



## BIRF2M - Introduction

### Introduction

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## BIRF2M - Teaching profile

### Learning outcomes

Master in Forests and Natural Areas students must endeavour to diagnose and solve complex and original issues in bioengineering through a multidisciplinary approach in order to develop and implement innovative and sustainable solutions.

This Master's programme aims to train experts in the field of management, conservation and the responsible and sustainable use of forests and natural spaces in multiple ecological and socio-economic contexts.

The future bioengineers acquire the knowledge and skills required to become:

- professionals able to tackle and diagnose problems related to the management and use of natural resources and forests and to provide operational solutions: sustainable management of ecosystems, management of natural areas and forests, development of forest-wood resources;
- scientists able to understand complex processes on different spatial and temporal scales, used to multidisciplinary approaches and able to collaborate with other specialists;
- innovators tasked with developing new methods of managing natural environments and forests with a view to ensuring the sustainability of goods, resources and services from ecosystems, in the context of climate change and changing social demands.

Highly versatile and multidisciplinary in character, the course dispensed by the Faculty of Biological, Agricultural and Environmental Engineering focuses on acquiring skills which combine theory and practice to train "bioengineers" mastering a broad base of scientific and technological knowledge and skills allowing them to adopt an integrated approach to biological, agricultural and environmental systems.

On successful completion of this programme, each student is able to :

1. To explore a body of knowledge (knowledge, methods and techniques, models and processes) in natural and human sciences which serves as the foundation from which to operate with expertise in the field of forest sciences.

1.1 To build an advanced knowledge base in the field of forest science and more specifically in the following disciplines[1].

- Soil and water sciences
- Ecology
- Wood sciences
- Dendrology
- Geomatics applied to the environment
- Statistics and data analysis
- Economics of natural and forestry resources
- Sustainable development law

1.2 To build highly specialised (cutting-edge) scientific knowledge in one of the following[2] bioengineering specialisations:

- Ecosystems and biodiversity
- Forest and society
- Tropical forestry and development
- Information analysis and management in biological engineering

1.3 To master procedural skills in conducting experiments[3] in a natural or controlled environment, and in the observation and monitoring of forests and natural systems at different scales as well as the specific techniques related to their choice of specialisation.

1.4 To apply their knowledge critically to tackle a complex problem in the field of forest sciences, by incorporating processes at different scales ranging from the living organism scale, to landscape and biosphere.

1.5 To apply multiple strands of knowledge to resolve a multidisciplinary problem in the forest sciences field in order to develop relevant and innovative solutions.

[1] Refers to the choice of the Master (core subjects and professional focus). The knowledge of some of these disciplines will have been partially acquired in the Bachelor's degree (in the advanced minor).

[2] Refers to the option / module choice in the Master.

[3] Refers to mastering all the laboratory and field techniques used for the characterisation or monitoring of a system.

2. To explore an integrated body of "engineering and management knowledge" which serves as the foundation from which to operate with expertise in the forest science field.

2.1 To build an advanced knowledge base (e.g.: concepts, laws, technologies) and tools (e.g. modelling, programming) in engineering sciences:

- Geomatics applied to the environment
- Hydrology
- Applied soil sciences
- Dendrometry: forest resource inventory
- Topometry
- Ecological and forestry diagnosis
- Statistics and data analysis
- Forest engineering and wood transformation



