

**At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In French**Dissertation/Graduation Project : **YES** - Internship : **optional**Activities in English: **YES** - Activities in other languages : **NO**Activities on other sites : **NO**Main study domain : **Sciences agronomiques et ingénierie biologique**Organized by: **Faculty of bioscience engineering (AGRO)**Programme acronym: **BIRF2M** - Francophone Certification Framework: 7**Table of contents**

Introduction .....	2
Teaching profile .....	3
Learning outcomes .....	3
Programme structure .....	5
Programme .....	6
Detailed programme by subject .....	6
Supplementary classes .....	14
Course prerequisites .....	16
The programme's courses and learning outcomes .....	16
Information .....	17
Access Requirements .....	17
Teaching method .....	19
Evaluation .....	19
Mobility and/or Internationalisation outlook .....	19
Possible trainings at the end of the programme .....	20
Contacts .....	20

## 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

- 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.)<sup>[1]</sup>:
- 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 radiology 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.

- 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

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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**

Enrolment is not automatic. In order to enrol, students must apply for admission and participate in a selection process. Only after having received the permission to participate in this programme may students contact the academic secretary to establish their personal course programme and plan the distribution of their courses over the two years of their Master's programme.

This additional programme features in the Master programmes of various faculties (Bioengineering, Law, Business Management, Civil Engineering and Psychology). It is designed to provide students, as potential creators, with the tools for analysis and understanding which will help them appreciate how entrepreneurship works when creating or taking on a business and develop projects of this kind within existing organizations.

In addition, this training enables students to gain familiarity with other disciplines and to learn how to work in multidisciplinary teams.

For further information on this training programme, please refer to: <https://uclouvain.be/cpme.html>

## BIRF2M Programme

### Detailed programme by subject

#### CORE COURSES [75.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊙ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

				Year	
				1	2
○ LBIRF2200	Mémoire de fin d'études		FR [q1+q2] [] [27 Credits]		x
○ LBIRE2210	Master thesis' accompanying seminar	Charles Bielders Patrick Bogaert (coord.) Sophie Opfergelt (compensates) Pierre Delmelle Caroline Vincke	FR [q1+q2] [30h] [3 Credits]		x
○ LBIRE2102	Applied Geomatic	Pierre Defourny	FR [q1] [30h+22.5h] [4 Credits]	x	
○ LBIRF2101	Mesure des arbres et des peuplements forestiers	Mathieu Jonard Quentin Ponette (coord.)	FR [q2] [30h+22.5h] [4 Credits]	x	

				Year	
				1	2
○ LBIRF2103	Anatomie et propriétés des bois	Hugues Frère (compensates) Caroline Vincke Caroline Vincke (coord.)	FB [q1] [30h+30h] [5 Credits]	x	
○ LBIRF2105	Sylviculture et dendrologie	Quentin Ponette	FB [q1] [30h+52.5h] [6 Credits]	x	
○ LBIRF2106	Analyse et gestion des habitats et des espèces	Anne-Laure Jacquemart	FB [q2] [30h+22.5h] [5 Credits]	x	
○ LBIRF2201	Principes d'économie et de génie forestier	Valéry Bemelmans (compensates) Caroline Vincke Mathieu Jonard	FB [q2] [37.5h] [3 Credits]	x	
○ LBIRF2204	Sylviculture tropicale et enjeux forestiers internationaux	Christine Farcy (coord.) Sylvie Gourlet Régis Peltier	FB [q1] [37.5h] [3 Credits] ⊕	x	x
○ LBIRF2213	Fieldtrip - Forest, natural areas and land use	Anne-Laure Jacquemart Quentin Ponette (coord.) Caroline Vincke	FB [q2] [30h] [2 Credits]		x
○ LBRAT2101B	Aménagement du territoire: Principes	Pierre Defourny Yves Hanin Marie Pairon	FB [q1] [45h] [3 Credits]	x	

### ○ Courses to be chosen for 5 credits (5 credits)

Sauf pour l'option 13F

### ○ Statistiques (3 credits)

Courses to be chosen for 3 credits minimum

⊗ LBIRA2110B	Applied Econometrics	Xavier Draye Frédéric Gaspard Bernadette Govaerts	FB [q1] [27.5h+7.5h] [3 Credits]	x	
⊗ LBRTI2101A	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert	FB [q1] [22.5h+15h] [3 Credits]	x	

### ○ Ethics (2 credits)

The students will opt firstly for the course LTECO2300. Two other choices are also available.

