UCLouvain

BIRE2M

*2019 - 2020*

# Master [120] in Environmental Bioengineering

**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: **Faculté des bioingénieurs (AGRO)**
Programme acronym: **bire2m** - Francophone Certification Framework: 7

## Table of contents

# BIRE2M - Introduction

## Introduction

# BIRE2M - Teaching profile

## Learning outcomes

Master in Environmental Bioengineering 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 use of natural renewable resources (land and water) as well as natural and man-made ecosystems.

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

• professionals able to tackle and diagnose environmental problems: the management and use of resources (soil, water, plants) and ecosystems, land management;

• scientists able to understand complex processes on different scales, used to multidisciplinary approaches and able to collaborate with other specialists;

• innovators tasked with developing new resource management methods that respect the environment.

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 understand and conceptualise biological, agricultural and environmental systems.

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

1. To explore an integrated 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 environmental science and technology.

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

- Soil and water sciences and quality
- Ecology
- Geomatics applied to the environment
- Analysis of natural and agrarian systems
- Statistics and data analysis

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

- Environmental technology: water-soil-earth
- Land management
- Water and land resources
- Information analysis and management in biological engineering

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

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

1.5 To apply multiple strands of knowledge to resolve a multidisciplinary environmental problem 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 field of environmental sciences.

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
- Topometry and photogrammetry
- Ecological and environmental diagnosis
- Environmental statistical data analysis
- Support for decision-making and project management

2.2 To build and master highly specialised knowledge and tools in one of the following bioengineering specialisations:

- Environmental technology: water-soil-earth
- Land management
- Water and land resources
- Information analysis and management in biological 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
- Environmental 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 environmental field by incorporating processes at different scales ranging from the mineral and living organism scale, 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 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 environmental engineering problem related to new situations presenting a degree of uncertainty. The student will be able to design appropriate, sustainable and innovative solutions through a systematic approach. This problem may be related to the management and use of resources (soil, water, plant) and ecosystems, to land management, to the impact of human activities on the capacity of the environment to provide goods and services to humanity.

4.1 To strategically differentiate the key elements from the less critical elements relating to a complex environmental 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 environmental engineering problem.

4.3 To analyse a complex environmental engineering problem using 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 environmental 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 environmental sciences and technologies.

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.

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.

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 themself: 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 :

- **core subjects programme of 40 credits** (compulsory) with the opportunity to do an internship of 40 days in a company;
- **professional focus programme** 30 credits (compulsory)
- **choice of one option course for 30 credits from four available and its complement(s) of 20 credits to choose amongst 4 possibilities.** The fifth complement called "CPME" is generalist in nature and may be taken to follow on from any option course.

*For a programme-type, and regardless of the focus, options/or elective courses selected, this master will carry a minimum of 120 credits divided over two annual units, corresponding to 60 credits each.*

> Tronc commun *[ en-prog-2019-bire2m-lbire200t.html ]*

> Master [120] in Environmental Bioengineering, Professional Focus *[ en-prog-2019-bire2m-lbire200s ]*

Options courses

> Environmental Technology: Water, Soil, Air *[ en-prog-2019-bire2m-lbire101g.html ]*
> > Environmental Technology : Water, Soil, Air (Option 4E) *[ en-prog-2019-bire2m-lbire204o.html ]*
> > Complément d'option 4E - Technologies environnementales : eau, sol, air *[ en-prog-2019-bire2m-lbire214o.html ]*

> Filière : Aménagement du territoire *[ en-prog-2019-bire2m-lbire103g.html ]*
> > Land Use Planning (Option 5E) *[ en-prog-2019-bire2m-lbire205o.html ]*
> > Option's complement 5E - Land Use Planning *[ en-prog-2019-bire2m-lbire215o.html ]*

> Option: Water and Soil Resources *[ en-prog-2019-bire2m-lbire104g.html ]*
> > Water and Soil Resources (Option 7E) *[ en-prog-2019-bire2m-lbire207o.html ]*
> > Option's complement 7E - Water and soil resources *[ en-prog-2019-bire2m-lbire217o.html ]*

> Option: Analysis and Management of Information in Biological Engineering *[ en-prog-2019-bire2m-lbire106g.html ]*

> Analysis and Management of Information in Biological Engineering (Option 10E - AGI) *[ en-prog-2019-bire2m-lbire210o.html ]*
> OPtion's complement: Analysis and Management of Information in Biological Engineering *[ en-prog-2019-bire2m-lbire211o.html ]*
> Complément à toutes les options - CPME *[ en-prog-2019-bire2m-lbire107g.html ]*
> Business Creation *[ en-prog-2019-bire2m-lbire250o.html ]*

# BIRE2M Detailled programme

## Programme by subject

### *CORE COURSES [40.0]*

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

*L'étudiant·e qui choisit le complément d'option CPME réalise son mémoire dans le cadre de la formation interdisciplinaire en création d'entreprise et remplace l'activité LBIRE2210 par une activité au choix libre pour 3 crédits.*

| | | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|---|
| O LBIRE2200 | Master thesis | | | 27 Credits | | | x |
| O LBIRE2210 | Master thesis' accompanying seminar | Charles Bielders<br>Patrick Bogaert (coord.)<br>Pierre Delmelle<br>Caroline Vincke | 30h | 3 Credits | 1 + 2q | | x |

