

**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: **BIRA2M** - Francophone Certification Framework: 7

**Table of contents**

Introduction .....	2
Teaching profile .....	3
- Learning outcomes .....	3
- Programme structure .....	5
- Detailed programme .....	7
- Programme by subject .....	7
- Course prerequisites .....	20
- The programme's courses and learning outcomes .....	20
Information .....	21
- Access Requirements .....	21
- Supplementary classes .....	23
- Teaching method .....	24
- Evaluation .....	24
- Mobility and/or Internationalisation outlook .....	24
- Possible trainings at the end of the programme .....	25
- Contacts .....	25

## BIRA2M - Introduction

### Introduction

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## BIRA2M - Teaching profile

### Learning outcomes

Master in Agricultural Sciences Engineering 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 sustainable animal and plant production, respectful of the environment and conscious of food security.

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

- professionals able to tackle and diagnose agronomic problems: production and quality, production systems and industries, protection and development of resources, socio-economic impacts;
- scientists able to understand complex processes on different scales, used to multidisciplinary approaches and consultation with other specialists;
- innovators able to design new kinds of production and management methods, new processes, etc. in response to many major challenges: feeding the world, bringing together food and health, reconciling agriculture, environment and sustainable development.

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 :

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 five 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 three 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.

1. To explore an integrated body of knowledge (knowledge, methods and techniques, models and processes) which serves as the foundation from which to operate with expertise in the field of agricultural science and technology.

1.1 To build an advanced knowledge base in the field of agricultural science and more specifically in the following disciplines:

- Plant and animal sciences
- The agrarian system
- Agricultural and rural policies
- Biotechnology

1.2 To build highly specialised scientific knowledge in one of the following bioengineering specialisations:

- Science, technology and food quality
- Integrated agronomy
- Integrated plant protection
- Water and land resources
- Information analysis and management in agricultural engineering
- Agricultural development and production in the tropical zones

1.3 To master procedural skills in conducting experiments: molecular biology techniques, experimental design, biometrics and data analysis as well as specific techniques in relation to their choice of specialisation.

1.4 To apply their knowledge critically to tackle a complex agricultural issue ranging from the molecular level to an agro-ecosystem.

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

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 agricultural science and technology.

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

- Applied biotechnology
- Biometrics
- Animal and plant production
- Management and analysis of production systems and processing
- Agricultural management and decision-making support
- Process engineering

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

- Technology and food quality
- Integrated agronomy
- Integrated plant protection
- Water and land resources
- Agricultural economics and natural resources
- Information analysis and management in agricultural engineering
- Agricultural development and production in the tropical zones

2.3 To master the operational use of specialised tools in engineering sciences (e.g. systems analysis, statistical analysis, programming, modelling, etc.):

- Planning experiments
- Carrying out surveys
- 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 agricultural problem ranging from the molecular level to an agro-ecosystem.

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.

4. To formulate and resolve a complex agricultural 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 incorporating scientific, economic and sociological aspects. This problem may be related to agricultural production and the quality of products, agricultural production systems and sectors, and to the transformation of agricultural products.

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

4.3 To analyse a complex agricultural 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 agricultural 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.

*As the graduate must be able to manage a project alone and in a team, the skills listed below are described in the context of the master, through projects not only considered in their 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 computerised and technological tools essential for professional communication.

6.9 To learn English to level C1 according to the European references.

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.

*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. 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 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 :

*Year 1 :*

- compulsory professional focus programme for 30 credits.
- compulsory core subjects programme : 5 credits (out of 40) are taken in the first year. All the others (35 credits) from the core subjects programme are taken in the second year.
- choice of one option course of 30 credits from a list of six. The majority of option courses (25 credits) are organized in the first year. Certain courses (5 credits), as already mentioned, are taken in the second year.

Certain option courses are organized jointly with one or two other programmes from the Master in Bioengineering. This is the reason for the special numbering of these option courses. (For example, option course 1A is also in the programme for the Master in Chemistry and Bioindustry where it is called option course 1C. Option course 10 A is also in the programme for the Master in Bioengineering (Environment Science and Technology) where it is called option course 10E and the Master in Chemistry and Bioindustry where it is called option course 10C.)

*Year 2 :*

- compulsory core subjects programme : 35 credits (out of 40) are taken in the second year.
- the remainder of the option course (5 credits) chosen in Year 1 of the Master is taken in Year 2.
- choice of a module of 20 credits from nine advanced modules, some of which follow on from the six option courses of Year 1. Students are strongly encouraged to follow the instructions regarding each of these modules.

*Optional subjects :*

There are some optional courses within the programme. They may either be chosen from a suggested list or may be chosen freely from the all courses available at UCL or even another institution. The same applies to all the optional courses in the programme.