⊗ LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	FB [q1] [15h] [2 Credits]	x	x
⊗ LTECO2200	Societies-cultures-religions : Human Questions	Sébastien Dehorter (compensates) Régis Burnet Dominique Martens	FB [q1 or q2] [15h] [2 Credits]	x	x
⊗ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	FB [q1] [15h] [2 Credits]	x	x

**PROFESSIONAL FOCUS [30.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊙ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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:**

○ LBIRE2104	Applied soil sciences	Yannick Agnan Pierre Delmelle (coord.) Brieuc Hardy (compensates Pierre Delmelle)	FR [q1] [22.5h+22.5h] [4 Credits]		x
○ LBIRF2102	Transformation et industries du bois	Hugues Frère Caroline Vincke (coord.)	FR [q2] [30h+7.5h] [4 Credits]	x	
○ LBIRF2104	Ecologie et santé des forêts	Claude Bragard Anne Legrève Quentin Ponette Caroline Vincke (coord.)	FR [q2] [45h] [4 Credits]	x	

**o Projet de M1 (10 credits)**

○ LBIRE2130	Évaluation d'impact environnemental: projet et introduction à la gestion de bases de données	Yannick Agnan Charles Bielders (coord.) Patrick Bogaert Pierre Defourny Nathalie Kruyts Guillaume Lobet Quentin Ponette	FR [q2] [47.5h+30h] [7 Credits]	x	
○ LBIRE2131	Evaluation d'impact environnemental: diagnostic et indicateurs	Charles Bielders (coord.) Pierre Defourny	FR [q2] [22.5h] [3 Credits]	x	

**o Projet de M2 (8 credits)****⊗ Projet de M2 pour les options 5F, 7F, 10F, 13F et 16F (8 credits)**

○ LBIRF2202	Multifunctional forest management	Quentin Ponette	FR [q1] [15h+15h] [3 Credits]		x
○ LBIRF2230	Projet intégré en forêt et espaces naturels	Olivier Baudry (compensates Caroline Vincke) Quentin Ponette (coord.)	FR [q1] [45h] [5 Credits]		x

**⊗ Projet de M2 pour l'option 12F (8 credits)**

○ LBIRF2202	Multifunctional forest management	Quentin Ponette	FR [q1] [15h+15h] [3 Credits]		x
○ LBIRE2234	Data Science and Sustainability Engineering projects	Patrick Bogaert (coord.) Pierre Defourny Emmanuel Hanert	FR [q1] [50h+10h] [5 Credits]		x



**OPTIONS [15.0]**

L'option en Création d'entreprise (CPME) 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 CPME. 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 CPME sur les deux années du master.

- > [Option 5F](#) [ en-prog-2021-birf2m-lbirf201o ]
- > [Option 7F](#) [ en-prog-2021-birf2m-lbirf202o ]
- > [Option 10F - Data science](#) [ en-prog-2021-birf2m-lbirf204o ]
- > [Option 12F : Sustainability engineering](#) [ en-prog-2021-birf2m-lbirf207o ]
- > [Business Creation \(Option 13F\)](#) [ en-prog-2021-birf2m-lbirf205o ]
- > [Option 16F](#) [ en-prog-2021-birf2m-lbirf203o ]
- > [Option 17F](#) [ en-prog-2021-birf2m-lbirf206o ]

**OPTION 5F [15.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊙ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