- 5.6 To work within a team and collaborate effectively to achieve common objectives.
- 5.7 To take and assume the decisions required for the effective project management either alone or in a team in order to achieve the intended objectives.
- 5.8 To recognise and take into consideration the diversity of opinions and ways of thinking of team members and to manage conflict constructively to work towards a consensual decision.
- 5.9 To lead a team (demonstrate leadership): to motivate team members, to develop a collaborative climate, to guide them to cooperate in the achievement of a common objective, to manage conflict.
6. To communicate, interact and convince in a professional manner, in French and English at level C1 (Common European Framework of Reference for Languages published by the Council of Europe), both verbally and in writing, adapting to their conversational partners and the context.
- 6.1 To understand and use scientific articles and advanced technical documents in French and English.
- 6.2 To communicate information, ideas, solutions and conclusions as well as the knowledge and underlying principles, in a clearly structured, substantiated, concise and comprehensive way (as appropriate) both verbally and in writing according to the standards of communication specific to the context and by adapting their presentation according to the level of expertise of the audience.
- 6.3 To develop logic diagrams to concisely pose complex global questions.
- 6.4 To communicate the state of knowledge in a specific field concisely and critically.
- 6.5 To communicate results and conclusions, and to support a message, in an appropriate manner using scientific tables, graphs and diagrams.
- 6.6 To communicate effectively and respectfully with various stakeholders, demonstrating listening skills, empathy and assertiveness.
- 6.7 To argue and convince: to understand the points of view of various stakeholders and present their arguments accordingly.
- 6.8 To master the IT and technological tools essential for professional communication.
- 6.9 To learn English to level C1 according to the European Framework.
7. To act critically and responsibly by taking account of sustainable development issues and operating with a humanistic outlook.
- 7.1 To demonstrate intellectual independence of thought, to examine knowledge and professional practices and trends critically.
- 7.2 To make decisions and act in society with respect for ethical values and in compliance with laws and conventions.
- 7.3 To make decisions and act responsibly by factoring in sustainable development values.
- 7.4 To make decisions and act with respect for humanistic values, cultural openness and solidarity, especially in North–South relations.
- 7.5 To assume professional responsibilities and act in a managerial capacity vis-à-vis their colleagues.
8. To demonstrate independence of thought and professional capacity vis-à-vis their colleagues.





***PROFESSIONAL FOCUS [30.0]***

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## OPTIONS [15.0]

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L'option en Entrepreneuriat (INEO) est une formation interdisciplinaire et interfacultaire (EPL, AGRO, IEPR, PSP, DROIT, IAG-LSM, SC) qui totalise des activités pour 20 crédits, nécessitant un aménagement du programme de cours du tronc commun.

Elle doit être choisie dès la première année et nécessite la participation à une sélection conformément aux règles établies par les responsables du programme INEO. Ce n'est qu'après avoir reçu l'accord de participation à ce programme que les étudiants devront prendre contact avec le vice-doyen pour aménager leur programme de cours personnel et répartir les cours INEO sur les deux années du master.

- > [Option 5F](#) [ en-prog-2024-birf2m-lbirf201o ]
- > [Option 7F](#) [ en-prog-2024-birf2m-lbirf202o ]
- > [Option 10F - Data science](#) [ en-prog-2024-birf2m-lbirf204o ]
- > [Option 12F : Sustainability engineering](#)



**OPTION 10F - DATA SCIENCE [15.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Year

1 2

o **Content:**

● LBRTI2101B	<a href="#">Data Science in bioscience engineering</a>	Patrick Bogaert Emmanuel Hanert	(FR) [q1] [30h] [2 Credits] 🌐 > English-friendly	X
● LBRTI2102	<a href="#">Process-based modelling in bioscience engineering</a>	Emmanuel Hanert	(FR) [q1] [30h+15h] [5 Credits] 🌐 > French-friendly	

**OPTION 12F : SUSTAINABILITY ENGINEERING [15.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Year

1 2

**o Content:**

○ LBIRE2205A	Decision tools and project management - Decision tools	Raphaël Amory Frédéric Gaspard	EN [q1] [22.5h+7.5h] [3 Credits] 🌐 > French-friendly	X	
○ LBIRE2235	Innovative system management for sustainability	Benjamin Berger (compensates Francesco Contino) Quentin Goor (compensates Mathieu Javaux) Mathieu Javaux (coord.) Goedele Van den Broeck	EN [q1] [22.5h+7.5h] [3 Credits] 🌐 > French-friendly		X
○ LBRES2101	Smart technologies for environmental engineering	Sébastien Lambot	EN [q1] [32.5h+20h] [4 Credits] 🌐 > French-friendly		X
○ LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	EN [q1] [30h+15h] [5 Credits] 🌐 > French-friendly		X

**BUSINESS CREATION (OPTION 13F) [20.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

When chosen, the students are exempted from two courses among the mandatory courses: BIRE2210 and BIRE2106A. Access is limited via a selection process when entering the master (<https://uclouvain.be/fr/etudier/ineo>).