All these choices must be made in the timescale laid down by the Faculty Department and agreed by the Academic Secretary. For courses from another faculty or institution, students must gain prior agreement from the lecturer in charge of the course.

*Additional training "Business Creation"*

Students enrolled on the Master in Bioengineering programme have the possibility of taking a module of interdisciplinary training entitled "Business Creation". 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 the training programme, please refer to : <https://uclouvain.be/cpme.html>

- on how the Master in Bioengineering programmes work, please contact the Faculty Office.

*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.*

[> Core courses](#) [ en-prog-2021-bira2m-tronc\_commun ]

Liste au choix de finalités BIRA2M

[> Professional Focus](#) [ en-prog-2021-bira2m-lbira200s ]

[> List of electives](#) [ en-prog-2021-bira2m-options ]

Option 1A - Food nutrition and health

[> Option 1A - Food nutrition and health](#) [ en-prog-2021-bira2m-lbira201o ]

Option 7A - Water and soil resources

[> Option 7A- Water and Earth Resources](#) [ en-prog-2021-bira2m-lbira207o ]

Option 8A - Integrated agronomy

[> Option 8A](#) [ en-prog-2021-bira2m-lbira208o ]

Option 9A - Food nutrition and health

[> Option 9A - Plant health](#) [ en-prog-2021-bira2m-lbira209o ]

Option 10A - Data Science

[> Option 10A - Data science](#) [ en-prog-2021-bira2m-lbira210o ]

Option 11A - Agricultural and Resource Economics

[> Option 11A - Agricultural and Resource Economics](#) [ en-prog-2021-bira2m-lbira211o ]

Option 12A - Sustainability engineering

[> Option 12A : Sustainability engineering](#) [ en-prog-2021-bira2m-lbira012o ]

Option 13A - Business Creation

[> Option 13A - Business Creation](#) [ en-prog-2021-bira2m-lbira232o ]

Option 18A - Human health

[> Option 18A - Human health](#) [ en-prog-2021-bira2m-lbira218o ]

Preparatory Module (only for students who qualify for the course via complementary coursework)

[> Master \[120\] in Agricultural Bioengineering](#) [ en-prog-2021-bira2m-module\_complementaire ]

## BIRA2M Detailed programme

### Programme by subject

#### CORE COURSES [60.0]

Au sein de ce programme, des cours sont proposés au choix. Ils sont à choisir au sein d'une liste ou peuvent faire l'objet d'un choix totalement libre dans le portefeuille de cours de l'UCL, voire d'une autre institution. Tous ces choix doivent être validés par le vice-doyen et/ou avoir reçu l'accord préalable du titulaire du cours, si le cours est emprunté dans une autre faculté ou institution.

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

							Year	
							1	2
○ LBIRA2200	<a href="#">Master thesis</a>			27 Credits	q1+q2		x	
○ LBIRA2210	<a href="#">Master thesis' accompanying seminar</a>	Philippe Baret Pierre Bertin (coord.) Cathy Debier Frédéric Gaspart Anne Legrève	30h	3 Credits	q1+q2		x	
○ LBIRA2130	<a href="#">Projet disciplinaire</a>	Ignace Adant Philippe Baret (coord.) Pierre Bertin Claude Bragard Cathy Debier Xavier Draye Richard Lambert Yvan Larondelle Anne Legrève Guillaume Lobet Goedele Van den Broeck	100h+0h	10 Credits	q2		x	

#### ○ **Projet intégré pour les options 1A, 7A, 8A, 9A, 10A, 11A, 13A et 18A (10 credits)**

○ LBIRA2230	<a href="#">Projet interdisciplinaire</a>	Xavier Draye François Heroufosse Anne-Laure Jacquemart Yvan Larondelle (coord.) Anne Legrève Julie Van Damme Goedele Van den Broeck	100h+0h	10 Credits	q1		x
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#### ○ **Projet intégré pour l'option 12A (10 credits)**

○ LBIRE2205B	<a href="#">Decision tools and project management - Project Management</a>		15h	1 Credits	q1		x
○ LBIRE2234	<a href="#">Data Science and Sustainability Engineering projects</a>	Patrick Bogaert (coord.) Pierre Defourny Emmanuel Hanert	50h+10h	6 Credits	q1		x
○ LBIRE2235	<a href="#">Innovative system management for sustainability</a>		22.5h +7.5h	3 Credits	q1		x

#### ○ **Internship programme LBIR2000 or courses to be taken for 10 credits in the option complement(s)**

⊗ LBIR2004	<a href="#">Masters Internship</a>		20h	10 Credits	q2		x
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⊗ **Programme alternatif au stage d'insertion socio-professionnelle pour les options 1A, 7A, 8A, 9A, 10A, 12A, 13A, 18A (10 credits)**

6 crédits minimum à choisir parmi les unités d'enseignement suivantes et 4 crédits d'unité d'enseignement au choix libre