**⊗ Content:**

○ LBRAT2101C	Aménagement du territoire: Etude de cas	Pierre Defourny Yves Hanin Marie Pairon	FR [q1] [0h+15h] [2 Credits]	X	
○ LBRAT2102	Spatial modelling of land dynamics	Pierre Defourny	FR [q2] [15h+15h] [3 Credits]		X
○ LICAR2901A	Droit de l'espace bâti et non bâti (partie1)		FR [q1] [25h] [2 Credits]	X	
○ LSTAT2110A	Analyse des données	Johan Segers	FR [q1] [15h+7.5h] [3 Credits]	X	

**○ Courses to be chosen for 5 credits minimum (5 credits)**

⊗ LBIRE2205A	Decision tools and project management - Decision tools	Frédéric Gaspard	EN [q1] [22.5h+7.5h] [3 Credits]	X	X
⊗ LBRAT2103	Sociology of the actors and the rural territories	Yves Hanin	FR [q1] [30h] [3 Credits]	X	X
⊗ LBRAT2104A	Land monitoring by advanced earth observation	Sophie Bontemps Pierre Defourny (coord.)	EN [q2] [22.5h+15h] [3 Credits]	X	X
⊗ LBRTI2101A	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert	FR [q1] [22.5h+15h] [3 Credits]	X	X
⊗ LBRTI2101B	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert	FR [q1] [30h] [2 Credits]	X	X
⊗ LENVI2011	Méthodes d'évaluation et de gestion environnementale	Jean-Pierre Tack	FR [q2] [30h] [3 Credits]	X	X

**OPTION 7F [15.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊖ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

**⊗ Content:**

● LBIRE2105	Water - soil - air quality's Evaluation	Henri Halen Philippe Maetz Xavier Rollin (coord.)	[FR] [q1] [30h+0h] [3 Credits]		x
● LBRES2204	Integrated water management of water resources	François Jonard Marnik Vanclooster (coord.)	[FR] [q1] [22.5h+22.5h] [4 Credits]	x	

**○ Courses to be chosen for 8 credits minimum (8 credits)**

⊗ LBIRF2203	Pisciculture	Xavier Rollin	[FR] [q1] [30h] [3 Credits]	x	x
⊗ LBOE2122	Biodiversité du milieu marin	Cathy Debier Jean-François Rees	[FR] [q2] [24h] [2 Credits]	x	x
⊗ LBRAT2104A	Land monitoring by advanced earth observation	Sophie Bontemps Pierre Defourny (coord.)	[EN] [q2] [22.5h+15h] [3 Credits]	x	x
⊗ LBRES2101B	Smart technologies for environmental engineering	François Jonard Sébastien Lambot	[FR] [q1] [22.5h+15h] [3 Credits]	x	x
⊗ LBRES2103	Soil physics applied to Agronomy and Environment	Charles Bielders (coord.) Mathieu Javaux	[FR] [q1] [30h+15h] [4 Credits]	x	x
⊗ LBRES2105	Soil erosion and conservation	Charles Bielders	[EN] [q2] [22.5h+22.5h] [4 Credits]	x	x
⊗ LB RTE2101	Applied hydro-biogeochemistry - Applied hydro-biogeochemistry	Pierre Delmelle Patrick Gerin (coord.)	[EN] [q1] [30h+15h] [4 Credits]	x	x

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

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊖ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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]	X	
○ LBRTI2102	<a href="#">Process-based modelling in bioscience engineering</a>	Emmanuel Hanert	EN [q1] [30h+15h] [5 Credits]		X

**o Courses to be chosen for 8 credits minimum (8 credits)**

⊗ LBIRA2110B	<a href="#">Applied Econometrics</a>	Xavier Draye Frédéric Gaspart Bernadette Govaerts	FR [q1] [27.5h+7.5h] [3 Credits]	X	X
⊗ LBRAT2102	<a href="#">Spatial modelling of land dynamics</a>	Pierre Defourny	FR [q2] [15h+15h] [3 Credits]	X	X
⊗ LBRAT2104A	<a href="#">Land monitoring by advanced earth observation</a>	Sophie Bontemps Pierre Defourny (coord.)	EN [q2] [22.5h+15h] [3 Credits]	X	X
⊗ LELEC2870	<a href="#">Machine learning : regression, deep networks and dimensionality reduction</a>	John Lee Michel Verleysen	EN [q1] [30h+30h] [5 Credits]	X	X
⊗ LINFO2172	<a href="#">Databases</a>	Siegfried Nijssen	EN [q2] [30h+30h] [6 Credits]	X	X
⊗ LINFO2275	<a href="#">Data mining &amp; decision making</a>	Marco Saerens	EN [q2] [30h+15h] [5 Credits]	X	X
⊗ LSTAT2020	<a href="#">Statistical softwares and basic statistical programming</a>	Céline Bugli	FR [q1] [15h+15h] [4 Credits]	X	X

