

BIRE2M - Introduction

Introduction

2.3 To master the operational use of specialised tools in engineering sciences (e.g.: systems analysis, statistical analysis, programming, modelling, etc.)(1) :

- Measurement techniques
- Environmental statistical data analysis
- Specific tools in relation to the choice of specialisation

2.4 To activate and apply their knowledge of engineering with a critical mind and using a quantitative approach to tackle a complex problem in the environmental field by incorporating processes at different scales ranging from the mineral and living organism scale, to landscape and biosphere.

2.5 To locate and understand how companies and organisations operate, including the role of the different players, their financial and social realities and responsibilities and the challenges and constraints which characterise their environment.

[1] The tools are explained on the basis of the radiology of the programme and courses.

3. To design and execute a research project, implementing an analytical scientific and, if applicable, systematic approach, to further understanding of an original research problem in their field of specialisation, incorporating several disciplines.

This skill set will develop throughout the 5 years. Amongst others it requires the use of a set of skills as described below. These skills correspond in fact to the different stages of the scientific approach.

The majority of these skills are developed in the Bachelor and Master programmes, with differentiation predominately on 3 levels:

- the level of detail and complexity applied to the scientific problem/research studied;
- the degree of innovation shown by the student;
- the degree of autonomy demonstrated by the student throughout the process.

3.1 To summarise the state of knowledge on a complex research problem which relates to their choice of specialisation: to research information, to select and validate its reliability based on the nature of the source of the information and comparing several sources.

3.2 To specify and define the research question.

3.3 To examine the research question using conceptual abstraction and formulate hypotheses.

3.4 To develop and implement a rigorous methodology to answer the research question.

3.5 To master and apply statistical data analysis tools in the context of a complex scientific issue.

3.6 To analyse and interpret the results to produce a substantiated critique on a complex scientific question.

3.7 To demonstrate an ability to summarise and formulate conclusions on a complex scientific question.

3.8 In each of the skills mentioned above, to demonstrate rigour, precision and the critical thinking essential for any scientific method.

3.9 To demonstrate innovation in at least one of the skills mentioned above.

4. To formulate and resolve a complex environmental engineering problem related to new situations presenting a degree of uncertainty. The student will be able to design appropriate, sustainable and innovative solutions through a systematic approach. This problem may be related to the management and use of resources (soil, water, plant) and ecosystems, to land management, to the impact of human activities on the capacity of the environment to provide goods and services to humanity.

4.1 To strategically differentiate the key elements from the less critical elements relating to a complex environmental engineering problem, in order to define and determine the field of action for this problem.

4.2 To identify the knowledge acquired and that to be acquired to resolve the complex environmental engineering problem.

4.3 To analyse a complex environmental engineering problem using a systematic and multidisciplinary approach in order to carry out diagnostics and formulate the specifications.

4.4 To demonstrate an ability for conceptual abstraction and formalisation in analysing and resolving the complex environmental engineering problem.

4.5 To develop scientifically and technologically relevant and innovative solutions, through a multidisciplinary (integration and articulation of knowledge) and quantitative approach, making it possible to develop products, systems, processes or services in the field of environmental sciences and technologies.

4.6 To test solutions and evaluate their impact in relation to an economic, environmental, social and cultural context.

4.7 To formulate concrete and responsible recommendations to encourage sustainable development in relation to the efficient operational and sustainable implementation of the solutions proposed.

5. To design and implement a multidisciplinary project, alone and in a team, with the stakeholders concerned while taking the objectives into account and incorporating the scientific, technical, environmental, economic and human factors.

5.1 To know and understand the principles and factors of group dynamics (including the constructive role of conflict).

5.2 To know and understand the project management process (project cycles): formulation and definition of the project, project management, monitoring and evaluation of the project.

5.3 To situate a multidisciplinary project within its environment and identify the issues, constraints and stakeholders and to clearly define its objectives.

5.4 To plan and develop all the stages of a multidisciplinary project, alone and in a team, and to work together after having allocated the tasks.

5.5 To involve key players at appropriate stages in the process.

5.6 To work within a team and collaborate effectively to achieve common objectives.

5.7 To take and assume the decisions required for the effective project management either alone or in a team in order to achieve the intended objectives.

