

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.

- Temperate and tropical forestry
 - Management of forests and natural areas
 - Land management
- 2.2 To build and master highly specialised knowledge and tools in one of the following bioengineering specialisations:
- Ecosystems and biodiversity
 - Forest and society
 - Tropical forestry and development
 - Information analysis and management in agricultural engineering
- 2.3 To master the operational use of specialised tools in engineering sciences (e.g.: systems analysis, statistical analysis, programming, modelling, etc.)[1]:
- Measurement techniques
 - Statistical data analysis
 - Specific tools in relation to the choice of specialisation
- 2.4 To activate and apply their knowledge of engineering with a critical mind and using a quantitative approach to tackle a complex problem in the field of forest science by incorporating long-term processes at different scales ranging from the tree to landscape and biosphere.
- 2.5 To locate and understand how companies and organisations operate, including the role of the different players, their financial and social realities and responsibilities and the challenges and constraints which characterise their environment.

[1] The tools are explained on the basis of the radioscopia of the programme and courses.

3. To design and execute a research project, implementing an analytical scientific and, if applicable, systematic approach, to further understanding of an original research problem in their field of specialisation, incorporating several disciplines.

This skill set will develop throughout the 5 years. Amongst others it requires the use of a set of skills as described below. These skills correspond in fact to the different stages of the scientific approach.

The majority of these skills are developed in the Bachelor and Master programmes, with differentiation predominately on 3 levels:

- *the level of detail and complexity applied to the scientific problem/research studied;*
- *the degree of innovation shown by the student;*
- *the degree of autonomy demonstrated by the student throughout the process.*

3.1 To summarise the state of knowledge on a complex research problem which relates to their choice of specialisation: to research information, to select and validate its reliability based on the nature of the source of the information and comparing several sources.

3.2 To specify and define the research question.

3.3 To examine the research question using conceptual abstraction and formulate hypotheses.

3.4 To develop and implement a rigorous methodology to answer the research question.

3.5 To master and apply statistical data analysis tools in the context of a complex scientific issue.

3.6 To analyse and interpret the results to produce a substantiated critique on a complex scientific question.

3.7 To demonstrate an ability to summarise and formulate conclusions on a complex scientific question.

3.8 In each of the skills mentioned above, to demonstrate rigour, precision and the critical thinking essential for any scientific method.

3.9 To demonstrate innovation in at least one of the skills mentioned above.

4. To formulate and resolve a complex engineering problem in the forest sciences field, related to new situations presenting a degree of uncertainty and by using a systematic approach to develop relevant sustainable and innovative solutions.

4.1 To strategically differentiate the key elements from the less critical elements relating to a complex forest engineering problem, in order to define and determine the field of action for this problem.

4.2 To identify the knowledge acquired and that to be acquired to resolve the complex forest engineering problem.

4.3 To analyse a complex forest engineering problem according to a systematic and multidisciplinary approach in order to carry out diagnostics and formulate the specifications.

4.4 To demonstrate an ability for conceptual abstraction and formalisation in analysing and resolving the complex forest engineering problem.

4.5 To develop scientifically and technologically relevant and innovative solutions, through a multidisciplinary (integration and articulation of knowledge) and quantitative approach, making it possible to develop products, systems, processes or services in the field of agricultural sciences.

4.6 To test solutions and evaluate their impact in relation to an economic, environmental, social and cultural context.

4.7 To formulate concrete and responsible recommendations to encourage sustainable development in relation to the efficient operational and sustainable implementation of the solutions proposed.

5. To design and implement a multidisciplinary project, alone and in a team, with the stakeholders concerned while taking the objectives into account and incorporating the scientific, technical, environmental, economic and human factors.

The graduate must be able to manage a project alone and in a team, not only the scientific and technological dimensions but also the financial and, if applicable social aspects and with a degree of complexity representative of typical professional scenarios.

5.1 To know and understand the principles and factors of group dynamics (including the constructive role of conflict).

5.2 To know and understand the project management process (project cycles): formulation and definition of the project, project management, monitoring and evaluation of the project.

- 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 and be proactive in acquiring new knowledge and developing new skills in order to adapt to changing or uncertain situations and to grow, to build a professional project within a continuing development approach.
- The majority of these skills are not developed exclusively through specific activities, but rather as a result of the multiple and diverse situations encountered throughout the course, the educational programmes and the way in which it is run, as well as through the university environment.*
- 8.1 To manage their work independently: to set priorities, anticipate and plan all the activities in time, including in the face of changing, uncertain or urgent situations.
- 8.2 To manage stress and frustrations in urgent, changing, inconsistent or uncertain situations.
- 8.3 To question and know themselves: to undergo self-assessment, by analysing their successes and failures, to identify strengths and weaknesses and their personal performance in relation to the context.
- 8.4 To grow personally and professionally: to build a professional project in line with their own values and aspirations, to manage their motivation and involvement in bringing the project to fruition, to persevere in complex situations.
- 8.5 To independently identify and absorb new knowledge and skills essential for learning to understand new contexts quickly.
- 8.6 To commit to the lifelong learning which will allow them to grow socially and professionally.