Year

1 2

**o Content:**

○ LINEO2001	Théorie de l'entrepreneuriat	Frank Janssen	FR [q1] [30h+20h] [5 Credits] 🌐	X	
○ LINEO2002	Aspects juridiques, économiques et managériaux de la création d'entreprise	Yves De Cordt Marine Falize	FR [q1] [30h+15h] [5 Credits] 🌐		X
○ LINEO2003	Plan d'affaires et étapes-clefs de la création d'entreprise	Frank Janssen	FR [q2] [30h+15h] [5 Credits] 🌐		X
○ LINEO2004	Séminaire d'approfondissement en entrepreneuriat	Frank Janssen	FR [q2] [30h+15h] [5 Credits] 🌐		X

***OPTION 16F [15.0]***

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○ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Quentin Goor (compensates Mathieu Javaux) Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits] 🌐
○ LBIR1328	Climatology and hydrology applied to agronomy and the environment	Alice Alonso (coord.) Charles Bielders (coord.) Hugues Goosse	FR [q1] [45h+22.5h] [6 Credits] 🌐 > French-friendly
○ LBIR1334	Introduction to forest science	Quentin Ponette (coord.) Caroline Vincke	FR [q2] [22.5h+15h] [3 Credits] 🌐 > English-friendly
○ LBIR1336	Soil science and integrated excursions	Yannick Agnan (coord.) Richard Lambert Caroline Vincke	FR [q2] [30h+37.5h] [5 Credits] 🌐 > English-friendly
○ LBIR1349	Analytical Chemistry I	Christine Dupont (coord.) Yann Garcia Yann Garcia (compensates Christine Dupont)	FR [q1] [30h+15h] [3 Credits] 🌐
○ LBIR1350	General Microbiology	Annika Gillis	FR [q2] [37.5h+15h] [4 Credits] 🌐
○ LBIR1351	Introduction to systems analysis	Philippe Baret	FR [q1] [10h+20h] [3 Credits] 🌐
○ LBIR1354	Biologie des interactions	Anne-Laure Jacquemart (coord.) Anne Legrève	FR [q2] [22.5h+15h] [3 Credits] 🌐
○ LBIR1360	Firm management and organisation	Pierre De Muelenaere	FR [q1] [30h+7.5h] [3 Credits] 🌐 > French-friendly
○ LBIR1362	Environmental Economics	Frédéric Gaspart	FR [q2] [30h+7.5h] [3 Credits] 🌐

### ○ Unités d'enseignement spécifiques (11 credits)

○ LBIR1260	Principles of economics	Goedele Van den Broeck	FR [q1] [30h+15h] [4 Credits] 🌐 > French-friendly
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### ○ Courses to be chosen for 7 credits (7 credits)

Activités au choix libre dans l'un des programmes de bachelier du Secteur des Sciences et Technologies : <https://uclouvain.be/fr/etudier/les-facultes.html>

Minimum 7 credit(s)

## Course prerequisites

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There are no prerequisites between course units (CUs) for this programme, i.e. the programme activity (course unit, CU) whose learning outcomes are to be certified and the corresponding credits awarded by the jury before registration in another CU.

## The programme's courses and learning outcomes

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For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.



## BIRF2M - Information

## Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the higher education landscape and the academic organisation of courses.

General and specific admission requirements for this programme must be satisfied at the time of enrolling at the university.