**O *Internship or courses for 10 credits within the complement of the chosen option***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ⊠ LBIR2000 | Masters Internship | | | 10 Credits | 2q | | x |
| ⊠ | Courses to be chosen for 10 credits in the alternate programme offered in the same option's complement | | | Credits | | | x |

### *MASTER [120] IN ENVIRONMENTAL BIOENGINEERING, PROFESSIONAL FOCUS [30.0]*

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

**O *Contenu:***

| | | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|---|
| O LBIRA2109A | Agrarian systems and farm : partim | Pierre Bertin | 22.5h +7.5h | 3 Credits | 1q | x | |

| | | | | | | Year 1 | 2 |
|---|---|---|---|---|---|---|---|
| LBIRE2102 | Applied Geomatic | Pierre Defourny | 30h +22.5h | 4 Credits | 1q | x | |
| LBIRE2104 | Applied soil sciences | Yannick Agnan<br>Pierre Delmelle (coord.) | 30h +22.5h | 5 Credits | 2q | x | |
| LBIRE2105 | Water and soil quality's Evaluation | Henri Halen<br>Xavier Rollin (coord.) | 30h+7.5h | 3 Credits | 2q | x | |
| LBIRE2106 | Topometry and photogrammetry | Pierre Defourny (coord.)<br>François Jonard<br>Sébastien Lambot | 22.5h +22.5h | 4 Credits | 2q | x | |
| LBIRE2204 | Territorial diagnostic and decision aid | Pierre Defourny | 22.5h | 3 Credits | 2q | | x |
| LBIRE2205 | Decision Tools and Project Management | Olivier Cogels<br>Frédéric Gaspart (coord.) | 30h+7.5h | 3 Credits | 1q | x | |

## Statistiques (3 credits)

*3 crédits à choisir parmi les activités suivantes :*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| LBIRE2101 | Statistical analysis of spatial and temporal data | Patrick Bogaert | 22.5h +15h | 3 Credits | 2q | x | |
| LSTAT2110A | Analyse des données | Johan Segers | 15h+7.5h | 3 Credits | 1q | x | |

## Ethics (2 credits)

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| LTECO2300 | Societies, cultures, religions : Ethical questions | Marcela Lobo Bustamante | 15h | 2 Credits | 1q | x | x |
| LTECO2100 | Sociétés, cultures, religions : Biblical readings | Hans Ausloos | 15h | 2 Credits | 1q | x | x |
| LTECO2200 | Societies-cultures-religions : Human Questions | Régis Burnet<br>Dominique Martens | 15h | 2 Credits | 1 ou 2q | x | x |

## OPTIONS

Students in this programme have a choice of four options followed by a complement to the chosen option in the second year of the programme.

Students who wish to take the CPME module have to enrol in their first year of the master programme. It will be considered however as a complement to the option chosen in the first year.

Students have also the opportunity to take optionnal courses either from a suggested list or from another programme at UCL. In this case, the choice has to be validated by the Study Counsellor. Prior to that, the student must obtain an authorization from the lecturer of the course.

Environmental Technology: Water, Soil, Air

> Environmental Technology : Water, Soil, Air (Option 4E) *[ en-prog-2019-bire2m-lbire204o ]*
> Complément d'option 4E - Technologies environnementales : eau, sol, air *[ en-prog-2019-bire2m-lbire214o ]*

Filière : Aménagement du territoire

> Land Use Planning (Option 5E) *[ en-prog-2019-bire2m-lbire205o ]*
> Option's complement 5E - Land Use Planning *[ en-prog-2019-bire2m-lbire215o ]*

Option: Water and Soil Resources

> Water and Soil Resources (Option 7E) *[ en-prog-2019-bire2m-lbire207o ]*
> Option's complement 7E - Water and soil resources *[ en-prog-2019-bire2m-lbire217o ]*

Option: Analysis and Management of Information in Biological Engineering

> Analysis and Management of Information in Biological Engineering (Option 10E - AGI) *[ en-prog-2019-bire2m-lbire210o ]*
> OPtion's complement: Analysis and Management of Information in Biological Engineering *[ en-prog-2019-bire2m-lbire211o ]*

Complément à toutes les options - CPME

> Business Creation *[ en-prog-2019-bire2m-lbire250o ]*

## ENVIRONMENTAL TECHNOLOGY : WATER, SOIL, AIR (OPTION 4E) [30.0]

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

*This option will be followed by the corresponding option complement OR by "the Business Creation".*

### Contenu:

| | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|
| O LBIRC2109 | Process engineering : unit operations | Damien Debecker | 60h+15h | 6 Credits | 2q | x | |
| O LBIRE2218 | Séminaire professionnel en gestion des ressources en eau et sol | Charles Bielders (coord.)<br>Marnik Vanclooster | 20h | 2 Credits | 1q | | x |
| O LBRES2103 | Soil physics applied to Agronomy and Environment | Charles Bielders (coord.)<br>Mathieu Javaux | 30h+15h | 4 Credits | 1q | x | |
| O LBRTE2101 | Aquatic and soil biological and physical chemistry | Pierre Delmelle<br>Patrick Gerin (coord.) | 37.5h +15h | 5 Credits | 1q | x | |
| O LBRTE2102 | Integrated exercises in environmental science and technology | Patrick Gerin (coord.)<br>Mathieu Javaux<br>Marnik Vanclooster | 45h | 4 Credits | 2q | x | |

| | | | | | | Year 1 | 2 |
|---|---|---|---|---|---|---|---|
| LBRTE2201 | Human and environmental toxicology | Cathy Debier (coord.)<br>Philippe Hantson | 37.5h<br>+7.5h | 5 Credits | 1q | x | |
| LENVI2007 | Renewable energies | Xavier Draye<br>Patrick Gerin (coord.)<br>Hervé Jeanmart<br>Geoffrey Van Moeseke | 30h | 4 Credits | 1q | x | |