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

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊙ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

**⊗ Content:**

○ LBIRE2205A	Decision tools and project management - Decision tools	Frédéric Gaspart	EN [q1] [22.5h+7.5h] [3 Credits]	X	
○ LBIRE2235	Innovative system management for sustainability		EN [q1] [22.5h+7.5h] [3 Credits]		X
○ LBRES2101	Smart technologies for environmental engineering	François Jonard Sébastien Lambot (coord.)	FR [q1] [32.5h+20h] [4 Credits]		X
○ LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	EN [q1] [30h+15h] [5 Credits]	X	

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

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊙ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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 programme. <http://www.uclouvain.be/cpme> ou [cpme@uclouvain.be](mailto:cpme@uclouvain.be)

Year

1 2

**○ Content:**

○ LCPME2001	Théorie de l'entrepreneuriat	Frank Janssen	FR [q1] [30h+20h] [5 Credits]	X	
○ LCPME2002	Aspects juridiques, économiques et managériaux de la création d'entreprise	Yves De Cordt Marine Falize	FR [q1] [30h+15h] [5 Credits]	X	
○ LCPME2003	Plan d'affaires et étapes-clefs de la création d'entreprise	Frank Janssen	FR [q2] [30h+15h] [5 Credits]		X
○ LCPME2004	Séminaire d'approfondissement en entrepreneuriat	Frank Janssen	FR [q2] [30h+15h] [5 Credits]	X	

**OPTION 16F [15.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊖ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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:**

● LBIRA2109	<a href="#">Agrarian systems and farm</a>	<a href="#">Pierre Bertin</a>	[FR] [q1] [30h+0h] [3 Credits]	X	
● LBRAI2106B	<a href="#">Phytotechnie - Cultures tropicales</a>	<a href="#">Pierre Bertin</a>	[FR] [q2] [20h] [2 Credits]	X	
● LBRAI2106C	<a href="#">Phytotechnie - Cultures fruitières</a>	<a href="#">Pierre Bertin</a>	[FR] [q2] [6h+4h] [1 Credits]	X	

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

⊗ LBIRF2203	<a href="#">Pisciculture</a>	<a href="#">Xavier Rollin</a>	[FR] [q1] [30h] [3 Credits]	X	X
⊗ LBRAI2107	<a href="#">Animal Production 2</a>	<a href="#">Marleen Abdel Massih</a> <a href="#">Jean-Paul Dehoux</a> <a href="#">Isabelle Donnay</a> <a href="#">Eric Froidmont</a> <a href="#">Yvan Larondelle (coord.)</a>	[FR] [q2] [30h+12.5h] [4 Credits]	X	X
⊗ LBRAI2110	<a href="#">Elements of Agroecology</a>	<a href="#">Philippe Baret</a>	[EN] [q1] [30h] [3 Credits]	X	X
⊗ LBRAI2212	<a href="#">Economics of Rural Development</a>	<a href="#">Frédéric Gaspard (coord.)</a> <a href="#">Goedele Van den Broeck</a>	[EN] [q1] [30h] [3 Credits]	X	X
⊗ LBRAI2214	<a href="#">Enquête et pratiques d'intervention en milieu rural tropical</a>	<a href="#">Philippe Baret</a> <a href="#">Pierre Defourny (coord.)</a>	[FR] [q1] [15h+15h] [3 Credits]	X	X
⊗ LBRAI2220	<a href="#">Génétique quantitative, amélioration et biotechnologies végétales</a>	<a href="#">Philippe Baret</a> <a href="#">Pierre Bertin (coord.)</a> <a href="#">Xavier Draye</a>	[FR] [q2] [40h+10h] [5 Credits]	X	X
⊗ LBRAT2104A	<a href="#">Land monitoring by advanced earth observation</a>	<a href="#">Sophie Bontemps</a> <a href="#">Pierre Defourny (coord.)</a>	[EN] [q2] [22.5h+15h] [3 Credits]	X	X
⊗ LBRES2105	<a href="#">Soil erosion and conservation</a>	<a href="#">Charles Bielders</a>	[EN] [q2] [22.5h+22.5h] [4 Credits]	X	X
⊗ LBRES2203	<a href="#">Soil management and planning in warm regions</a>	<a href="#">Charles Bielders (coord.)</a> <a href="#">Bruno Delvaux</a>	[FR] [q2] [22.5h+7.5h] [3 Credits]	X	X
⊗ LDVLP2675	<a href="#">Dynamics of development - environment inter-actions</a>	<a href="#">An Ansoms</a>	[FR] [q2] [30h] [5 Credits]	X	X

