Physics
- Mathematics

HUMANITIES: MANAGEMENT AND SOCIETY

- Sports, toolbox (methodology and communication), humanitarian project
- Professional development project

LANGUAGES

- English and a second foreign language (LV2)

INTERNSHIP

- 1-month internship optional in an English-speaking environment

YEAR 2

BIOSCIENCES

- Metabolic biochemistry
- Chemical kinetics and enzymology
- Cell biology – signaling pathways
- Genetic engineering
- Bacteriology, virology, and parasitology
- Animal and plant physiology
- Immunology
- Ecosystem biology

ENGINEERING SCIENCES AND TECHNIQUES

- Computer science
- Analytical sciences
- Electronics
- Biostatistics

FUNDAMENTAL SCIENCES

- Organic chemistry
- Physics
- Mathematics

HUMANITIES: MANAGEMENT AND SOCIETY

- Interculturality, ecological transition, and sustainable development
- Professional development project

LANGUAGES

- English and a second foreign language (LV2)

INTERNSHIP

- 4 to 8-week internship in production

ENGINEERING CYCLE - YEAR 3

YEAR 3 - UNDER STUDENT STATUS (FISE)

BIOSCIENCES

- Infectious foundations
- Overview of biotechnologies and introduction to bioproduction
- Introduction to genetic analysis
- Advanced immunology
- Genetic engineering
- Project: European biotechnologies

ENGINEERING SCIENCES AND TECHNIQUES

- Quality management systems (GMP, GLP)
- Bioprocess engineering foundations
- Analytical method validation
- Entrepreneurship – Level 1
- Cellular technologies
- Bioinformatics
- Industrial microbiology

FUNDAMENTAL SCIENCES

- Physics
- Mathematics/Statistics

HUMANITIES: MANAGEMENT AND SOCIETY

- Introduction to economic sciences
- Society and biotechnology: ethical and societal challenges / Introduction to law
- Personalized professional development project
- Humanitarian project
- Sports

LANGUAGES

- English and a second foreign language (LV2)

YEAR 3 - UNDER APPRENTICE STATUS (FISA)

BIOTECHNOLOGIES

- From Infection to Immune Response
- Genetic Engineering and Cell Technologies

ENGINEERING SCIENCE AND TECHNOLOGY

- Related Regulations: from GLP to GMP
- Bioprocess Engineering Applied to Biotechnologies
- Validation of Analytical Methods
- Bioinformatics and Cellular Modeling with Mini-Project / In Silico Analysis

FUNDAMENTAL SCIENCES

- Physics: Heat and Mass Transfer
- Mathematics Level 4

HUMANITIES: MANAGEMENT AND SOCIETY

- Introduction to Economic Sciences
- Interculturality in Questions, Practices, and Encounters – Europe, China, and the USA
- Review and Analysis of Internships
- Society and Biotechnology: Ethical and Societal Issues and Introduction to Law
- Ecological Transition and Sustainable Development with an Entrepreneurship Case Study
- Review and Analysis of Internships
- Personal and Professional Project (PPP)

LANGUAGES

- English and Second Foreign Language (LV2)

ENGINEERING CYCLE - YEAR 4

YEAR 4 – UNDER STUDENT STATUS (FISE)

CORE CURRICULUM

ENGINEERING SCIENCE AND TECHNOLOGY

- Information Systems
- Biotechnology Economics: Challenges and Requirements
- Regulatory Requirements
- Geopolitics and Economics of International Industries
- Entrepreneurship – Level 2 – Applications to Health

HUMANITIES: MANAGEMENT AND SOCIETY

- Personalized Professional Project
- Ethics of Research, Emerging Technologies, and AI
- Management – Level 1

LANGUAGES

- English and Second Foreign Language (LV2)

INTERNSHIP

- Assistant Engineer Internship (8 to 17 weeks)

TRACK 1: INNOVATION MANAGEMENT IN BIOTECHNOLOGIES

- Biotechnology Innovation – Level 1
- Development of Critical Thinking
- Business Management
- Innovation Management and Creativity