5.8 To recognise and take into consideration the diversity of opinions and ways of thinking of team members and to manage conflict constructively to work towards a consensual decision.

- 5.9 To lead a team (demonstrate leadership): to motivate team members, to develop a collaborative climate, to guide them to cooperate in the achievement of a common objective, to manage conflict.
6. To communicate, interact and convince in a professional manner, in French and English at level C1 (Common European Framework

CORE COURSES [47.0]

- 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

○ LBIRE2200	Master thesis		EM [q1+q2] [] [27 Credits] 🌐	x
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				Year	
				1	2
⌘ LECSO2330	Economie sociale et transition écologique et sociale	Anaïs Perilleux	PR [q2] [30h] [3 Credits]		x

○ 7 crédits minimum à choisir au sein de l'un des masters BIRA, BIRC, BIRE, BIRF, ENVI (7 credits)

OPTIONS

Students in this programme have a choice of 5 options followed by a complement to the chosen option in the second year of the programme.

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

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

- > [Option 4E - Pollution management](#) [en-prog-2024-bire2m-lbire204o]
- > [Complement to the option 4E : Pollution management](#) [en-prog-2024-bire2m-lbire214o]
- > [Option 5E - Land Use Planning](#) [en-prog-2024-bire2m-lbire205o]
- > [Option's complement 5E - Land Use Planning](#) [en-prog-2024-bire2m-lbire215o]
- > [Option 7E- Water and Soil Resources](#) [en-prog-2024-bire2m-lbire207o]
- > [Option's complement 7E - Water and soil resources](#) [en-prog-2024-bire2m-lbire217o]
- > [Option 10E - Data science](#) [en-prog-2024-bire2m-lbire210o]
- > [Option's complement - Data science](#) [en-prog-2024-bire2m-lbire111o]
- > [Option 12E : Sustainability engineering](#) [en-prog-2024-bire2m-lbire212o]
- > [Option's complement - Sustainability engineering](#) [en-prog-2024-bire2m-lbire120o]
- > [Business Creation \(13E\)](#) [en-prog-2024-bire2m-lbire250o]

OPTION 4E - POLLUTION MANAGEMENT [23.0]

- 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...)

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

Year

1 2

o Content:

○ LBIR1346	Surface and colloid chemistry	Christine Dupont Aurélien vander Straeten (compensates Christine Dupont)	
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POLLUTION MANAGEMENT [20.0]

- 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:**

● LBIRC2109	Process engineering : unit operations	Damien Debecker	EN [q2] [52.5h+15h] [5 Credits] 🌐 > English-friendly	X
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o Courses to be chosen for 4 credits minimum (4 credits)

⌘ LBRES2105	Soil erosion and conservation	Charles Bielders	EN [q2] [22.5h+22.5h] [4 Credits] Δ  > French-friendly	X
⌘ LBRES2204	Integrated water management of water resources	Marnik Vanclooster (coord.)	FR [q1] [22.5h+22.5h] [4 Credits] 	X
⌘ LBRES2206	Advanced Hydrology for Engineers	Mathieu Javaux	EN [q1] [22.5h+15h] [3 Credits]  > French-friendly	X
⌘ LBRTI2101A	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert	FR [q1] [22.5h+15h] [3 Credits]  > English-friendly	X
⌘ LDROP2062	Urban Planning Law	Charles-Hubert Born Damien Jans	FR [q2] [30h] [3 Credits] 	X

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

- 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:**

● LBIRF2106	Analyse et gestion des habitats et des espèces	Anne-Laure Jacquemart (coord.) Marie Pairon	(FR) [q2] [30h+22.5h] [5 Credits] 🌐	x
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OPTION 7E- WATER AND SOIL RESOURCES [23.0]

- 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
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● LBIRE2233

OPTION 10E - DATA SCIENCE [23.0]

- 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...)x

Year

1 2

o **Content:**

● LBRAI2219	Systems Biology Modelling	Valentin Couvreur (compensates Mathieu Javaux) Xavier Draye (coord.) Guillaume Lobet	(FR) [q2] [30h] [3 Credits] 🌐 > English-friendly	X	
● LBRAT2102	Spatial modelling of land dynamics	Pierre Defourny	(FR) [q2] [15h+15h] [3 Credits] 🌐 > French-friendly	X	
● LBRTI2101B	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert	(FR) [q1] [30h] [2 Credits] 🌐 > English-friendly	X	