**OPTION 17F [15.0]**

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊖ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

**1 2****⊗ Content:****○ 5 crédits minimum à choisir au sein de l'une des options du master (5 credits)**

○ LBIR2004	Masters Internship	Charles Bielders Damien Debecker (coord.) Xavier Draye Anne-Laure Jacquemart	FR [q2] [20h] [10 Credits]	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, they must add supplementary classes at the beginning of their Master's programme in order to obtain the prerequisites for these studies.**

- Mandatory
- ⊗ Optional
- △ Not offered in 2021-2022
- ⊖ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

**○ 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	English Communication Skills for Bioengineers	Ahmed Adriouche Maïté Dupont Dominique François Lucille Meyers Hila Peer (compensates Marie Van Reet) Charlotte Peters Adrien Pham (coord.) Anne-Julie Toubeau	EN [q2] [30h] [2 Credits]
○ LBIR1315	Probability and statistics II	Patrick Bogaert	FR [q1] [22.5h+22.5h] [3 Credits]
○ LBIR1325A	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q1] [37.5h+22.5h] [5 Credits]
○ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits]

○ LBIR1328	Climatology and hydrology applied to agronomy and the environment	Alice Alonso (compensates) Marnik Vanclooster Charles Bielders (coord.) Hugues Goosse	EN [q1] [45h+22.5h] [6 Credits]
○ LBIR1334	Introduction to forestry sciences	Quentin Ponette (coord.) Caroline Vincke	FR [q2] [22.5h+15h] [3 Credits]
○ LBIR1336	Sciences du sol et excursions intégrées	Yannick Agnan (coord.) Richard Lambert Caroline Vincke	FR [q2] [30h+37.5h] [5 Credits]
○ LBIR1349	Chimie analytique I	Christine Dupont (coord.) Yann Garcia (coord.)	FR [q1] [30h+15h] [3 Credits]
○ LBIR1350	General Microbiology	Jacques Mahillon	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	EN [q1] [30h+7.5h] [3 Credits]
○ LBIR1362	Environmental Economics	Frédéric Gaspart	FR [q2] [30h+7.5h] [3 Credits]

### ○ Cours spécifiques (11 credits)

○ LBIR1260	Principles of economics	Goedele Van den Broeck	EN [q1] [30h+15h] [4 Credits]
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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 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.

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

#### SUMMARY

- > [General access requirements](#)
- > [Specific access requirements](#)
- > [University Bachelors](#)
- > [Non university Bachelors](#)
- > [Holders of a 2nd cycle University degree](#)
- > [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
<b>UCLouvain Bachelors</b>			
<a href="#">Bachelor in Bioengineering</a>		Direct access	
Autre Bachelier du domaine des sciences et technologies		Access based on application	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	
		Access based on application	
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
		Direct access	
		Access based on application	
<b>Foreign Bachelors</b>			
		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 <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 techniques et gestion agricoles - crédits supplémentaires entre 45 et 60		

BA en agronomie, orientation techniques et gestion horticolas - 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
<b>"Licenciés"</b>			
<b>Masters</b>			
Master Bioingénieur : sciences et technologies de l'environnement		Access based on application	
		Access based on application	
		Access based on application	

## Access based on validation of professional experience

> It is possible, under certain conditions, to use one's personal and professional experience to enter a university course without having the required qualifications. However, validation of prior experience does not automatically apply to all courses. Find out more about [Validation of priori experience](#).