							Year	
							1	2
✘ LBRAI2219	Systems Biology Modelling	Xavier Draye (coord.) Mathieu Javaux Guillaume Lobet	30h	3 Credits	q2		x	
✘ LSTAT2320	Design of experiment.	Patrick Bogaert Bernadette Govaerts	22.5h +7.5h	5 Credits	q2		x	
✘ LINFO2275	Data mining & decision making	Marco Saerens	30h+15h	5 Credits	q2		x	
✘ LBIR2050A	Enjeux du développement durable et de la transition		30h	3 Credits	q2		x	
✘ LEPL1804	Développement durable et transition	David Bol Hervé Jeanmart Patricia Luis Alconero Xavier Marichal Jean-Pierre Raskin	22.5h +15h	3 Credits	q1		x	
✘ LBRAI2221	Agriculture de précision, géomatique agricole et mécanisation	Charles Bielders Pierre Defourny Xavier Draye (coord.)	30h+15h	4 Credits	q1		x	
✘ LBRAI2222	Compléments de biométrie et plans expérimentaux	Xavier Draye (coord.) Bernadette Govaerts	22.5h +15h	3 Credits	q2		x	
✘ LBRAI2220	Génétique quantitative, amélioration et biotechnologies végétales	Philippe Baret Pierre Bertin (coord.) Xavier Draye	40h+10h	5 Credits	q2		x	
✘ LBRTI2101	Data Science in bioscience engineering	Patrick Bogaert (coord.) Emmanuel Hanert	52.5h +15h	5 Credits	q1		x	
✘ LBRTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	30h+7.5h	4 Credits	q1		x	
✘ LBIRE2102	Applied Geomatic	Pierre Defourny	30h +22.5h	4 Credits	q1		x	
✘ LENVI2007	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin (coord.) Hervé Jeanmart	45h+15h	5 Credits	q1		x	
✘ LBRES2104	IRRIGATION AND DRAINAGE	Mathieu Javaux	22.5h +22.5h	4 Credits	q2		x	
✘ LSTAT2340	Statistical Analyses of $\omicron$ omics Data	Céline Bugli Bernadette Govaerts	15h	4 Credits	q2		x	
✘ LBRPP2211	Lutte biologique et santé végétale	Claude Bragard Stephan Declerck Anne Legrève (coord.)	37.5h+0h	4 Credits	q2		x	
✘ LMECA2711	Quality management and control.	Nicolas Bronchart	30h+30h	5 Credits	q2		x	

**✘ Unités d'enseignement au choix libre pour 4 crédits (4 credits)**

4 crédits minimum à choisir au sein des programmes UCLouvain

**✘ Programme alternatif au stage d'insertion socio-professionnelle pour l'option 11A (10 credits)**

6 crédits minimum à choisir parmi les unités d'enseignement suivantes et 4 crédits d'unité d'enseignement au choix libre

✘ LEPL1804	Développement durable et transition	David Bol Hervé Jeanmart Patricia Luis Alconero Xavier Marichal Jean-Pierre Raskin	22.5h +15h	3 Credits	q1		x
✘ LBIR2050	Enjeux du développement durable et de la transition	Philippe Baret (coord.) Nathalie Delzenne Valérie Swaen	30h+30h	3 Credits	q2		x
✘ LDVLP2675	Dynamics of development - environment inter-actions	An Ansoms	30h	5 Credits	q2		x
✘ LGEO1321	Human and Economic geography 1	Patrick Meyfroidt Sophie Vanwambeke	22.5h +22.5h	4 Credits	q2		x
✘ LGEO2110B	Mondialisation, développement et environnement			3 Credits			x

**✘ Unités d'enseignement au choix libre pour 4 crédits (4 credits)**

4 crédits minimum à choisir au sein des programmes UCLouvain

**PROFESSIONAL FOCUS [30.0]**

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

**o Content:**

○ LBIRA2105	Agricultural and rural policies		30h	3 Credits	q1	x	
○ LBIRA2107	Animal production 1	Eric Froidmont	37.5h +7.5h	3 Credits	q2	x	
○ LBIRA2108A	Crop productions : principes		22.5h +15h	3 Credits	q1	x	
○ LBIRA2109	Agrarian systems and farm	Pierre Bertin	30h+0h	3 Credits	q1	x	
○ LBIRA2110	Modélisation et exploration des données multivariées	Xavier Draye (coord.) Frédéric Gaspard Bernadette Govaerts	52.5h +22.5h	6 Credits	q1	x	
○ LBIRA2111	Médecine des plantes	Claude Bragard Anne Legrève (coord.)	30h+0h	3 Credits	q1	x	
○ LBIRA2112	Questions d'actualité (BIRA)	Philippe Baret	22.5h+0h	2 Credits	q1	x	

**o Courses to be chosen for 5 credits (5 credits)****o 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	15h	2 Credits	q1	x	
⊗ LTECO2200	Societies-cultures-religions : Human Questions	Régis Burnet Dominique Martens	15h	2 Credits	q1 or q2	x	
⊗ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	15h	2 Credits	q1	x	

## OPTIONS

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Les étudiants ont le choix entre 7 options en première année de master et 11 modules d'approfondissement en deuxième année de master. La plupart des combinaisons sont possibles. Cependant, les étudiants sont invités à réfléchir dès la première année à l'articulation des options et des modules, certains modules suivant de manière préférentielle certaines options.

