UCLouvain

BIRA2M - Introduction

Introduction

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 recomnd evatnd6 toiensounag, sustainable development in relation to theefificien:

Year
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Projet intégré pour l'option 12A (10 credits)

LBIRE2205B	Decision tools and project management - Project Management	Raphaël Amory Frédéric Gaspart	1

Year
1 2

⛒ 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

⛒ LBIR2050	Challenges of sustainable development and transition	Valentin Couvreur Nathalie Delzenne Valérie Swaen (coord.)	FR [q2] [30h] [5 Credits]		x
⛒ LDVLP2675	Dynamics of development - environment inter-actions	An Ansoms	FR [q2] [30h] [5 Credits]		x
⛒ LEPL1804	Sustainable development and transition	David Bol Hervé Jeanmart			

OPTION 1A - FOOD NUTRITION AND HEALTH [30.0]

- O Mandatory
- ⊠ Optional
- △ Not offered in 2023-2024
- ⊘

OPTION 7A - WATER AND SOIL RESSOURCES

OPTION 7A- WATER AND EARTH RESOURCES [30.0]

- Mandatory
- Optional
- Not offered in 2023-2024
- Not offered in 2023-2024 but offered the following year
- Offered in 2023-2024 but not the following year
- Not offered in 2023-2024 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, ...)

OPTION 8A - INTGRATED AGRONOMY

OPTION 8A [30.0]

- ⭘ Mandatory
- ⊠ Optional
- △ Not offered in 2023-2024
- ⊘

OPTION 9A - PLANT HEALTH

OPTION 9A - PLANT HEALTH [30.0]

- Mandatory
- Optional
- Not offered in 2023-2024
- Not offered in 2023-2024 but offered the following year
- Offered in 2023-2024 but not the following year
- Not offered in 2023-2024 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Content:

				Year 1	Year 2
LBIRA2108B	Plant production	Yannick Agnan Pierre Bertin Stephan Declerck Xavier Draye	FR [q1] [22.5h+0h] [2 Credits] > English-friendly	x	
LBRAI2106A	Crop science - Field and vegetable crops	Pierre Bertin	FR [q2] [24h+6h] [3 Credits] > English-friendly	x	
LBRAI2106C	Crop science - Fruit crops	Pierre Bertin	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.)	EN [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 10A - DATA SCIENCE

OPTION 10A - DATA SCIENCE [30.0]

- Mandatory
- Optional
- Not offered in 2023-2024
- Not offered in 2023-2024 but offered the following year
- Offered in 2023-2024 but not the following year
- Not offered in 2023-2024 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

Content:

LBRAI2219	Systems Bioln Tf 1 0 0 -1 0 9.35700035ng language (FR, EN, ES, NL, DE, ...)

OPTION 11A - AGRICULTURAL AND RESOURCE ECONOMICS

OPTION 11A - AGRICULTURAL AND RESOURCE ECONOMICS [30.0]

- Mandatory
- Optional
- Not offered in 2023-2024
- Not offered in 2023-2024 but offered the following year
- Offered in 2023-2024 but not the following year
- Not offered in 2023-2024 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Content:

				Year 1	Year 2
LBRAI2208	Firms and Markets : Strategic Analysis	Frédéric Gaspart	EN [q1] [30h] [4 Credits] *> French-friendly*	x	
LBRAI2210	Microeconomics of Development	Frédéric Gaspart	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)	EN [q1] [30h+12h] [5 Credits]		x
LECON2604	Advanced International Trade	Joseph Gomes Gonzague Vannoorenberghe	EN [q2] [30h] [5 Credits]	x	

OPTION 12A - SUSTAINABILITY ENGINEERING

OPTION 12A : SUSTAINABILITY ENGINEERING [30.0]

- O Mandatory
- ⊠ Optional
- △ Not offered in 2023-2024
- ⊘ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Content:

				Year 1	Year 2
O LBIRE2131	Environmental Impact Assessment : diagnosis and indicators	Charles Bielders (coord.) Pierre Defourny	FR [q2] [22.5h] [3 Credits]	x	
O LBIRE2205A	Decision tools and project management - Decision tools	Raphaël Amory Frédéric Gaspart	EN [q1] [22.5h+7.5h] [3 Credits] *> French-friendly*	x	
O LBRAI2213	Impact evaluation in agriculture	Goedele Van den Broeck	EN [q2] [30h+8h] [4 Credits] *> French-friendly*	x	
O LBRES2101	Smart technologies for environmental engineering	Sébastien Lambot	EN [q1] [32.5h+20h] [4 Credits] *> French-friendly*	x	
O LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	EN [q1] [30h+15h] [5 Credits] *> French-friendly*	x	
O LENVI2007A	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin Hervé Jeanmart	EN [q1] [30h] [3 Credits] *> French-friendly*		x

Courses to be chosen for 6 credits minimum (8 credits)

⊠ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Quentin Goor (compensates Mathieu Javaux) Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits]	x	x
⊠ LBIR2050A	Challenges of sustainable development and transition	Valentin Couvreur Nathalie Delzenne Valérie Swaen	FR [q1 or q2] [22.5h] [3 Credits]	x	x
⊠ LBIRC2109A					

Year

OPTION 18A - HUMAN HEALTH

OPTION 18A - HUMAN HEALTH [30.0]

- Mandatory
- Optional
- Not offered in 2023-2024
- Not offered in 2023-2024 but offered the following year
- Offered in 2023-2024 but not the following year
- Not offered in 2023-2024 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Content:

				Year 1	Year 2
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	EN [q2] [30h+7.5h] [3 Credits] > *English-friendly*	x	

Supplementary classes

To access this Master, students must have a good command of certain subjects. If this is not the case, students must take supplementary classes chosen by the faculty to satisfy course prerequisites.

- Mandatory
- Optional
- Not offered in 2023-2024
- Not offered in 2023-2024 but offered the following year
- Offered in 2023-2024 but not the following year
- Not offered in 2023-2024 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...)

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

LANGL2480	English Communication Skills for Bioengineers	Ahmed Adrioueche Ariane Halleux Lucille Meyers Philippe Neyt Charlotte Peters (coord.) Adrien Pham Anne-Julie Toubeau (coord.)	[FR] [q2] [30h] [2 Credits] *> French-friendly*
LBIR1315	LBIR1315		

LBIR1355	microbial metabolism and biomolecules synthesis	Michel Ghislain (coord.) Yvan Larondelle	FR [q2] [22.5h+15h] [3 Credits]
LBIR1360	Firm management and organisation	Pierre De Muelenaere	EN [q1] [30h+7.5h] [3 Credits] *> French-friendly*
LBIR1362	Environmental Economics		

BIRA2M - Information

Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the hiher education landscape and the academic organisation of courses.

General and specific admission requirements for this programme must be satisfied at the time of enrolling at the university.

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

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

SUMMARY

BA en agronomie, orientation agronomie des régions chaudes - crédits supplémentaires entre 45 et 60

BA en agronomie, orientation environnement - crédits supplémentaires entre 45 et 60

BA en agronomie, orientation forêt et nature - crédits supplémentaires entre 45 et 60

BA en agronomie, orientation techniques et gestion agricoles - crédits supplémentaires entre 45 et 60

BA en agronomie, orientation techniques et gestion horticoles - crédits supplémentaires entre 45 et 60

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 (BIR**C**13BA, BIR**A**13BA, BIR**E**13BA) : three advanced subsidiary

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