OPTION'S COMPLEMENT - DATA SCIENCE [20.0]

- 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, ...)
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o Unité d'enseignement obligatoire pour l'étudiant-e qui ne l'aurait pas créditée en Bachelier (2 credits)

<p>LBIR1325B</p>	<p>Transfer of fluids and energy for Bio-engineer</p>	<p>Yann Bartosiewicz Quentin Goor (compensates Mathieu Javaux) Marnik Vanclooster</p>	<p>FR [q2] [0h+30h] [2 Credits] </p>	<p>X</p>
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OPTION'S COMPLEMENT - SUSTAINABILITY ENGINEERING [20.0]

- 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

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Course prerequisites

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

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

BIRE2M - 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.

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

- > [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	Remarks	Special Requirements	Access	Remarks
UCLouvain Bachelors				
Bachelor in Bioengineering		Additional module in Environment	Direct access	
Autre Bachelier UCL du domaine des sciences et technologies			Access based on application	Le/la futur-e étudiant-e rencontrera obligatoirement le Conseiller aux études pour déterminer le programme à

(max.60 crédits). Prendre obligatoirement contact avec le Conseiller aux études.

Access based on application

Non university Bachelors

> Find out more about [links](#) to the university

Diploma	Access	Remarks
BA en agronomie, orientation agro-industries et biotechnologies - crédits supplémentaires entre 45 et 60	Les enseignements supplémentaires éventuels peuvent être consultés dans le module complémentaire .	Type court
BA en agronomie, orientation agronomie des régions chaudes - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation environnement - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation forêt et nature - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation 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		

Holders of a 2nd cycle University degree

Diploma	Special Requirements
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Teaching method

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

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

1st cycle (Bachelor) :

- programme designed for the BIR students starting from Year 1
- special programme in second year for all the BIR students
- distinct programme with 30 credits for option courses in third year : three advanced subsidiary subjects available : chemistry , agronomy , environment.

2nd cycle (Master) :

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

This overall structure gives students the opportunity to have a highly individualized programme whilst at the same time retaining both the **comprehensive nature** of the training and the foundation elements of university education : **independence, competence, open-mindedness and interest in research.**

The options, which partly overlap at the level of the four Masters in Bioengineering, correspond to fields of activity identified on the basis of a wide-ranging survey of graduates of the Faculty working professionally and of contacts with potential employers.

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

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

Training for research, through research, which is essential for conceptual and innovative awareness and developing intellectual rigour, is reflected by different types of activities :

- producing a final dissertation and taking part in dissertation seminars ;
- participation in subject seminars providing direct contact with young researchers working in the field of environment science and land development;
- presentation of seminars by students from an outside research group or groups and the production of a dissertation.

The application of skills, knowledge and techniques that students have acquired and how they use them together is taken into account in an integrated project in environmental science and technology. This is an important learning activity supplements the dissertation which, in the view of the Faculty, remains the most important part of training for research.

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

Evaluation

The evaluation methods comply with the regulations concerning studies and exams. More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

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

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

Possible trainings at the end of the programme

The Master in Bioengineering programme follows on directly from the Bachelor in Engineering Science : Bioengineering with an option course in Environment. Successful completion of this programme enables direct entry to other training programmes in the second and third cycles.

- **Advanced Masters** : The Advanced Masters in the field authorized by regulations in addition to those established by the ARES-CCD
- **Doctoral programmes** : doctorates in Agronomic Sciences and Biological Engineering.

Contacts

Curriculum Management

Faculty

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

Mandate(s)

- Dean : Christine Dupont
- Administrative director : Carole Dekelver

Commission(s) of programme

- Commission de programme - Master Bioingénieur-Sciences agronomiques ([BIRA](#))
- Commission de programme - Master Bioingénieur-Chimie et 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: [Patrick Bogaert](#)

Jury

- Président: president-jury-agro@uclouvain.be
- Secrétaire de jury de la 2^{ème} année de master: [Sophie Opfergelt](#)

Useful Contact(s)

- Information pour les étudiants par le Conseiller aux études: conseiller-agro@uclouvain.be