# COMPLÉMENT D'OPTION 4E - TECHNOLOGIES ENVIRONNEMENTALES : EAU, SOL, AIR [20.0]

- O Mandatory
- △ Courses not taught during 2019-2020
- ⊕ Periodic courses taught during 2019-2020
- ⊠ Optional
- ⊘ Periodic courses not taught during 2019-2020
- Activity with requisites

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

## O Contenu:

| | | | | | Year 1 | Year 2 | |
|---|---|---|---|---|---|---|---|
| O LBIR1346 | Surface and colloid chemistry | Christine Dupont | 30h | 3 Credits | 2q | | x |
| O LBIRE2214 | Projet intégré en technologies environnementales eau-sol-air | Yannick Agnan<br>Mathieu Javaux (coord.) | 50h+20h | 7 Credits | 1q | | x |

## O Courses to be chosen for minimum 10 credits amongst the following list:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ⊠ LBRES2102 | Engineering of the water and the pollutants in grounds and groundwaters | Sébastien Lambot (coord.)<br>Marnik Vanclooster | 30h +22.5h | 5 Credits | 2q | | x |
| ⊠ LGCIV2073 | Hydrogeology and Geoenvironment | Pierre-Yves Bolly | 30h | 5 Credits | 1q | | x |
| ⊠ LMAPR2647 | Sustainable treatment of industrial and domestic waste: Fundamentals | Olivier Françoisse<br>Patricia Luis Alconero<br>Olivier Noiset<br>Benoît Stenuit | 30h+15h | 5 Credits | 1q | | x |
| ⊠ LMAPR2648 | Evaluation of sustainability in chemical and environmental engineering | Damien Debecker<br>Olivier Françoisse<br>Patricia Luis Alconero (coord.)<br>Olivier Noiset | 30h+15h | 5 Credits | 2q | | x |

## ⊠ Programme alternatif au stage d'insertion socio-professionnelle pour la filière Technologies environnementales : eau, sol, air

*Students not doing the internship will complete the master programme inorder to reach minimum 120 credits.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ⊠ LBIRE2101 | Statistical analysis of spatial and temporal data | Patrick Bogaert | 22.5h +15h | 3 Credits | 2q | | x |
| ⊠ LBRES2102 | Engineering of the water and the pollutants in grounds and groundwaters | Sébastien Lambot (coord.)<br>Marnik Vanclooster | 30h +22.5h | 5 Credits | 2q | | x |
| ⊠ LGCIV2073 | Hydrogeology and Geoenvironment | Pierre-Yves Bolly | 30h | 5 Credits | 1q | | x |
| ⊠ LMAPR2647 | Sustainable treatment of industrial and domestic waste: Fundamentals | Olivier Françoisse<br>Patricia Luis Alconero<br>Olivier Noiset<br>Benoît Stenuit | 30h+15h | 5 Credits | 1q | | x |
| ⊠ LMAPR2648 | Evaluation of sustainability in chemical and environmental engineering | Damien Debecker<br>Olivier Françoisse<br>Patricia Luis Alconero (coord.)<br>Olivier Noiset | 30h+15h | 5 Credits | 2q | | x |
| ⊠ LSTAT2110A | Analyse des données | Johan Segers | 15h+7.5h | 3 Credits | 1q | | x |

## LAND USE PLANNING (OPTION 5E) [30.0]

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

### Contenu:

| | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|
| O LBIRA2105 | Agricultural and rural policies | Bruno Henry de Frahan | 30h | 3 Credits | 1q | x | |
| O LBIRF2104A | Phytosociologie | Anne-Laure Jacquemart<br>Quentin Ponette<br>Caroline Vincke | 15h+30h | 4 Credits | 2q | x | |
| O LBRAT2101 | Suburban and rural space development | Pierre Defourny (coord.)<br>Yves Hanin<br>Anne-Laure Jacquemart<br>Marie Pairon<br>(compensates Anne-Laure Jacquemart) | 45h+15h | 5 Credits | 1q | x | |
| O LBRAT2102 | Spatial modelling of territorial dynamics | Pierre Defourny | 15h+15h | 3 Credits | 2q | x | |
| O LBRAT2103 | Sociology of the actors and the rural territories | Yves Hanin | 30h | 3 Credits | 2q | x | |
| O LDROP2061 | Sustainable Development Law | Charles-Hubert Born | 30h | 3 Credits | 2q | x | |
| O LENVI2011 | Méthodes d'évaluation et de gestion environnementale | Jean-Pierre Tack | 30h | 3 Credits | 2q | x | |
| O LICAR2901A | Droit de l'espace bâti et non bâti (partie1) | | 25h | 2 Credits | 1q | x | |

