



MA-IRBE | 2024-2025

# Master in Environmental Bioengineering

## Programme mnemonic

MA-IRBE

> Focus *Professional* : M-IRBES

## Studies level

Master 120 credits

## Learning language

french

## Schedule

office hours

## Studies category / subcategory

Sciences and technics / Agronomy and bioengineering

## Campus

Plaine and Solbosch

The Masters in bioengineering deliver, on top of this general versatile training, a more specific training that is translated in 3 major orientations, corresponding to the main domains of bioengineers activity, namely, **environment science and technology**, agronomic science and chemical and bio industries.

Bioengineers student at ULB benefits from a unique **interfaculty environment**, in a multidisciplinary university in the **capital of Europe**, close to the European Institutions. The combination of the teachings from the Science Faculty and from the Brussels Polytechnic School is a major asset to strengthen the multidisciplinary of the training.

The teachings in this Master are based on cutting edge research in the different laboratories of the EIB and some laboratories of the Science Faculty and of the Brussels Polytechnic School. Particular attention is paid to the water science domain thanks to the researchers and teachers in domains such as ecology of aquatic systems, marine biology, wastewater treatment, water potabilization, applied microbiology, glaciology, ...

## Programme objectives

The training meets the objectives set by the society, evolving and lead by the ever widening range of bioengineering applications. The studies take their roots in the domains of environment management, agro-ecosystems and all the industrial activities based on living beings.

The deeply multidisciplinary training helps the student to develop his creativity and his versatility in order to be functional in the various domain of engineering and biological sciences.

This master centered on **environmental engineering** aims at applying the engineering science to improve the quality of the environment (modelling the transport of contaminants, optimize water treatment, analyze the environmental impacts of industrial processes).

## Programme's added value

The studies leading to the academic degree of Master in Bioengineering ensure the student of a versatility based on the acquisition of general scientific bases associated with the learning of engineering technics. This **versatility** favor the development of an integration and interaction capability for a global approach of the problems and coming from a care of the sustainability of the realized solutions.

## Teaching methods

The program, divided in mandatory courses, elective courses and internship, offers varied teaching methods: from lecture to exercise and practical in laboratories or personal work in the framework of projects.

During the block 1 of the Master, half the teaching is allocated to exercises, practical, visits, personal work while the other half is dedicated to lectures.

During the block 2 of the Master, emphasis is put on the master thesis (25 ECTS), which is a long duration thorough research work and on a 12 weeks internship (15 ECTS). These two works represent together 66% of the final year.

## Succeed in your studies

### Choose

The information and guidance counsellors at the InfOR-études [<https://www.ulb.be/en/studies-info-desk-1>] service will help you choose your studies throughout the year.

### Succeed

Take part in preparatory courses [<https://www.ulb.be/en/studies-info-desk-1>] or get help to succeed [<https://www.ulb.be/en/studies-info-desk-1>], before or during your studies.



## Get help

Apply for financial aid, look for accommodation or a student job, get support [<https://www.ulb.be/fr/aides-services-et-accompagnement/aid-services-and-support-1>] for your specific needs.

## International/Openness

EIB students have the opportunity to stay one or two semesters in an foreign university. Most of the time, this stay takes place during the first block of the Master. To enable those stays, EIB has signed exchanges agreements with about twenty bioengineering departments of EU universities (Erasmus program)

Available destinations through these agreements are : Austria France, Italy, Portugal, Spain and the United Kingdom. Moreover, bilateral exchange agreements have been signed by the ULB with non-EU universities, allowing students to go study outside of Europe for a semester or a complete academic year.

The internship organized by the Development Cooperation Committee of the Polytechnic School (Codepo) offers the opportunity to some of EIB students to go for one month in a developing country. This internship is proposed in the list of elective course of the Master.

On top of that, various laboratories propose master thesis on subjects that require a one to three month stay abroad, most of the time in developing countries.

EIB has developed a national and international network of academic and industrial partnership that is materialized by students exchanges (Erasmus and internship), lecture given by industrial specialists, on site visits and research collaborations.

For the master in environment sciences and technology, this is translated, among other things, in practical on industrial pilot plants, lectures from industrial executives from Vivaqua and Total,

visits of wastewater treatment plants and river environmental tracing stations.

## Job opportunities

This training leads to a broad range of application domains. Agronomy, environment, territorial planning, biotechnologies,... are all sectors in which a bioengineer will be able to flourish. He might particularly work in industry, administrations (national and international), and consultancy but also in teaching and research.

