UCLouvain

BIRF2M

2024 - 2025

Master [120] in Forests and Natural Areas Engineering

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In French

BIRF2M - Introduction

Introduction

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 provos0m99iman889 s aral resources an7ioengin0 l Tm o tackmv0 0 yr ms,oJ 1 0 0 and use of naturnagement and use of natJ 1 0aros0m99iman889 s a

• 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.

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[1] The tools are explained on the basis of the radioscopy 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.

5.3 To situate a multidisciplinary project within its environment and identify the issues, constraints and stakeholders and to clearly define its objectives.

5.4 To plan and develop all the stages of a multidisciplinary project, alone and in a team, and to work together after having allocated the tasks.

5.5 To involve key players at appropriate stages in the process.

OPTIONS [15.0]

OPTION 7F [15.0]

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year

2 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...)

Content:

				Year 1	Year 2
LBRTI2101B	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert	FR [q1] [30h] [2 Credits] *> English-friendly*	x	
LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	EN [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...)

Content:

				Year 1	Year 2
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	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).

Content:

				Year 1	Year 2
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]

- 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...)

Content:

				Year 1	Year 2
LBIRA2109	Agrarian systems and farm	Guillaume Lobet	FR [q1] [30h+0h] [3 Credits] > English-friendly	x	
LBRAI2106B	Crop science - Tropical crops	Guillaume Lobet	FR [q2] [20h] [2 Credits] > English-friendly	x	
LBRAI2106C	Crop science - Fruit crops	Guillaume Lobet	FR [q2] [6h+4h] [1 Credits] > English-friendly	x	

Courses to be chosen for 9 credits minimum (9 credits)

LBIRF2203	Aquaculture	Xavier Rollin	FR [q1] [30h] [3 Credits] > English-friendly	x	x
LBRAI2110	Elements of Agroecology	Philippe Baret (coord.) Gaëtan Vanloqueren (compensates Philippe Baret)	EN [q1] [30h] [3 Credits] > French-friendly	x	x
LBRAI2212	Economics of Rural Development	Goedele Van den Broeck	EN [q1] [30h] [3 Credits] > French-friendly	x	x
LBRAI2214	Enquête et pratiques d'intervention en milieu rural tropical	Philippe Baret Pierre Defourny (coord.)	FR [q1] [15h+15h] [3 Credits]	x	x
LBRAI2220	Quantitative genetics, crop improvement and biotechnology	Philippe Baret Xavier Draye (coord.)	FR [q2] [35h+15h] [5 Credits] > English-friendly	x	x
LBRAT2104A	Land monitoring by advanced earth observation	Sophie Bontemps Pierre Defourny	EN [q2] [22.5h+15h] [3 Credits] > French-friendly	x	x
LBRES2105	Soil erosion and conservation	Charles Bielders	EN [q2] [22.5h+22.5h] [4 Credits] △ > French-friendly	x	x
LBRES2203	Soil management in tropical and subtropical regions	Charles Bielders (coord.)	FR [q2] [22.5h+7.5h] [3 Credits] △	x	x
LDVLP2675	Dynamics of development - environment inter-actions	An Ansoms	FR [q2] [30h] [5 Credits]	x	x

OPTION 17F [15.0]

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year

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	EN [q1] [45h+22.5h] [6 Credits] *> French-friendly*
LBIR1334	Introduction to forest science	Quentin Ponette (coord.) Caroline Vincke	EN [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	[redacted]	Christine Dupont (coord.) Yann Garcia Yann Garcia (compensates Christine Dupont)	FR [q1] [30h+15h] [3 Credits]

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 y7wb856 equisites

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

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.

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 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

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 devises 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.

This mobility should increase given the harmonization of education at the European level and the conclusion of new partnership agreements outside ERASMUS as well as membership of thematic networks. The AGRO Faculty is also a member of the ATHENS network.

The Master in Forests and Natural Areas proposes privileged exchanges with the following institutions:

1. Université de Moncton, Edmunston campus, Faculté de Foresterie (Canada)
2. Universitad politecnica de Madrid (Spain)
3. Institut Polytechnique LaSalle Beauvais (France)
4. Ecole Nationale du Génie Rural, des Eaux et des Forêts (Nancy, France)
5. Ecole Nationale Forestière dâ€™Ingénieurs (Salé, Morocco)

The â€˜Réseau des Ingénieurs Forestiers de Louvain (RIFL)â€™ creates possibilities for project-based student mobility.

Possible trainings at the end of the programme

The Master in Bioengineering programme follows on the Bachelor in Engineering (Bioengineering) with a minor in Environment. Access to this Master is also possible after a minor in â€œAgronomyâ€#, providing a small adaptation of the programme that must be validated by the academic secretary.

Successful completion of this programme enables direct entry to other training programmes in the second and third cycles.

- Advanced Masters: the Advanced Masters in the field authorized by regulations in addition to those established by the University Development Commission (Commission Universitaire au Développement â€“ CUD) in the same field.
-