### Courses to be chosen for 4 credits minimum amongst the following list:

| | | | | | | |
|---|---|---|---|---|---|---|
| ⊠ LBIRA2108 | Plant production | Pierre Bertin (coord.)<br>Xavier Draye | 37.5h<br>+15h | 4 Credits | 1q | x | |
| ⊠ LBIRF2105A | Sylviculture et dendrologie: partie sylviculture | Quentin Ponette | 30h+30h | 4 Credits | 1q | x | |
| ⊠ LENVI2007 | Renewable energies | Xavier Draye<br>Patrick Gerin (coord.)<br>Hervé Jeanmart<br>Geoffrey Van Moeseke | 30h | 4 Credits | 1q | x | |

## OPTION'S COMPLEMENT 5E - LAND USE PLANNING [20.0]

O Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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

### O Contenu:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Year | | |
| | | | | | 1 | 2 | |
| O LBIRE2215 | Projet intégré et excursion en aménagement du territoire | Pierre Defourny<br>Pierre Defourny (compensates Anne-Laure Jacquemart)<br>Anne-Laure Jacquemart (coord.)<br>Marie Pairon (compensates Anne-Laure Jacquemart) | 50h+20h | 7 Credits | 1q | | x |
| O LDROP2062B | Droit de l'urbanisme - 2ème partie | Charles-Hubert Born<br>Damien Jans | 15h | 2 Credits | 2q | | x |
| O LBIRF2106A | Management of ecological habitat and species conservation | Anne-Laure Jacquemart<br>Nicolas Titeux | 15h+15h | 3 Credits | 1q | | x |

### O Courses to be chosen for 8 credits minimum.

### ⊠ Programme alternatif au stage d'insertion socio-professionnelle pour la filière Aménagement du territoire (10 credits)

*L'étudiant·e qui ne réalise pas le stage d'insertion socio-professionnelle choisit 10 crédits minimum parmi les activités suivantes :*

#### O Courses to be chosen for 3 credits minimum amongst the following list:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ⊠ LBIRA2108 | Plant production | Pierre Bertin (coord.)<br>Xavier Draye | 37.5h +15h | 4 Credits | 1q | | x |
| ⊠ LBIRF2105A | Sylviculture et dendrologie: partie sylviculture | Quentin Ponette | 30h+30h | 4 Credits | 1q | | x |
| ⊠ LBIRF2213 | Tournée forestière | Anne-Laure Jacquemart<br>Quentin Ponette (coord.)<br>Caroline Vincke | 30h | 2 Credits | 2q | | x |
| ⊠ LBRAI2110 | Elements of Agroecology | Philippe Baret (coord.)<br>Olivier Baudry (compensates Philippe Baret)<br>Olivier Baudry (compensates Claude Bragard)<br>Pierre Bertin<br>Claude Bragard | 30h | 3 Credits | 1q | | x |
| ⊠ LBRAI2210 | Microeconomics of Development | Frédéric Gaspart | 30h | 3 Credits | 1q | | x |
| ⊠ LBRAI2212 | Economics of Rural Development | Frédéric Gaspart (coord.)<br>Goedele Van den Broeck | 30h | 3 Credits | 1q | | x |
| ⊠ LBRAI2214 | Enquête et pratiques d'intervention en milieu rural tropical | Philippe Baret<br>Pierre Defourny (coord.)<br>Anne Legrève | 15h+15h | 3 Credits | 1q | | x |
| ⊠ LDROP2063 | Sectoral Environmental Law | Valérie Dupont<br>Damien Jans | 30h | 3 Credits | 2q | | x |
| ⊠ LECGE1228 | Regional Economics | Arastou Khatibi | 30h+10h | 5 Credits | 2q | | x |
| ⊠ LSTAT2110A | Analyse des données | Johan Segers | 15h+7.5h | 3 Credits | 1q | | x |
| ⊠ LURBA3011A | Acteurs, territoires et contextes de développement - partim | | 30h | 3 Credits | 1q | | x |

#### O Courses to be chosen for 4 credits

*L'étudiant·e est invité à suivre l'activité LENVI2007.*

## WATER AND SOIL RESOURCES (OPTION 7E) [30.0]

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

### Contenu:

| | | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|---|
| O LBIRE2218 | Séminaire professionnel en gestion des ressources en eau et sol | Charles Bielders (coord.)<br>Marnik Vanclooster | 20h | 2 Credits | 1q | | x |
| O LBRES2102 | Engineering of the water and the pollutants in grounds and groundwaters | Sébastien Lambot (coord.)<br>Marnik Vanclooster | 30h<br>+22.5h | 5 Credits | 2q | x | |
| O LBRES2103 | Soil physics applied to Agronomy and Environment | Charles Bielders (coord.)<br>Mathieu Javaux | 30h+15h | 4 Credits | 1q | x | |
| O LBRES2104 | IRRIGATION AND DRAINAGE | Mathieu Javaux | 20h<br>+22.5h | 4 Credits | 2q | x | |
| O LBRES2105 | Soil erosion and conservation | Charles Bielders | 20h<br>+22.5h | 4 Credits | 2q | x | |
| O LBRES2106 | Integrated management of the soil-plant system | Stephan Declerck<br>Xavier Draye (coord.)<br>Guillaume Lobet | 45h+15h | 6 Credits | 2q | x | |
| O LBRTE2101 | Aquatic and soil biological and physical chemistry | Pierre Delmelle<br>Patrick Gerin (coord.) | 37.5h<br>+15h | 5 Credits | 1q | x | |

