



BIRA2M -

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.

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

OPTIONS

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 entrepreneuriat (INEO) 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 INEO 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

- > [Option 1A - Food nutrition and health](#) [en-prog-2024-bira2m-lbira201o]
- > [Option 7A- Water and Earth Resources](#) [en-prog-2024-bira2m-lbira207o]
- > [Option 8A](#) [en-prog-2024-bira2m-lbira208o]
- > [Option 9A - Plant health](#) [en-prog-2024-bira2m-lbira209o]
- > [Option 10A - Data science](#) [en-prog-2024-bira2m-lbira210o]
- > [Option 11A - Agricultural and Resource Economics](#) [en-prog-2024-bira2m-lbira211o]
- > [Option 12A : Sustainability engineering](#) [en-prog-2024-bira2m-lbira012o]
- > [Option 13A - Business Creation](#) [en-prog-2024-bira2m-lbira232o]
- > [Option 18A - Human health](#) [en-prog-2024-bira2m-lbira218o]

OPTION 1A - FOOD NUTRITION AND HEALTH [30.0]

- Mandatory
- ✘ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

OPTION 8A [30.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- ⊗ Open to incoming exchange students
- ⊗ Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

o Content:

<p>● LBIRA2108B</p>	<p>Plant production</p>	<p>Yannick Agnan Stephan Declerck Xavier Draye Guillaume Lobet</p>	
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OPTION 9A - PLANT HEALTH [30.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

o **Content:**

○ LBIRA2108B	Plant production	Yannick Agnan Stephan Declerck Xavier Draye Guillaume Lobet	(FR) [q1] [22.5h+0h] [2 Credits] 🌐 > English-friendly	X	
○ LBRAI2106A	Crop science - Field and vegetable crops	Guillaume Lobet	(FR) [q2] [24h+6h] [3 Credits] 🌐 > English-friendly	X	
○ LBRAI2106C	Crop science - Fruit crops	Guillaume Lobet	(FR) [q2] [6h+4h] [1 Credits] 🌐 > English-friendly	X	
○ LBRPP2102	Entomology applied to agriculture	Claude Bragard (coord.) Thierry Hance	(FR) [q1] [22.5h+12.5h] [3 Credits] 🌐		X
○ LBRPP2204	Topical questions in plant protection	Claude Bragard (coord.) Anne Legrève	(FR) [q1+q2] [30h] [3 Credits] 🌐 > English-friendly		X
○ LBRPP2208	Plant-microbe interactions	Claude Bragard Stephan Declerck Anne Legrève (coord.)	(FR) [q2] [27.5h+15h] [4 Credits] 🌐 > English-friendly	X	
○ LBRPP2210	Plant pathology	Claude Bragard (coord.) Anne Legrève	(FR) [q1] [30h+12.5h] [4 Credits] 🌐 > English-friendly	X	
○ LBRPP2211	Biological control and plant health	Claude Bragard Stephan Declerck Anne Legrève (coord.)	(FR) [q2] [37.5h+0h] [4 Credits] 🌐 > English-friendly	X	
○ LBRPP2212	Plant clinic	Claude Bragard Anne Legrève (coord.)	(FR) [q1] [30h+0h] [3 Credits] 🌐 > English-friendly		X
○ LBRPP2213	Biotechnology and diagnosis	Claude Bragard (coord.) Anne Legrève	(FR) [q1] [22.5h+7.5h] [3 Credits] 🌐 > English-friendly	X	

OPTION 11A - AGRICULTURAL AND RESOURCE ECONOMICS [30.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

o Content:

● LBRAI2208	Firms and Markets : Strategic Analysis	Frédéric Gaspard	EN [q1] [30h] [4 Credits] 🌐 > French-friendly	X	
● LBRAI2210	Microeconomics of Development	Frédéric Gaspard	EN [q1] [30h] [3 Credits] 🌐 > French-friendly	X	
● LBRAI2212	Economics of Rural Development	Goedele Van den Broeck	EN [q1] [30h] [3 Credits] 🌐 > French-friendly	X	
● LBRAI2213	Impact evaluation in agriculture	Goedele Van den Broeck	EN [q2] [30h+8h] [4 Credits] 🌐 > French-friendly	X	
● LECON2033	Applied econometrics: Microeconometrics	Bertrand Verheyden (compensates Muriel Dejemeppe)	FR [q1] [30h+12h] [5 Credits] 🌐		

OPTION 18A - HUMAN HEALTH [30.0]

- Mandatory
- ✘ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

1 2

o Content:

○ LBIO1237B	Immunology : basis and applications in biology - Lectures	Jean-Paul Dehoux	(FR) [q1] [25h] [3 Credits] 🌐	X	
○ LBIR1342A	Analyse de composés organiques dans des matrices complexes 1 partim A	Sonia Collin	(FR) [q2] [30h] [3 Credits] 🌐	X	
○ LBIRC2109A	Process engineering: Unit operations	Damien Debecker	(FR) [q2] [30h+7.5h] [3 Credits] 🌐 > English-friendly	X	
○ LBRAL2102	Physiological and nutritional biochemistry	Cathy Debier (coord.) Emeline Dierge	(EN) [q1] [37.5h+0h] [4 Credits] 🌐 > French-friendly	X	

○ LBIR1360	Firm management and organisation	Pierre De Muelenaere	EN [q1] [30h+7.5h] [3 Credits]  > French-friendly
○ LBIR1362	Environmental Economics	Frédéric Gaspart	FR [q2] [30h+7.5h] [3 Credits] 

○ Specifics courses (10 credits)

○ LBIR1230	Introduction to biosphere engineering	Philippe Baret Pierre Defourny (coord.) Pierre Delmelle	FR [q2] [60h] [5 Credits] 
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○ Unités d'enseignement au choix libre pour 5 crédits (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 5credit(s)

BA en agronomie, orientation agronomie des régions chaudes - crédits supplémentaires entre 45 et 60
 BA en agronomie, orientation environnement - crédits supplémentaires entre 45 et 60
 BA en agronomie, orientation forêt et nature - crédits supplémentaires entre 45 et 60
 BA en agronomie, orientation systèmes alimentaires durables et locaux - crédits supplémentaires entre 45 et 60
 BA en agronomie, orientation techniques et gestion agricoles - crédits supplémentaires entre 45 et 60
 BA en agronomie, orientation techniques et gestion horticoles - crédits supplémentaires entre 45 et 60
 BA en agronomie, orientation technologie animalière - crédits supplémentaires entre 45 et 60
 BA en chimie, orientation biochimie - crédits supplémentaires entre 45 et 60
 BA en chimie, orientation biotechnologie - crédits supplémentaires entre 45 et 60
 BA en chimie, orientation chimie appliquée - crédits supplémentaires entre 45 et 60
 BA en chimie, orientation environnement - crédits supplémentaires entre 45 et 60

peuvent être consultés dans le [module complémentaire](#).

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
Masters			

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) :

- 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**