Les étudiants qui souhaitent suivre le module interdisciplinaire en Création d'entreprise (CPME) doivent s'y inscrire en même temps qu'à l'option dès la première année de master. En effet, le programme de ce module devra s'articuler avec celui de l'option sur les deux années de master.

Attention: l'inscription à ce module fait l'objet d'une sélection qui a lieu au moment de la rentrée académique. Une fois sélectionnés, les étudiants prendront contact avec le vice-doyen pour aménager leur programme de cours personnel et répartir les cours CPME et les cours d'option sur les deux années du master.

La participation au programme Erasmus Mundus interuniversitaire AFEPA (Agricultural, Food and Environmental Policy Analysis) fait également l'objet d'une sélection dont les modalités sont décrites à la page suivante: [www.uclouvain.be/afepa](http://www.uclouvain.be/afepa)

### Option 1A - Food nutrition and health

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> [Option 1A - Food nutrition and health](#) [ en-prog-2021-bira2m-lbira201o ]

### Option 7A - Water and soil resources

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> [Option 7A- Water and Earth Resources](#) [ en-prog-2021-bira2m-lbira207o ]

### Option 8A - Integrated agronomy

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> [Option 8A](#) [ en-prog-2021-bira2m-lbira208o ]

### Option 1A - Food nutrition and health

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> [Option 9A - Plant health](#) [ en-prog-2021-bira2m-lbira209o ]

### Option 10A - Data Science

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> [Option 10A - Data science](#) [ en-prog-2021-bira2m-lbira210o ]

### Option 11A - Agricultural and Resource Economics

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> [Option 11A - Agricultural and Resource Economics](#) [ en-prog-2021-bira2m-lbira211o ]

### Option 12A - Sustainability engineering

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> [Option 12A : Sustainability engineering](#) [ en-prog-2021-bira2m-lbira012o ]

### Option 13A - Business Creation

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> [Option 13A - Business Creation](#) [ en-prog-2021-bira2m-lbira232o ]

### Option 18A - Human health

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> [Option 18A - Human health](#) [ en-prog-2021-bira2m-lbira218o ]

## OPTION 1A - FOOD NUTRITION AND HEALTH

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### OPTION 1A - FOOD NUTRITION AND HEALTH [30.0]

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● Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

## o Content:

○ LBIR1342A	Analyse de composés organiques dans des matrices complexes 1 partim A		30h	3 Credits	q2	x	
○ LBIRC2109A	Génie des procédés : Opérations unitaires		30h+7.5h	3 Credits	q2	x	
○ LBRAL2102	Physiological and nutritional biochemistry	Cathy Debier Yvan Larondelle (coord.)	37.5h+0h	4 Credits	q1	x	
○ LBRAL2103A	Food Chemistry		30h	3 Credits	q1	x	
○ LBRAL2104	Food microbiology	Jacques Mahillon	30h +22.5h	4 Credits	q2	x	
○ LBRAL2201	Food technology	Axel Kather	52.5h	5 Credits	q2	x	x
○ LBRAL2202	Technological quality control	Vincent Baeten	30h	2 Credits	q1		x
○ LBRTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	30h+7.5h	4 Credits	q1		x
○ LSTAT2310A	Controle stat. de Qualité : Partim A		12h+4h	2 Credits	q1		x

**OPTION 7A - WATER AND SOIL RESSOURCES****OPTION 7A- WATER AND EARTH RESOURCES [30.0]**

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

**o Content:**

○ LBIRA2108B	Plant production		22.5h+0h	2 Credits	q1	x	
○ LBRAI2106	Phytotechnie	Pierre Bertin	50h+10h	6 Credits	q2	x	
○ LBRES2101B	Smart technologies for environmental engineering		22.5h +15h	3 Credits	q1	x	
○ LBRES2103	Soil physics applied to Agronomy and Environment	Charles Biolders (coord.) Mathieu Javaux	30h+15h	4 Credits	q1	x	
○ LBRES2203	Soil management and planning in warm regions	Charles Biolders (coord.)	22.5h +7.5h	3 Credits	q2	x	
○ LBRES2204	Integrated water management of water resources	François Jonard Marnik Vanclooster (coord.)	22.5h +22.5h	4 Credits	q1		x