## OPTION'S COMPLEMENT 7E - WATER AND SOIL RESOURCES [20.0]

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

### O Contenu:

| | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|
| O LBIRE2217 | Projet intégré et excursions en ressources en eau et en sol | Charles Bielders<br>Mathieu Javaux<br>Marnik Vanclooster (coord.) | 50h+40h | 9 Credits | 1q | x |
| O LBRES2203 | Soil management and planning in warm regions | Charles Bielders (coord.)<br>Bruno Delvaux | 22.5h +7.5h | 3 Credits | 2q | x |
| O LBRES2204 | Integrated water management of water resources | François Jonard<br>Marnik Vanclooster (coord.) | 30h +22.5h | 5 Credits | 1q | x |
| O LBRES2206 | Advanced Hydrology for Engineers | Mathieu Javaux | 20h+15h | 3 Credits | 2q | x |

### ⊠ Programme alternatif au stage d'insertion socio-professionnelle pour la filière Ressources en eau et sol (10 credits)

*L'étudiant·e qui ne réalise pas le stage d'insertion socio-professionnelle choisit 10 crédits minimum parmi les activités suivantes :*

| | | | | | | |
|---|---|---|---|---|---|---|
| O LENVI2007 | Renewable energies | Xavier Draye<br>Patrick Gerin (coord.)<br>Hervé Jeanmart<br>Geoffrey Van Moeseke | 30h | 4 Credits | 1q | x | x |

#### O Statistiques (3 credits)

*3 crédits à choisir parmi les activités suivantes :*

| | | | | | | |
|---|---|---|---|---|---|---|
| ⊠ LBIRE2101 | Statistical analysis of spatial and temporal data | Patrick Bogaert | 22.5h +15h | 3 Credits | 2q | x | |
| ⊠ LSTAT2110A | Analyse des données | Johan Segers | 15h+7.5h | 3 Credits | 1q | x | |

#### O Free choice of courses for 3 credits.

## ANALYSIS AND MANAGEMENT OF INFORMATION IN BIOLOGICAL ENGINEERING (OPTION 10E - AGI) [30.0]

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

### Contenu:

| | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|
| O LBRAI2219 | Systems Biology Modelling | Xavier Draye (coord.) Guillaume Lobet | 30h | 3 Credits | 1q | x | |
| O LBRAT2102 | Spatial modelling of territorial dynamics | Pierre Defourny | 15h+15h | 3 Credits | 2q | x | |
| O LBRTI2102 | Process-based modelling in bioscience engineering | Emmanuel Hanert | 30h+15h | 5 Credits | 1q | x | |
| O LCOMU2600 | Scientific popularisation | Philippe Verhaegen | 30h | 4 Credits | 1q | x | |
| O LINFO1225 | Conception orientée objet et gestion de données | Kim Mens | 30h+30h | 5 Credits | 2q | x | |
| O LINMA2472 | Algorithms in data science | Vincent Blondel Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel) | 30h +22.5h | 5 Credits | 1q | x | |
| O LSTAT2320 | Design of experiment. | Patrick Bogaert Bernadette Govaerts | 22.5h +7.5h | 5 Credits | 2q | x | |

## OPTION'S COMPLEMENT: ANALYSIS AND MANAGEMENT OF INFORMATION IN BIOLOGICAL ENGINEERING [20.0]

O Mandatory
⊠ Optional
△ Courses not taught during 2019-2020
⊘ Periodic courses not taught during 2019-2020
⊕ Periodic courses taught during 2019-2020
Activity with requisites

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

### Contenu:

| | | | | | Year 1 | Year 2 | |
|---|---|---|---|---|---|---|---|
| O LBIRE2211 | Integrated project in information management | Patrick Bogaert (coord.)<br>Pierre Defourny<br>Emmanuel Hanert | 50h+20h | 7 Credits | 1q | | x |
| O LBRTI2202 | Special questions in information management | Patrick Bogaert (coord.)<br>Emmanuel Hanert | 30h | 3 Credits | 2q | | x |
| O LINGI2172 | Databases | Siegfried Nijssen | 30h+30h | 6 Credits | 2q | | x |