## Access based on application

Admission on the basis of a submitted dossier may be granted either directly or on the condition of completing additional coursework of a maximum of 60 ECTS credits, or refused.

## Admission and Enrolment Procedures for general registration

## 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.

Through the close connection between the teaching and research, the development of new tools and new approaches is the subject of advanced training from the beginning of the 2nd cycle and is therefore central to this Master programme. All this enables graduates of this programme to be able to make rapid use of new techniques and approaches in their early professional experience.

## Evaluation

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***The evaluation methods comply with the regulations concerning studies and exams (<https://uclouvain.be/fr/decouvrir/rgee.html>). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".***

Students are assessed according to the regulations of the programme and can take the form of written and/or oral examinations as well as individual and/or group work.

Further details about how the assessment is done can be found in the course specifications.

## Mobility and/or Internationalisation outlook

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The Master in Forests and Natural Areas offers a wide range of opportunities to study at other institutions, in Belgium, Europe and elsewhere.

The Faculty would like to highlight the strengths of this programme, particularly the potential for research and the fact that it is very much a part of a comprehensive University. The shape of the elective modules available has also been influenced by the different fields of activity in which bioengineers work.

There are two kinds of international mobility: students who have already gained their Bachelor degree can move abroad to study for their Master at another institution; it is also possible to take some course modules in another institution. The mobility rate for AGRO students on exchange schemes such as Erasmus is around 30-40%, depending on the year.

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. Universidad 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 d'Ingénieurs (Salé, Morocco)

The Réseau des Ingénieurs Forestiers de Louvain (RIFL) 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 Agronomy, 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 CUD) in the same field.
- Doctoral programmes: PHD in Agronomy and Bioengineering

## Contacts

### Curriculum Management

Faculty

Structure entity

Denomination

Sector

Acronym

Postal address

SST/AGRO

Faculty of bioscience engineering (AGRO)

Sciences and Technology (SST)

AGRO

Croix du Sud 2 - bte L7.05.01

1348 Louvain-la-Neuve

Tel: +32 (0) 10 47 37 19 - Fax: +32 (0) 10 47 47 45

<http://www.uclouvain.be/agro>

Website

Mandate(s)

- Dean : Christine Dupont
- Administrative director : Carole Dekelver

Commission(s) of programme

- Commission de programme - Master Bioingénieur-Sciences agronomiques (BIRA)
- Commission de programme - Master Bioingénieur-Chimie et biotechnologies (BIRC)
- Commission de programme - Master Bioingénieur-Sciences & technologies de l'environnement (BIRE)
- Commission de programme - Bachelier en sciences de l'ingénieur, orientation bioingénieur (CBIR)
- Commission de programme interfacultaire en Sciences et gestion de l'environnement (ENVI)
- Fermes universitaires de Louvain (FERM)

Academic supervisor: [Caroline Vincke](https://uclouvain.be/repertoires/caroline.vincke) (<https://uclouvain.be/repertoires/caroline.vincke>)

Jury

- Président: [Charles Biielders](https://uclouvain.be/repertoires/charles.biielders) (<https://uclouvain.be/repertoires/charles.biielders>)
- Secrétaire de jury 2<sup>ième</sup> année de master: [Quentin Ponette](https://uclouvain.be/repertoires/quentin.ponette) (<https://uclouvain.be/repertoires/quentin.ponette>)

Useful Contact(s)

- Conseiller aux études: [Eric Gaigneaux](https://uclouvain.be/repertoires/eric.gaigneaux) (<https://uclouvain.be/repertoires/eric.gaigneaux>)