**o Courses to be chosen for 4 credits minimum (8 credits)**

⊗ LBIRE2102	Applied Geomatic	Pierre Defourny	30h +22.5h	4 Credits	q1	x	x
⊗ LBRES2104	IRRIGATION AND DRAINAGE	Mathieu Javaux	22.5h +22.5h	4 Credits	q2	x	x
⊗ LBRES2105	Soil erosion and conservation	Charles Biolders	22.5h +22.5h	4 Credits	q2	x	x

## OPTION 8A - INTEGRATED AGRONOMY

## OPTION 8A [30.0]

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

## o Content:

○ LBIRA2108B	Plant production		22.5h+0h	2 Credits	q1	x	
○ LBRAI2106	Phytotechnie	Pierre Bertin	50h+10h	6 Credits	q2	x	
○ LBRAI2110	Elements of Agroecology	Philippe Baret	30h	3 Credits	q1		x
○ LBRAI2201	Integrated exercises in agronomy	Patrick Gerin Richard Lambert (coord.) Julie Van Damme	30h	3 Credits	q1		x
○ LBRAI2220	Génétique quantitative, amélioration et biotechnologies végétales	Philippe Baret Pierre Bertin (coord.) Xavier Draye	40h+10h	5 Credits	q2	x	
○ LBRAI2221	Agriculture de précision, géomatique agricole et mécanisation	Charles Bielders Pierre Defourny Xavier Draye (coord.)	30h+15h	4 Credits	q1	x	
○ LBRAI2222	Compléments de biométrie et plans expérimentaux	Xavier Draye (coord.) Bernadette Govaerts	22.5h +15h	3 Credits	q2	x	

## o Courses to be chosen for 4 credits minimum (4 credits)

⊗ LBRAI2107	Animal Production 2	Marleen Abdel Massih Jean-Paul Dehoux Isabelle Donnay Eric Froidmont Yvan Larondelle (coord.)	30h +12.5h	4 Credits	q2	x	
⊗ LBRPP2211	Lutte biologique et santé végétale	Claude Bragard Stephan Declerck Anne Legrève (coord.)	37.5h+0h	4 Credits	q2	x	

## OPTION 1A - FOOD NUTRITION AND HEALTH

## OPTION 9A - PLANT HEALTH [30.0]

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

o Content:

Course ID	Course Title	Coordinator	Hours	Credits	Exam	Year 1	Year 2
○ LBIRA2108B	Plant production		22.5h+0h	2 Credits	q1	x	
○ LBRAI2106A	Phytotechnie - Grandes cultures et maraîchage		24h+6h	3 Credits	q2	x	
○ LBRAI2106C	Phytotechnie - Cultures fruitières		6h+4h	1 Credits	q2	x	
○ LBRPP2102	Entomology applied to agriculture	Claude Bragard (coord.) Thierry Hance	22.5h +12.5h	3 Credits	q1		x
○ LBRPP2204	Special questions in plant protection	Claude Bragard (coord.) Anne Legrève	30h	3 Credits	q1+q2		x
○ LBRPP2208	Interactions plantes - microorganismes	Claude Bragard Stephan Declerck Anne Legrève (coord.)	27.5h +15h	4 Credits	q2	x	
○ LBRPP2210	Pathologies végétales	Claude Bragard (coord.) Anne Legrève	30h +12.5h	4 Credits	q1	x	
○ LBRPP2211	Lutte biologique et santé végétale	Claude Bragard Stephan Declerck Anne Legrève (coord.)	37.5h+0h	4 Credits	q2	x	
○ LBRPP2212	Plant chemistry	Claude Bragard Anne Legrève (coord.)	30h+0h	3 Credits	q1		x
○ LBRPP2213	Biotechnologies and diagnostics	Claude Bragard (coord.) Anne Legrève	22.5h +7.5h	3 Credits	q1	x	

## OPTION 10A - DATA SCIENCE

## OPTION 10A - DATA SCIENCE [30.0]

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

## o Content:

○ LBRAI2219	Systems Biology Modelling	Xavier Draye (coord.) Mathieu Javaux Guillaume Lobet	30h	3 Credits	q2	x	
○ LBRAI2222	Compléments de biométrie et plans expérimentaux	Xavier Draye (coord.) Bernadette Govaerts	22.5h +15h	3 Credits	q2		x
○ LBRTI2101	Data Science in bioscience engineering	Patrick Bogaert (coord.) Emmanuel Hanert	52.5h +15h	5 Credits	q1	x	
○ LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	30h+15h	5 Credits	q1	x	
○ LINFO1104	Concepts des langages de programmation	Peter Van Roy	30h+30h	5 Credits	q2	x	
○ LINMA2472	Algorithms in data science	Vincent Blondel Jean-Charles Delvenne (coord.)	30h +22.5h	5 Credits	q1	x	