### Courses to be chosen for min 4 credits among the suggested list:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ⊠ LBIRA2101A | Biométrie: analyse de la variance | Xavier Draye<br>Bernadette Govaerts | 22h+10h | 3 Credits | 1q | | x |
| ⊠ LBRAI2101 | Population and quantitative genetics | Philippe Baret (coord.)<br>Xavier Draye | 30h+7.5h | 3 Credits | 1q | | x |
| ⊠ LELEC2870 | Machine Learning : regression, dimensionality reduction and data visualization | John Lee (compensates Michel Verleysen) | 30h+30h | 5 Credits | 1q | | x |
| ⊠ LELEC2920 | Communication networks | Benoît Macq | 30h+30h | 5 Credits | 1q | | x |
| ⊠ LENVI2007 | Renewable energies | Xavier Draye<br>Patrick Gerin (coord.)<br>Hervé Jeanmart<br>Geoffrey Van Moeseke | 30h | 4 Credits | 1q | | x |
| ⊠ LINGE1216 | Management Science: Deterministic models | Jean-Sébastien Tancrez (compensates Philippe Chevalier)<br>Mathieu Van Vyve | 30h+15h | 5 Credits | 2q | | x |
| ⊠ LPHYS2162 | Introduction to the physics of the climate system and its modelling | Hugues Goosse<br>Jean-Pascal van Ypersele de Strihou | 22.5h<br>+22.5h | 5 Credits | 1q | | x |
| ⊠ LSINF2275 | Data mining & decision making | Marco Saerens | 30h+15h | 5 Credits | 2q | | x |
| ⊠ LSTAT2020 | Statistical softwares and basic statistical programming | Céline Bugli | 15h+15h | 4 Credits | 1q | | x |
| ⊠ LSTAT2120 | Linear models | Christian Hafner | 30h+7.5h | 5 Credits | 1q | | x |
| ⊠ LSTAT2350 | Data Mining | Tim Verdonck | 15h+15h | 5 Credits | 2q | | x |

### ⊠ Programme alternatif au stage d'insertion socio-professionnelle pour la filière Analyse et gestion de l'information en ingénierie biologique (10 credits)

*L'étudiant·e qui ne réalise pas le stage d'insertion socio-professionnelle choisit 10 crédits minimum parmi les activités suivantes :*

#### Courses to be chosen for 5 credits minimum:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ⊠ LBIRA2101A | Biométrie: analyse de la variance | Xavier Draye<br>Bernadette Govaerts | 22h+10h | 3 Credits | 1q | | x |
| ⊠ LBRAI2101 | Population and quantitative genetics | Philippe Baret (coord.)<br>Xavier Draye | 30h+7.5h | 3 Credits | 1q | | x |
| ⊠ LDEMO2220 | Population models and projections | Bruno Masquelier | 30h+15h | 5 Credits | 2q | | x |
| ⊠ LECGE1333 | Game theory and information in economics | Julio Davila Muro<br>Pierre Dehez | 30h+10h | 5 Credits | 2q | | x |
| ⊠ LELEC2870 | Machine Learning : regression, dimensionality reduction and data visualization | John Lee (compensates Michel Verleysen) | 30h+30h | 5 Credits | 1q | | x |
| ⊠ LELEC2920 | Communication networks | Benoît Macq | 30h+30h | 5 Credits | 1q | | x |

| | | | | | | Year 1 | 2 |
|---|---|---|---|---|---|---|---|
| ⊠ LGEO2130 | Fundamentals of geographic and environmental modelling | Eric Deleersnijder Jean-François Remacle (compensates Eric Deleersnijder) Sophie Vanwambeke | 30h+30h | 5 Credits | 2q | | x |
| ⊠ LINGE1216 | Management Science: Deterministic models | Jean-Sébastien Tancrez (compensates Philippe Chevalier) Mathieu Van Vyve | 30h+15h | 5 Credits | 2q | | x |
| ⊠ LINGI1122 | Program conception methods | Charles Pecheur | 30h+30h | 5 Credits | 2q | | x |
| ⊠ LPHYS2162 | Introduction to the physics of the climate system and its modelling | Hugues Goosse Jean-Pascal van Ypersele de Strihou | 22.5h +22.5h | 5 Credits | 1q | | x |
| ⊠ LPHYS2267 | Paleoclimate dynamics and modelling | Qiuzhen Yin | 22.5h +7.5h | 5 Credits | 2q | | x |
| ⊠ LSINF2275 | Data mining & decision making | Marco Saerens | 30h+15h | 5 Credits | 2q | | x |
| ⊠ LSTAT2020 | Statistical softwares and basic statistical programming | Céline Bugli | 15h+15h | 4 Credits | 1q | | x |
| ⊠ LSTAT2120 | Linear models | Christian Hafner | 30h+7.5h | 5 Credits | 1q | | x |
| ⊠ LSTAT2350 | Data Mining | Tim Verdonck | 15h+15h | 5 Credits | 2q | | x |

**Courses to be chosen for 5 credits minimum.**

## BUSINESS CREATION [20.0]

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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

### Contenu:

| | | | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|---|---|
| O LCPME2001 | Entrepreneurship Theory (in French) | Blanche Havenne (compensates Frank Janssen) Frank Janssen | 30h+20h | 5 Credits | 1q | x | |
| O LCPME2002 | Managerial, legal and economic aspects of the creation of a company (in French) | Yves De Cordt Marine Falize | 30h+15h | 5 Credits | 1q | x | |
| O LCPME2003 | Business plan of the creation of a company (in French) | Frank Janssen | 30h+15h | 5 Credits | 2q | x | x |
| O LCPME2004 | Advanced seminar on Entrepreneurship (in French) | Frank Janssen | 30h+15h | 5 Credits | 2q | x | |

## Course prerequisites

A document entitled en-prerequis-2019-bire2m.pdf specifies the activities (course units - CU) with one or more pre-requisite(s) within the study programme, that is the CU whose learning outcomes must have been certified and for which the credits must have been granted by the jury before the student is authorised to sign up for that activity.

These activities are identified in the study programme: their title is followed by a yellow square.

As the prerequisites are a requirement of enrolment, there are none within a year of a course.