- Experimental Methods in Biotechnologies

TRACK 2: INFECTIOUS DISEASES

- Immunology Issues in Health
- Advanced Virology and Related Technologies
- Environmental Microbiology
- Infectious Microbiology
- Experimental Methods
- Public Health and Epidemiology

TRACK 3: BIOPROCESS ENGINEERING

- Unit Operations
- Separation and Purification Engineering
- Biocatalysis and Bioreactors
- Cell Engineering
- Experimental Methods
- Bioprocess Industrialization

TRACK 4: DIGITAL TRANSFORMATION AND E-HEALTH

- High-Throughput Sequencing Data Analysis Methods
- Artificial Intelligence
- Genetics and Population Dynamics
- Public Health and Epidemiology
- Immunology Issues in Health
- Advanced Programming

YEAR 4 - APPRENTICE STATUS (FISA)

BIOTECHNOLOGIES

- Bioresource and Biomarker Engineering
- Immunology Challenges in Biotechnologies
- Environmental and Infectious Microbiology
- Experimental Methods (including project)
- One World, One Health: Public Health and Epidemiology in both Bioresources and Infectious Diseases

ENGINEERING SCIENCES AND TECHNIQUES

- Separation and Purification Engineering
- Biocatalysis and Bioreactors (examples in Virology and Infectious Bacteriology)
- Core Unit Operations
- Regulatory Requirements (IP, Regulatory Affairs, Clinical Research, Pharmacovigilance)
- Advanced Programming

HUMANITIES: MANAGEMENT AND SOCIETY

- Management – Level 1
- Review and Analysis of Work Placement Periods
- Challenges and Economics of Biotechnologies
- Ethics in Research and New Technologies (Digital, AI...)
- Review and Analysis of Work Placement Periods
- Personal and Professional Project (PPP)

LANGUAGES

- English and a Second Foreign Language

ENGINEERING CYCLE - YEAR 5

YEAR 5 – WITH SPECIALIZATION TRACK - UNDER STUDENT STATUS (FISE)

CORE CURRICULUM

ENGINEERING SCIENCE AND TECHNOLOGY

- Market Access Strategy
- Entrepreneurship – Level 3

HUMANITIES: MANAGEMENT AND SOCIETY

- Personalized Professional Project
- Management – Level 2
- Bioethics – CSR (Corporate Social Responsibility)

LANGUAGES

- English

INTERNSHIP

- Final Year Project Internship (FYP)

TRACK 1: INNOVATION MANAGEMENT IN BIOTECHNOLOGIES

- Biotechnology Innovation – Level 2
- Experimental Approach (Capstone Project)
- Change Management
- Project Industrialization (Marketing, Procurement, Logistics, etc.)

TRACK 2: INFECTIOUS DISEASES

- Managing a Scientific Project in Infectious Diseases
- Infectious Diseases: Industrial Applications

TRACK 3: BIOPROCESS ENGINEERING

- Bioresources and Bioproduction

- Process Control and Automation
- Procurement and Logistics
- Industrialization Project / Design Report

TRACK 4: DIGITAL TRANSFORMATION AND E-HEALTH

- Epigenetics and Gene Expression Regulation
- Health Data Analysis, High-Throughput Technologies, and Big Data
- Engineering Project: Simulation of a Biological System

YEAR 5 - APPRENTICE STATUS (FISA)

BIOTECHNOLOGIES

- Analysis of High-Throughput Technologies and Big Data
- Industrialization of a Biotechnology Project – Experimental Approach
- Bioresources and Bioproduction for Health, Well-being (Cosmetology), Food, and Environment, including a Cross-disciplinary Project

ENGINEERING SCIENCES AND TECHNIQUES

- Industrialization of a Biotechnology Project – Modeling

HUMANITIES: MANAGEMENT AND SOCIETY

- Management – Level 2
- Bioethics
- Review and Analysis of Work Placement Periods
- Personal and Professional Project (PPP)

LANGUAGES

- English

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