## o Courses to be chosen for 4 credits minimum (4 credits)

⊗ LBRAI2220A	Génétique quantitative, amélioration et biotechnologies végétales		30h	3 Credits	q2	x	x
⊗ LBRAT2104A	Land monitoring by advanced earth observation		22.5h +15h	3 Credits	q2	x	
⊗ LBRAT2104B	Land monitoring by advanced earth observation - Sustainable food production monitoring		7.5h+7.5h	1 Credits	q2	x	
⊗ LELEC2870	Machine learning : regression, deep networks and dimensionality reduction	John Lee Michel Verleysen	30h+30h	5 Credits	q1	x	
⊗ LELEC2920	Communication networks	Sébastien Lugan Benoît Macq	30h+15h	5 Credits	q1	x	
⊗ LINFO2172	Databases	Siegfried Nijssen	30h+30h	6 Credits	q2	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	q1	x	
⊗ LINFO2275	Data mining & decision making	Marco Saerens	30h+15h	5 Credits	q2	x	
⊗ LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	15h+15h	4 Credits	q1	x	

**OPTION 11A - AGRICULTURAL AND RESSOURCE ECONOMICS****OPTION 11A - AGRICULTURAL AND RESOURCE ECONOMICS [30.0]**

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

**o Content:**

○ LBRAI2208	<a href="#">Firms and Markets : Strategic Analysis</a>	Frédéric Gaspart	30h	4 Credits	q1	x	
○ LBRAI2210	<a href="#">Microeconomics of Development</a>	Frédéric Gaspart	30h	3 Credits	q1	x	
○ LBRAI2212	<a href="#">Economics of Rural Development</a>	Frédéric Gaspart (coord.) Goedele Van den Broeck	30h	3 Credits	q1	x	
○ LBRAI2213	<a href="#">Impact evaluation in agriculture</a>	Goedele Van den Broeck	30h+8h	4 Credits	q2	x	
○ LECON2033	<a href="#">Applied econometrics: Microeconometrics</a>	Muriel Dejemeppe	30h+12h	5 Credits	q1		x
○ LECON2604	<a href="#">Advanced International Trade</a>	Joseph Gomes Gonzague Vannoorenberghe	30h	5 Credits	q2	x	

**o Courses to be chosen for 6 credits**

Minimum 6 credits

## OPTION 12A - SUSTAINABILITY ENGINEERING

## OPTION 12A : SUSTAINABILITY ENGINEERING [30.0]

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

⊗ Content:

○ LBIRE2131	Evaluation d'impact environnemental: diagnostic et indicateurs	Charles Bielders Pierre Defourny (coord.)	22.5h	3 Credits	q2	x	
○ LBIRE2205A	Decision tools and project management - Decision tools		22.5h +7.5h	3 Credits	q1	x	
○ LBRAI2213	Impact evaluation in agriculture	Goedele Van den Broeck	30h+8h	4 Credits	q2	x	
○ LBRES2101	Smart technologies for environmental engineering	François Jonard Sébastien Lambot (coord.)	32.5h +20h	4 Credits	q1	x	
○ LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	30h+15h	5 Credits	q1	x	
○ LENVI2007	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin (coord.) Hervé Jeanmart	45h+15h	5 Credits	q1		x

○ Courses to be chosen for 6 credits minimum (6 credits)

⊗ LBIR2050A	Enjeux du développement durable et de la transition		30h	3 Credits	q2	x	x
⊗ LBIRC2109A	Génie des procédés : Opérations unitaires		30h+7.5h	3 Credits	q2	x	x
⊗ LBIRE2102	Applied Geomatic	Pierre Defourny	30h +22.5h	4 Credits	q1	x	x
⊗ LBRAI2110	Elements of Agroecology	Philippe Baret	30h	3 Credits	q1	x	x
⊗ LBRAI2208	Firms and Markets : Strategic Analysis	Frédéric Gaspart	30h	4 Credits	q1	x	x
⊗ LBRAI2210	Microeconomics of Development	Frédéric Gaspart	30h	3 Credits	q1	x	x
⊗ LBRAI2212	Economics of Rural Development	Frédéric Gaspart (coord.) Goedele Van den Broeck	30h	3 Credits	q1	x	x
⊗ LBRAI2221	Agriculture de précision, géomatique agricole et mécanisation	Charles Bielders Pierre Defourny Xavier Draye (coord.)	30h+15h	4 Credits	q1	x	x
⊗ LEPL1804	Développement durable et transition	David Bol Hervé Jeanmart Patricia Luis Alconero Xavier Marichal Jean-Pierre Raskin	22.5h +15h	3 Credits	q1	x	x