The prerequisites are defined for the CUs for different years and therefore influence the order in which the student can enrol in the programme's CUs.

In addition, when the panel validates a student's individual programme at the beginning of the year, it ensures the consistency of the individual programme:

- It can change a prerequisite into a corequisite within a single year (to allow studies to be continued with an adequate annual load);
- It can require the student to combine enrolment in two separate CUs it considers necessary for educational purposes.

For more information, please consult regulation of studies and exams.

## The programme's courses and learning outcomes

For each UCLouvain training programme, a reference framework of learning outcomes specifies the competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme's reference framework of learning outcomes in the document *"In which teaching units are the competences and learning outcomes in the programme's reference framework developed and mastered by the student?"*

*The document is available by clicking this link after being authenticated with UCL account.*

# BIRE2M - Information

## Admission

*General and specific admission requirements for this program 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



### University Bachelors

| Diploma | Special Requirements | Access | Remarks |
|---|---|---|---|
| **UCLouvain Bachelors** | | | |
| Bachelor in Bioengineering | Additionnal module in Environment | Direct Access | |
| Autre Bachelier UCL du domaine des sciences et technologies | | Based on application: accepted, conditional on further training, or refusal | Le/la futur·e étudiant·e rencontrera obligatoirement le Conseiller aux études pour déterminer le programme à suivre. |
| **Others Bachelors of the French speaking Community of Belgium** | | | |
| Bachelier en sciences de l'ingénieur, orientation bioingénieur | | Direct Access | Enseignements supplémentaires à déterminer selon le programme suivi antérieurement (max.15 crédits). Prendre obligatoirement contact avec le Conseiller aux études. |
| | | Based on application: accepted, conditional on further training, or refusal | |
| **Bachelors of the Dutch speaking Community of Belgium** | | | |
| Bachelor of Science in de bio-ingenieurswetenschappen | | Based on application: accepted, conditional on further training, or refusal | Enseignements supplémentaires à déterminer selon le programme suivi antérieurement (max.15 crédits). Prendre obligatoirement contact avec le Conseiller aux études. |
| | | Based on application: accepted, conditional on further training, or refusal | |
| **Foreign Bachelors** | | | |
| Bachelier en sciences de l'ingénieur, orientation bioingénieur | | Based on application: accepted, conditional on further training, or refusal | Sous réserve d'acceptation du dossier.<br>Enseignements supplémentaires à déterminer selon le programme suivi antérieurement (max.60 crédits). Prendre |

obligatoirement contact avec le Conseiller aux études.

## Non university Bachelors

> Find out more about links to the university

| Diploma | Access | Remarks |
|---|---|---|
| BA en agronomie (techniques et gestion agricoles) - EPS - crédits supplémentaires entre 45 et 60<br>BA en agronomie (toutes orientations) - HE - crédits supplémentaires entre 45 et 60<br>BA en chimie (biochimie, biotechnologie, chimie appliquée) - EPS - crédits supplémentaires entre 45 et 60<br>BA en chimie (biochimie, biotechnologie, chimie appliquée, environnement) - HE - crédits supplémentaires entre 45 et 60 | Les enseignements supplémentaires éventuels peuvent être consultés dans le module complémentaire. | Type court |

## Holders of a 2nd cycle University degree

| Diploma | Special Requirements | Access | Remarks |
|---|---|---|---|
| **"Licenciés"** | | | |
| Ingénieur agronome<br>Ingénieur chimiste et des bioindustries<br>Bioingénieur<br>Licencié en Sciences biomédicales<br>Licencié en Géographie<br>Licencié en Biologie<br>Licencié en Chimie | | Based on application: accepted, conditional on further training, or refusal | |
| **Masters** | | | |
| Master Bioingénieur (autre finalité que sciences et technologies de l'environnement)<br>Master en sciences biologiques<br>Master en Biochimie et biologie moléculaire et cellulaire<br>Master en Biologie des organismes et écologie<br>Master en sciences chimiques<br>Master en Sciences géographiques | | Based on application: accepted, conditional on further training, or refusal | |

## Holders of a non-University 2nd cycle degree

## Adults taking up their university training

> See the website Valorisation des acquis de l'expérience

It is possible to gain admission to all masters courses via the validation of professional experience procedure.

## Access on the file

Reminder : all Masters (apart from Advanced Masters) are also accessible on file.

## Admission and Enrolment Procedures for general registration

# Supplementary classes

***To enrol for this Masters, the student must have a good command of certain subjects. If this is not the case, they must add preparatory modules to their Master's programme.***

| | |
|---|---|
| O Mandatory | ⊠ Optional |
| △ Courses not taught during 2019-2020 | ⊘ Periodic courses not taught during 2019-2020 |
| ⊕ Periodic courses taught during 2019-2020 | Activity with requisites |