Programme structure

This programme comprises a series of activities totalling 120 credits spread over two years worth 60 credits each. It is structured as follows:

The overall structure of the Bachelor in Engineering (Bioengineering) and the Master in Bioengineering clearly reflect the concepts of specialization, gradual choice and individualization of the courses.

1st cycle (Bachelor):

- same programme for SC and AGRO in first year (BIR11BA),
- special programme in second year (BIR12BA) for all the BIR students,
- distinct programme with 30 credits for elective modules in third year (BIRC13BA, BIRA13BA, BIRE13BA): three minors available: chemistry (BIRC), agronomy (BIRA), environment (BIRE).

2nd cycle (Master):

- choice of four Masters in Bioengineering with a professional focus, together with sixteen elective modules which partly overlap, optional courses (either free choice or from the lists) and a final individual dissertation.

This overall structure gives students the opportunity to customize their programme whilst at the same time retaining both the **comprehensive nature** of the training and the foundation elements of university education: **independence, competence, open-mindedness and interest in research**.

The sixteen elective modules, which partly overlap at the level of the four Masters in Bioengineering, correspond to fields of activity identified on the basis of a wide-ranging survey of graduates of the Faculty working professionally and of contacts with potential employers.

Year 1:

- first part of the compulsory common core curriculum (25 credits),
- compulsory professional focus programme (30 credits),
- choice of one elective module (15 credits) from a list of five. At least 5 credits of this module should be taken during the first year. Certain optional courses may be organised in collaboration with the three other Masters in Bioengineering.

NB: Enrolment in the additional interdisciplinary training module in "Business Creation" is not automatic. In order to enrol, students must submit their application to the coordinators of the Business Creation programme and participate in the selection process.

Year 2:

- remainder of the compulsory common core curriculum (50 credits),
- remainder of the elective module (10 credits)

Additional training "Business Creation"

The interdisciplinary training in "Business Creation" is one of the elective modules proposed within the framework of the Master in Forestry and Natural Areas. However, since this module is worth 20 credits (instead of the 15 credits provided for an elective module), some modifications of the common core curriculum are required.

This module **must be taken as of the first year of this Master's programme**

Caroline Vincke)

			Year	
			1	2
○ LBIRF2101	Forest mensuration	Mathieu Jonard Quentin Ponette (coord.)	EN [q2] [30h+22.5h] [4 Credits]  > English-friendly	X
○ LBIRF2103		Hugues Frère (compensates Caroline Vincke) Caroline Vincke (coord.)	EN [q1] [30h+30h] [5 Credits]  > English-friendly	X
○ LBIRF2105	Silviculture and dendrology	Quentin Ponette	EN [q1] [30h+52.5h] [6 Credits]  > English-friendly	X
○ LBIRF2106	Analyse et gestion des habitats et des espèces	Anne-Laure Jacquemart (coord.) Marie Pairon	EN [q2] [30h+22.5h] [5 Credits] 	X
○				

PROFESSIONAL FOCUS [30.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊙ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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

○ **Content:**

○ LBIRE2104	Applied soil sciences	Yannick Agnan (coord.) Pierre Delmelle (coord.) Hugues Titeux (compensates) Pierre Delmelle	[FR] [q1] [22.5h+22.5h] [4 Credits] 🌐 > English-friendly		x
○ LBIRF2102	Transformation et industries du bois	Hugues Frère (compensates) Caroline Vincke Caroline Vincke (coord.)	[FR] [q2] [30h+7.5h] [4 Credits] 🌐		



OPTIONS [15.0]

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-2023-birf2m-lbirf201o]
- > [Option 7F](#) [en-prog-2023-birf2m-lbirf202o]
- > [Option 10F - Data science](#) [en-prog-2023-birf2m-lbirf204o]
- > [Option 12F : Sustainability engineering](#)

OPTION 10F - DATA SCIENCE [15.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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

Data Science in bioscience engineering

Patrick Bogaert

OPTION 12F : SUSTAINABILITY ENGINEERING [15.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊙ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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 Gaspart	EN [q1] [22.5h+7.5h] [3 Credits] 🌐 > French-friendly	X	
● LBIRE2235	Innovative system management for sustainability	Francesco Contino 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 2023-2024
- ⊙ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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 (

OPTION 17F [15.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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:**

o **5 crédits minimum à choisir au sein de l'une des options du master (5 credits)**

○ LBIR2004	Masters Internship	Damien Debecker (coord.) Xavier Draye François Gaspard Anne-Laure Jacquemart	10 [q2] [20h] [10 Credits] 🌐 > English-friendly	x	x
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Supplementary classes

To access this Master, students must have a good command of certain subjects. If this is not the case, students must take supplementary classes chosen by the faculty to satisfy course prerequisites.

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 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...)

o **Cours passerelle pour le master en bioingénieur, orientation chimie gestion des forêts et espaces naturels ET sciences et technologies de l'environnement (44 credits)**

○ LANGL2480	
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Course prerequisites

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

For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the 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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- > [Access based on validation of professional experience](#)
- > [Access based on application](#)
- > [Admission and Enrolment Procedures for general registration](#)

University Bachelors

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

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 le module complémentaire .	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 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 animalière - 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

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
Masters			

Teaching method

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