The studies leading to the academic degree of Master in Bioengineering are compliant to the law regarding the access to the profession and confers the **professional title of bioengineer**.

A recent survey among some of the recently graduates showed that they were for most of them working in research and industry. Yet, other sectors are also represented (teaching, development cooperation, public service,...).

### Contacts

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### Jury President

Frédéric DEBASTE

### Jury Secretary

Nathalie GYPENS



# Master in Environmental Bioengineering

## Focus Professional

Engineering and environmental sciences represent more than 90% of the first year of the master. This fraction is reduced to 60% in the second year to give way to other axes added to complete the overall technical training: socio-economic, legal and governance aspects are developed with water and hydrosystems as highlighted theme.

The analysis of ecosystems comes within the broader context of sustainable management and aims at understanding the natural and semi-natural ecosystems functioning under the pressure of global changes.

## Bloc 1 | M-IRBES | MA-IRBE

### Cours obligatoires

BING-F4002	<b>Acquisition et analyse de données</b>   Marius GILBERT (Coordinator) and Simon DELLICOUR ⌚ 5 credits [lecture: 24h, tutorial classes: 36h] 📅 first term 💬 French
BING-F410	<b>Ecosystèmes aquatiques: fonctionnement et paramètres de qualité de l'eau</b>   Nathalie GYPENS (Coordinator), Samah Chaoua, Isabelle GEORGE and samah chaoua ⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 💬 French
BING-H4000	<b>Modeling and control of dynamical systems in bioengineering</b>   Philippe BOGAERTS (Coordinator) and Didier GONZE ⌚ 5 credits [lecture: 48h, tutorial classes: 12h] 📅 second term 💬 English
BING-H4003	<b>Unit operations and processes for the environment and bio-industries</b>   Benoît HAUT (Coordinator), Frédéric DEBASTE and Benoit SCHEID ⌚ 10 credits [lecture: 36h, tutorial classes: 48h, practical work: 36h] 📅 second term 💬 English
BING-H5001	<b>Biorefinery: from biomass transformation to biobased products</b>   David CANNELLA (Coordinator) ⌚ 5 credits [lecture: 36h, practical work: 24h] 📅 first term 💬 English
BIOL-F412	<b>Biotechnologies animales et végétales</b>   Nathalie VERBRUGGEN (Coordinator) and Benoît VANHOLLEBEKE ⌚ 5 credits [lecture: 36h, project: 24h] 📅 second term 💬 French
CHIM-H413	<b>Chemical and biological reactor design</b>   Frédéric DEBASTE (Coordinator) and David CANNELLA ⌚ 5 credits [lecture: 30h, tutorial classes: 18h, practical work: 12h] 📅 first term 💬 English
CHIM-H422	<b>Environmental technology / Applied hydrology, hydraulic routing and hydrometry</b>   Michel VERBANCK (Coordinator) ⌚ 5 credits [lecture: 36h, tutorial classes: 12h, practical work: 12h] 📅 first term 💬 English
GEOG-F400	<b>The Earth system and its interactions</b>   François FRIPIAT (Coordinator) and Brice Van Liefferinge ⌚ 5 credits [lecture: 36h, tutorial classes: 24h] 📅 first term 💬 English
MATH-H304	<b>Automatique</b>   Michel KINNAERT (Coordinator) ⌚ 5 credits [lecture: 30h, practical work: 30h] 📅 second term 💬 French

*A total of five credits chosen from the following*

ENVI-F405 (optional)	<b>Climat: sciences et politiques</b>   Frank PATTYN (Coordinator) and Julien VANDEBURIE ⌚ 5 credits [lecture: 40h] 📅 second term 💬 French
ENVI-F510 (optional)	<b>Droit de l'environnement</b>   Chiara ARMENI (Coordinator) ⌚ 5 credits [lecture: 24h] 📅 first term 💬 French

# Master in Environmental Bioengineering

## Focus Professional

### Bloc 2 | M-IRBES | MA-IRBE

## Cours obligatoires

BING-F525	<b>Modélisation des écosystèmes aquatiques</b>   Nathalie GYPENS (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 36h] 📅 first term 🗨 French
BING-F531	<b>Bioremédiation / Environmental engineering : current methods and practices</b>   David CANNELLA (Coordinator) and Michel VERBANCK ⌚ 5 credits [lecture: 24h, practical work: 12h, project: 24h] 📅 first term 🗨 English/French
MEMO-F515	<b>Mémoire</b>   Frédéric DEBASTE (Coordinator) and Nathalie GYPENS ⌚ 25 credits [mfe/tfe: 300h] 📅 academic year 🗨 English/French
STAG-F013	<b>Stage en entreprise en sciences et technologie de l'environnement</b>   Frédéric DEBASTE (Coordinator) ⌚ 15 credits [work placement: 180h] 📅 academic year 🗨 French

## Cours à option

Cours optionnels pour un total de 10 crédits dont 5 crédits à choisir dans la liste des cours répartis en modules ci-dessous et 5 crédits à choisir dans la rubrique Autre UE.