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 (45 credits)*

| | | | | | |
|---|---|---|---|---|---|
| O LBIR1315 | Probability and statistics II | Patrick Bogaert | 22.5h+22.5h | 3 Credits | 1q |
| O LBIR1351 | Introduction to systems analysis | Philippe Baret | 10h+20h | 3 Credits | 1q |
| O LBIR1325A | Transfert de fluides et d'énergie pour les bioingénieurs: partim A | Yann Bartosiewicz<br>Mathieu Javaux<br>Marnik Vanclooster | 37.5h+22.5h | 5 Credits | 1q |
| O LBIR1349 | Chimie analytique I | Christine Dupont (coord.)<br>Yann Garcia | 30h+15h | 3 Credits | 1q |
| O LBIR1350 | General Microbiology | Jacques Mahillon | 37.5h+15h | 4 Credits | 2q |
| O LBIR1360 | Firm management and organisation | Pierre De Muelenaere | 30h+7.5h | 3 Credits | 1q |
| O LBIR1361 | Report on the work experience training | David Alsteens<br>Charles Bielders<br>Cathy Debier<br>Stephan Declerck<br>Eric Gaigneaux (coord.) | 60h | 5 Credits | |
| O LANGL2480 | English Communication Skills for Bioengineers | Ahmed Adrioueche<br>Dominique François<br>Sandrine Meirlaen<br>Charlotte Peters<br>Adrien Pham (coord.)<br>Anne-Julie Toubeau | 30h | 2 Credits | 2q |
| O LBIR1328 | Climatology and hydrology applied to agronomy and the environment | Charles Bielders<br>Hugues Goosse<br>Marnik Vanclooster (coord.) | 45h+22.5h | 6 Credits | 1q |
| O LBIR1362 | Environmental Economics | Frédéric Gaspart | 30h+7.5h | 3 Credits | 2q |
| O LBIR1336 | Sciences du sol et excursions intégrées | Yannick Agnan (coord.)<br>Richard Lambert<br>Caroline Vincke | 30h+37.5h | 5 Credits | 2q |
| O LBIR1334 | Introduction to forestry sciences | Quentin Ponette (coord.)<br>Caroline Vincke | 22.5h+15h | 3 Credits | 2q |
| O LBIR1325B | Transferts de fluide et d'énergie pour les bioingénieurs (partim B): Case studies | Yann Bartosiewicz<br>Mathieu Javaux<br>Marnik Vanclooster | 0h+30h | 2 Credits | 2q |

## O *Cours spécifiques (10 credits)*

| | | | | | |
|---|---|---|---|---|---|
| O LBIR1260 | Principles of economics | Goedele Van den Broeck | 30h+15h | 4 Credits | 1q |
| O | Activités au choix libre<br>*The students have a free choice of courses within one of the bachelor programs in Sciences and Technolgy Sector : https://uclouvain.be/fr/etudier/les-facultes.html* | | | 6 Credits | |

## Teaching method

The overall structure of the programmes for the Bachelor of Science in Engineering (Bioengineering) and the Master in Bioengineering clearly reflect the

concepts of specialization, gradual choice and individualization of the courses.

**1st cycle (Bachelor) :**

- programme designed for the BIR students starting from Year 1

- special programme in second year for all the BIR students
- distinct programme with 30 credits for option courses in third year : three advanced subsidiary subjects available : chemistry , agronomy , environment.

**2nd cycle (Master) :**

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

  This overall structure gives students the opportunity to have a highly individualized 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 options, 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.

The interdisciplinarity and the integrated approach are key dimensions in the training of **bioengineers in environmental science and technology**. This is reflected by :

- availability of courses organized by other faculties ;
- grouping of training activities : combined exercises, joint project, analysis of real situations, simulations ;
- the perception, analysis, diagnosis and content of the course specifications (e.g. management, remediation and development) combine different kinds of tools (e.g. field observation, laboratory analysis, databases and information systems ) and various scales in space (e.g. from the molecular to the hydrographic basin or from a region to a sub-continent) and in time ;
- teaching teams with a wide range of expertise ;
- learning how best to work in groups of students to develop a real, independent capacity for intellectual work.

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 from an outside research group or groups and the production of a dissertation.

The application of skills, knowledge and techniques that students have acquired and how they use them together is taken into account in an integrated project in environmental science and technology. This is an important learning activity supplements the 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

***The evaluation methods comply with the regulations concerning studies and exams. 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 activities in the programme : this 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.

## Possible trainings at the end of the programme

The Master in Bioengineering programme follows on directly from the Bachelor in Engineering Science : Bioengineering with an option course in Environment. 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 filed authorized by regulations in addition to those established by the ARES-CCD
- **Doctoral programmes** : doctorates in Agronomic Sciences and Biological Engineering.

# Contacts

## Curriculum Managment

Faculty

| | |
|---|---|
| Structure entity | SST/AGRO |
| Denomination | Faculty of bioscience engineering (AGRO) |
| Sector | Sciences and Technology (SST) |
| Acronym | AGRO |
| Postal address | Croix du Sud 2 - bte L7.05.01<br>1348 Louvain-la-Neuve<br>Tel: +32 (0) 10 47 37 19 - Fax: +32 (0) 10 47 47 45 |
| Web site | http://www.uclouvain.be/agro |

Mandate(s)

- Doyen : Philippe Baret
- Directeur administratif de faculté : Christine Denayer

Commission(s) of programme

- Commission de programme - Master Bioingénieur-Sciences agronomiques (BIRA)
- Commission de programme - Master Bioingénieur-Chimie et bioindustries (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)

Academic supervisor: Charles Bielders

Jury

- Président: Charles Bielders
- Secrétaire de jury de la 2ième année de master: Quentin Ponette

Usefull Contact(s)

- Information pour les étudiants par le Conseiller aux études: Eric Gaigneaux