**OPTION 13A - BUSINESS CREATION****OPTION 13A - BUSINESS CREATION**

L'objectif du module CPME est de fournir aux étudiants, créateurs potentiels d'entreprise, les outils d'analyse et de réflexion qui les aideront à comprendre les processus entrepreneuriaux afin de créer ou reprendre une entreprise et de développer des projets de cette nature au sein d'organisations existantes. En outre, cette formation permet aux étudiants de se familiariser avec d'autres disciplines et d'apprendre à travailler en équipes multidisciplinaires. Les étudiants qui souhaitent suivre le module interdisciplinaire en Création d'entreprise (CPME) doivent s'y inscrire en même temps qu'à l'option dès la première année de master. En effet, le programme de ce module devra s'articuler avec celui de l'option sur les deux années de master. Attention: l'inscription à ce module fait l'objet d'une sélection qui a lieu au moment de la rentrée académique. Une fois sélectionnés, les étudiants prendront contact avec le vice-doyen pour aménager leur programme de cours personnel et répartir les cours CPME et les cours d'option sur les deux années du master.

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

*This module is available for all students whatever option they have taken. Students who choose this interdisciplinary module will write a final paper within the CPME programme. Access to this module is limited. For more information: <http://www.uclouvain.be.cpme> No internship is possible via this option complement. BIR12210 will have to be replaced by any other course for 2 credits.*

Year

1 2

**o Content:**

○ LCPME2001	<a href="#">Entrepreneurship Theory (in French)</a>	Frank Janssen	30h+20h	5 Credits	q1	x	
○ LCPME2002	<a href="#">Managerial, legal and economic aspects of the creation of a company (in French)</a>	Yves De Cordt Marine Falize	30h+15h	5 Credits	q1	x	
○ LCPME2003	<a href="#">Business plan of the creation of a company (in French)</a>	Frank Janssen	30h+15h	5 Credits	q2	x	x
○ LCPME2004	<a href="#">Advanced seminar on Entrepreneurship (in French)</a>	Frank Janssen	30h+15h	5 Credits	q2	x	

**o Courses to be chosen for 10 credits (10 credits)**

## OPTION 18A - HUMAN HEALTH

## OPTION 18A - HUMAN HEALTH [30.0]

○ Mandatory

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

Year

1 2

## o Content:

○ LBIR1342A	Analyse de composés organiques dans des matrices complexes 1 partim A		30h	3 Credits	q2	x	
○ LBIRC2109A	Génie des procédés : Opérations unitaires		30h+7.5h	3 Credits	q2	x	
○ LBRAL2102	Physiological and nutritional biochemistry	Cathy Debier Yvan Larondelle (coord.)	37.5h+0h	4 Credits	q1	x	
○ LB RTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	30h+7.5h	4 Credits	q1	x	
○ LCHM2244	Medicinal chemistry	Raphaël Frédéric Didier Lambert	22.5h +7.5h	3 Credits	q2	x	
○ LGBIO2030	Biomaterials	Sophie Demoustier Christine Dupont	30h+30h	5 Credits	q1	x	x
○ LSTAT2330	Statistics in clinical trials.	Catherine Legrand Annie Robert	22.5h +7.5h	5 Credits	q2	x	
○ LBIO1237B	Immunology : basis and applications in biology - Lectures		25h	3 Credits	q1	x	

## Course prerequisites

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

## The programme's courses and learning outcomes

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

## BIRA2M - 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>	Approfondissement en agronomie	Direct access	
Autres bacheliers UCL		Access based on application	L'étudiant-e est invité-e à prendre contact avec le <a href="#">conseiller aux études</a> .
<b>Others Bachelors of the French speaking Community of Belgium</b>			
		Direct access	
		Access based on application	
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
		Direct access	Les conditions d'accès seront définies au cas par cas en fonction des prérequis nécessaires.
		Access based on application	
<b>Foreign Bachelors</b>			
		Access based on application	Les conditions d'accès seront définies au cas par cas en fonction des prérequis nécessaires.
		Access based on application	

### 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	Les enseignements supplémentaires éventuels peuvent être consultés dans le <a href="#">module complémentaire</a> .	Type court
BA en agronomie (toutes orientations) - HE - crédits supplémentaires entre 45 et 60		

BA en chimie (biochimie, biotechnologie, chimie appliquée) - EPS  
- crédits supplémentaires entre 45 et 60

BA en chimie (biochimie, biotechnologie, chimie appliquée,  
environnement) - HE - crédits supplémentaires entre 45 et 60

## Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
<b>"Licenciés"</b>			
<b>Masters</b>			
		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