*A total of five credits chosen from the following*

### Module: Ecosystèmes

BIOL-F417 (optional)	<b>Marine ecology</b>   Anton Van De Putte (Coordinator) and Marc Kochzius ⌚ 5 credits [lecture: 18h, practical work: 9h, field trips: 9h] 📅 first term 🗨 English
ENVI-F526 (optional)	<b>Sciences de l'atmosphère et changements climatiques</b>   Pierre COHEUR (Coordinator) and Cathy CLERBAUX ⌚ 5 credits [lecture: 36h, project: 24h] 📅 second term 🗨 French
GEOL-F414 (optional)	<b>Eléments d'hydrogéologie</b>   Philippe Orban (Coordinator) and Pascal Goderniaux ⌚ 5 credits [lecture: 24h, practical work: 24h, field trips: 12h] 📅 first term 🗨 French

### Module: Ingénierie

GEST-H501 (optional)	<b>Logistics Engineering and Management</b>   Alassane Ballé NDIAYE (Coordinator) ⌚ 5 credits [lecture: 12h, tutorial classes: 36h] 📅 first term 🗨 English
PROJ-H417 (optional)	<b>Projet coopération au développement / Development cooperation project</b>   Antoine NONCLERCQ (Coordinator) ⌚ 5 credits [project: 150h] 📅 first and second terms 🗨 French Only on selection : see the Development Unit of the Polytechnic School of Brussels ( <a href="http://polytech.ulb.be/en/international/development-cooperation">http://polytech.ulb.be/en/international/development-cooperation</a> )

### Module: Société

ENVI-F405 (optional)	<b>Climat: sciences et politiques</b>   Frank PATTYN (Coordinator) and Julien VANDEBURIE ⌚ 5 credits [lecture: 40h] 📅 second term 🗨 French
ENVI-F409 (optional)	<b>Economie écologique</b>   Thomas BAULER (Coordinator) ⌚ 5 credits [lecture: 24h, practical work: 12h] 📅 first term 🗨 French
ENVI-F434 (optional)	<b>Géohistoire des relations sociétés - environnement</b>   Jean-Michel DECROLY (Coordinator) and Chloé DELIGNE ⌚ 5 credits [lecture: 36h] 📅 first term 🗨 French

ENVI-F510  
(optional)

**Droit de l'environnement** | Chiara ARMENI (Coordinator)

⌚ 5 credits [lecture: 24h] 📅 first term 🗨 French

### Module: Impact environnemental

BIOL-F441  
(optional)

**Ecotoxicologie** | Philippe DUBOIS (Coordinator)

⌚ 5 credits [lecture: 18h] 📅 second term 🗨 French

ENVI-F452  
(optional)

**Environmental impact analysis and management** | Wouter ACHTEN (Coordinator) and Edgar Towa Kouokam

⌚ 5 credits [lecture: 24h, practical work: 12h, project: 24h] 📅 first term 🗨 English/French

ENVI-F454  
(optional)

**Energie: Société et environnement** | Michel HUART (Coordinator) and Nadine MATTIELLI

⌚ 5 credits [lecture: 24h, tutorial classes: 24h, practical work: 12h] 📅 first term 🗨 French

### Module: Télédétection

GEOG-F211  
(optional)

**Systèmes d'information géographique et projections** | Eléonore WOLFF (Coordinator) and Dimitri LEEMANS

⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 🗨 French

GEOG-F425  
(optional)

**Télédétection** | Eléonore WOLFF (Coordinator)

⌚ 5 credits [lecture: 30h, practical work: 30h] 📅 first term 🗨 French

## Autre UE

Choisir 5 crédits dans la liste des cours à option ci-dessus ou dans les programmes de l'Ecole de Bioingénierie de Bruxelles, de la Faculté des Sciences, de l'Ecole Polytechnique de Bruxelles ou dans le programme des Masters bioingénieurs de la Faculté de Bioingénieurs de l'Université Catholique de Louvain (UCL).

*A total of five credits chosen from the following*

TEMP-0000  
(optional)

**Cours extérieurs au programme**

⌚ 5 credits 📅 academic year 🗨 French