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

**In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.**

## SUMMARY

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- > [Specific access requirements](#)
- > [University Bachelors](#)
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- > [Holders of a 2nd cycle University degree](#)
- > [Access based on validation of professional experience](#)
- > [Access based on application](#)
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## University Bachelors

Diploma	Special Requirements	Access	Remarks
<b>UCLouvain Bachelors</b>			
<a href="#">Bachelor in Bioengineering</a>		Direct access	
Autre Bachelier du domaine des sciences et technologies		<a href="#">Access based on application</a>	Le ou la futur-e étudiant-e rencontrera obligatoirement le <a href="#">Conseiller aux études</a> qui examinera son dossier.
<b>Others Bachelors of the French speaking Community of Belgium</b>			
Tous les bacheliers de la CfB		Direct access	
		<a href="#">Access based on application</a>	
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
		Direct access	
		<a href="#">Access based on application</a>	
<b>Foreign Bachelors</b>			
		<a href="#">Access based on application</a>	
		<a href="#">Access based on application</a>	

## Non university Bachelors

> Find out more about [links](#) to the university

Diploma	Access	Remarks
BA en agronomie, orientation agro-industries et biotechnologies - crédits supplémentaires entre 45 et 60	Les enseignements supplémentaires éventuels peuvent être consultés dans <a href="#">le module complémentaire</a> .	Type court
BA en agronomie, orientation agronomie des régions chaudes - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation environnement - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation forêt et nature - crédits supplémentaires entre 45 et 60		

BA en agronomie, orientation systèmes alimentaires durables et locaux - crédits supplémentaires entre 45 et 60

BA en agronomie, orientation techniques et gestion agricoles - crédits supplémentaires entre 45 et 60

BA en agronomie, orientation techniques et gestion horticoles - crédits supplémentaires entre 45 et 60

BA en agronomie, orientation technologie animale - crédits supplémentaires entre 45 et 60

BA en chimie, orientation biochimie - crédits supplémentaires entre 45 et 60

BA en chimie, orientation biotechnologie - crédits supplémentaires entre 45 et 60

BA en chimie, orientation chimie appliquée - crédits supplémentaires entre 45 et 60

BA en chimie, orientation environnement - crédits supplémentaires entre 45 et 60

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## Holders of a 2nd cycle University degree

## Teaching method

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The interdisciplinary nature, integrated approach and the ability to reason on long-term issues are key dimensions in the training of **bioengineers in forests and natural areas**. This is reflected by:

- grouping of training activities: combined exercises, joint projects, case studies, weekly excursions, forestry tour (a one week study trip in Belgium and/or abroad), visits to companies;
- the integration of various approaches and tools (field observations, laboratory analyses, data bases, information systems, permanent experimental plots, ...), on different spatial scales (from a tree to a catchment basin, from a regional level to a sub-continental level) and temporal scales;
- student teamwork, training students to share their skills;
- the transversal educational offer (organized by other faculties).

### **A full array of pedagogical tools is placed at the students' disposal.**

The Louvain-la-Neuve campus includes a 200 ha forest which is owned by UCL: the Bois de Lauzelle. The forest serves as a model for the scientific, pedagogical, economical, ecological and recreational functions of a wood. Several special devices have been put in place in the Bois de Lauzelle that are used both for its daily management as well as for educational purposes. An example is the simulation area for the marking of trees, which, combined with a computer programme, allows to analyse the effects of the choices made during the process; but also a permanent inventory device for ligneous resources. Students learn to recognise ligneous species more easily thanks to the diversity of the species present on the site, both in the Bois de Lauzelle and in town. Students also have access to an arboretum of coniferous species.

The Forestry Department also manages various experimental devices in the Walloon and Brussels regions. These provide students with the opportunity to train themselves in the understanding and management of forest ecosystems.

A decentralised field laboratory, the "Centre de développement Agro-Forestier (CDAF)", conducts applied research on trees and forests. Situated in Chimay, the laboratory gives access to a great diversity of natural environments. It also accommodates students in the framework of internships and dissertations.

Training for research, through research, which is essential for conceptual and innovative awareness and developing intellectual rigour, is reflected by different types of activities:

- producing a final dissertation and taking part in dissertation seminars;
- participation in subject seminars providing direct contact with young researchers working in the field of environment science and land development;
- presentation of seminars by students within the research groups, during their master dissertation.

The application of skills, knowledge and techniques that students have acquired and how they use them together is taken into account in the realisation of an integrated project as well as during the "forestry tour". This one week field trip during the second year, allows students to gain practical experience. These are important learning activities in addition to the realisation of a dissertation which, in the view of the Faculty, remains the most important part of training for research.