## 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

△ Courses not taught during 2021-2022

⊕ Periodic courses taught during 2021-2022

⊗ Optional

⊖ Periodic courses not taught during 2021-2022

■ Activity with requisites

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

### ○ Cours passerelle pour le master en bioingénieur, orientation sciences agronomiques (45 credits)

○ LANGL2480	English Communication Skills for Bioengineers	Ahmed Adriouche Dominique François Sandrine Meirlaen Katherine Opello Charlotte Peters Adrien Pham (coord.) Anne-Julie Toubeau	30h	2 Credits	q2
○ LBIR1315	Probability and statistics II	Patrick Bogaert	22.5h+22.5h	3 Credits	q1
○ LBIR1325A	Transfer of fluids and energy for Bio-engineer		37.5h+22.5h	5 Credits	q1
○ LBIR1328A	Climatology and hydrology applied to agronomy and the environment - partim A		22.5h	2 Credits	q1
○ LBIR1336B	Sciences du sol et excursions intégrées - partim B		22.5h+30h	4 Credits	q2
○ LBIR1349	Chimie analytique I	Christine Dupont (coord.) Yann Garcia	30h+15h	3 Credits	q1
○ LBIR1350	General Microbiology	Jacques Mahillon	37.5h+15h	4 Credits	q2
○ LBIR1351	Introduction to systems analysis	Philippe Baret	10h+20h	3 Credits	q1
○ LBIR1352B	Génétique générale - partim B		0h+7.5h	4 Credits	q2
○ LBIR1353	Biologie intégrative	Guillaume Lobet Stanley Lutts (coord.) Muriel Quinet	22.5h+15h	3 Credits	q1
○ LBIR1354	Biologie des interactions	Anne-Laure Jacquemart (coord.) Anne Legrève	22.5h+15h	3 Credits	q2
○ LBIR1355	Métabolisme microbien et synthèse de biomolécules	Michel Ghislain (coord.) Yvan Larondelle	22.5h+15h	3 Credits	q2
○ LBIR1360	Firm management and organisation	Pierre De Muelenaere	30h+7.5h	3 Credits	q1
○ LBIR1362	Environmental Economics	Frédéric Gaspart	30h+7.5h	3 Credits	q2

### ○ Specifics courses (15 credits)

○ LBIR1230	Introduction to biosphere engineering	Philippe Baret (coord.) Pierre Defourny Pierre Delmelle	60h	5 Credits	q2
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### ○ Activités au choix libre (5 credits)

The students have a free choice of courses within one of the bachelor programs in Sciences and Technology Sector : <https://uclouvain.be/fr/etudier/les-facultes.html>

From 5 to 5 credits

## Teaching method

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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) :

- 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 option courses in third year (BIRC13BA, BIRA13BA, BIRE13BA) : three advanced subsidiary subjects available : chemistry (BIRC), agronomy (BIRA), environment (BIRE).

### 2nd cycle (Master) :

- choice of three Masters in Bioengineering with a professional focus, together with twelve option courses 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 twelve option courses, which partly overlap at the level of the three 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 agronomic science. 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 (management, design of new processes etc) combine different kinds of tools (field observation, laboratory analysis, databases, biometrics etc) and various scales in space (from the molecular to plots of land and farms, from an agricultural region to a sub-continent and beyond) 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 agronomic science (applied biology and agricultural production);
- 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 agronomic science. 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 (e.g. integrated fight, crop protection and bioinformatics). 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. 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.

## Mobility and/or Internationalisation outlook

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Mobility and/or international links

The programme for the Master in Agricultural Bioengineering 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 complete University. The shape of the option courses 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% and the number of our students who go abroad is similar to the number of foreign students who come to study here.

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.

In particular, the programme of the Master in Bioengineering (Agronomic Science) offers an option course and an advanced module on Agricultural Economics and Natural Resources, organized in cooperation with the Agrocampus in Rennes (France). Under the ERASMUS exchange agreement, courses on the special subject Agriculture and Resources : Policies and Markets (Politiques et marchés de l'agriculture et des ressources - POMAR) taken at the Agrocampus in Rennes ([http://www.agrocampus-rennes.fr/scripts/fr/B\\_formationen/spe/B\\_ENSAR\\_spe\\_pomar.htm](http://www.agrocampus-rennes.fr/scripts/fr/B_formationen/spe/B_ENSAR_spe_pomar.htm)) may count towards the option course and the advanced module Agricultural Economics and Natural Resources at UCL.

## Possible trainings at the end of the programme

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This Master in Bio-Science engineering programme follows on directly from the programme of the Bachelor in Engineering Science (Bioengineering).

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 (ARES-CDD) in the same field.
- **Doctoral programmes** : doctorate in Agronomic Science and Biological Engineering.

## Contacts

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### 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 : Philippe Baret
- Administrative director : 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)
- Fermes universitaires de Louvain (FERM)

Academic supervisor: [Xavier Draye](#)

Jury

- Président: [Charles Bielders](#)
- Secrétaire de jury de la 2<sup>ème</sup> année de master: [Quentin Ponette](#)

Useful Contact(s)

- Conseiller aux études: [Eric Gaigneaux](#)

