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.

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

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

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

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

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

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

3.2 To specify and define the research question.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.9 To lead a team (demonstrate leadership): to motivate team members, to develop a collaborative climate, to guide them to cooperate in the achievement of a common objective, to manage conflict.

6. To communicate, interact and convince in a professional manner, in French and English at level C1 (Common European Framework

UCL - Université catholique de Louvain Study Programme 2024-2025

BIRE2M: Master [120] in Environmental Bioengineering

CORE COURSES [47.0]

LBIRE2200

- 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	Year 2
LBIRE2200	Master thesis		[EN] [q1+q2] [] [27 Credits]		x

				Year 1	2
⊠ LECSO2330	Economie sociale et transition écologique et sociale	Anaïs Perilleux	FR [q2] [30h] [3 Credits]		x

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

Year

Year
1 2

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] > *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

Content:

- LBIRF2106

OPTION 7E- WATER AND SOIL RESOURCES [23.0]

O Mandatory
⊠ Optional
△

				Year 1	2
LBIRE2233	Integrated project in water and soil resources management	Charles Bielders (coord.) Mathieu Javaux (coord.) Marnik Vanclooster	FR [q1] [40h+8h] [6 Credits]		x
LBRES2206	Advanced Hydrology for Engineers	Mathieu Javaux	EN [q1] [22.5h+15h] [3 Credits] *> French-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, ...)

LBIR1325B

Year
1 2

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

LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Quentin Goor (compensates Mathieu Javaux) Marnik Vanclooster	FR [44 Tf 1 Tf85999.417 1 cm 0 0 m 198.42g /F BT /F7 6.

OPTION'S COMPLEMENT - SUSTAINABILITY ENGINEERING [20.0]

- O 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

[redacted]

s, methods, evaluation...)

		Year 1	Year 2
mmanuel Hanert	EN [q1] [30h+15h] [5 Credits] > *French-friendly*	x	
Véronique Dias (compensates ancesco Contino) Xavier Rixhon (compensates ervé Jeanmart)	EN [q2] [30h+15h] [5 Credits] > *French-friendly*	x	

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

O LBIRE2205B	Decision tools and g 203.944 m W l h W n 1 G [] 0 d /F7 6.38 T Q -'optioct2.43399811 Tm [0rien6urse91J ET Q M6.38 T Q 944 m 353.329987 203.944

				Year 1	2
LINEO2003	Plan d'affaires et étapes-clefs de la création d'entreprise	Frank Janssen	[FR] [q2] [30h+15h] [5 Credits]		x
LINEO2004	Séminaire d'approfondissement en entrepreneuriat	Frank Janssen	[FR] [q2] [30h+15h] [5 Credits]	x	

Supplementary classes

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

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- Optional
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- Not offered in 2024-2025 but offered the following year
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Unités d'enseignement passerelle pour le master Bioingénieur en sciences et technologies de l'environnemnt ET Bioingénieur en gestion des forêts et des espaces naturels (44 credits)

LANGL2480	English Communication Skills for Bioengineers	Ahmed Adrioueche Ariane Halleux Lucille Meyers Philippe Neyt Charlotte Peters (coord.) Adrien Pham Anne-Julie Toubeau (coord.)	[EN] [q2] [30h] [2 Credits] *> French-friendly*
LBIR1315	Probability and statistics II	Patrick Bogaert	[FR] [q1] [22.5h+22.5h] [3 Credits]
LBIR1325A	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Quentin Goor (compensates Mathieu Javaux) Marnik Vanclooster	[FR] [q1] [37.5h+22.5h] [5 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]
LBIR1328	Climatology and hydrology applied to agronomy and the environment	Alice Alonso (coord.) Charles Bielders (coord.) Hugues Goosse	[EN] [q1] [45h+22.5h] [6 Credits] *> French-friendly*
LBIR1334	Introduction to forest science	Quentin Ponette (coord.) Caroline Vincke	[EN] [q2] [22.5h+15h] [3 Credits] *> English-friendly*
LBIR1336	Soil science and integrated excursions	Yannick Agnan (coord.) Richard Lambert Caroline Vincke	[EN] [q2] [30h+37.5h] [5 Credits] *> English-friendly*
LBIR1349	Analytical Chemistry I	Christine Dupont (coord.) Yann Garcia Yann Garcia (compensates Christine Dupont)	[FR] [q1] [30h+15h] [3 Credits]

LBIR1350	General Microbiology	Annika Gillis	FR [q2] [37.5h+15h] [4 Credits]
LBIR1351	Introduction to systems analysis	Philippe Baret	FR [q1] [10h+20h] [3 Credits]
LBIR1354	Biologie des interactions	Anne-Laure Jacquemart (coord.) Anne Legrève	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	Frédéric Gaspart	FR [q2] [30h+7.5h] [3 Credits]

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.

		(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 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	Les enseignements supplémentaires éventuels peuvent être consultés dans le module complémentaire.	Type court

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
Masters			
Master Bioingénieur (autre finalité que sciences et technologies de l'environnement) Master en sciences biologiques Master en Biochimie et biologie moléculaire et cellulaire Master en Biologie des organismes et écologie Master en sciences chimiques Master en Sciences géographiques		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

Access based on application : access may be granted either directly or on the condition of completing additional courses of a maximum of 60 ECTS credits, or refused.

Admission and Enrolment Procedures for general registration

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 foc