

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: **BIRC2M** - Francophone Certification Framework: 7

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BIRC2M - Introduction

Introduction

- Information analysis and management in biological engineering
- 2.3 To master the operational use of specialised tools in engineering sciences (e.g.: systems analysis, statistical analysis, programming, modelling, etc.)([1]):
- Chemometrics and biometrics
 - Thermodynamics
 - 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 field of applied chemistry or bioindustries by incorporating processes at different scales ranging from the atomic scale to the organism and matter scale, and up to the process scale.
- 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 integrating processes from the nanoscale (atoms, chemical mechanisms,...) to the microscopic and macroscopic scales (organisms, reactor,...). This problem may relate 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.

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 engineering approach.

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

- the complexity and scope of the problem addressed;
- the degree of autonomy demonstrated by the student throughout the process;
- the degree of depth in each skill.

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

4.3 To analyse a complex chemical engineering or bioindustries 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 chemical engineering or bioindustries 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 applied chemistry and bioindustries.

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.

The graduate must be able to manage a project alone and in a team, not only the 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

Year 1 :

core subjects programme :

1. Foundation special subject: 10 credits
2. Information Analysis and Management special subject: 15 credits
3. Brewing special subject : 11 credits

professional focus programme :

1. Foundation special subject : 30 credits
2. Information Analysis and Management special subject: 30 credits
3. Brewing special subject: 19 credits

choice of one option course from six available :

1. Foundation special subject: 20 credits
2. Information Analysis and Management special subject: 15 credits
3. Brewing special subject: 30 credits

Year 2 :

core subjects programme :

1. Foundation special subject: 50 credits
2. Information Analysis and Management special subject: 45 credits
3. Brewing special subject: 49 credits (dissertation + 19 credits for courses at the University of Lorraine)

professional focus programme :

1. Foundation special subject : 0 credits
2. Information Analysis and Management special subject: 0 credits
3. Brewing special subject: 11 credits (taken at the University of Lorraine)

choice of one option course from six available :

1. Foundation special subject : 10 credits
2. Information Analysis and Management special subject: 15 credits
3. Brewing special subject: 0 credits

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 all the courses available at UCL or even at 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, Psychology). It is designed to provide students, as potential creators, with the tools for analysis and understanding which will help them to 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/fr/etudier/ineo>
- on how the Master in Bioengineering programmes work, please contact the Faculty Office.

BIRC2M Programme

Detailed programme by subject

CORE COURSES

- 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...)

Students taking the option "Information Analysis and Management in Biological Engineering" will enrol at the specific commun courses called "tronc commun" of that option. Students taking the option "Sustainability bioengineering" will enrol at the specific commun courses called "tronc commun" of that option.

Year

1 2

● LBIRC2200

				Year	
				1	2
⌘ LGBIO2030A	Biomaterials	Sophie Demoustier Christine Dupont	[q1] [30h+10h] [3 Credits]  > French-friendly	x	
⌘ WSBIM2122	Omics data analysis	Laurent Gatto	[q1] [30h+10h] [3 Credits] 	x	


⌘ Courses to be chosen for 5 credits minimum (suggestion for option 3C)

⌘ LBBMC2101A	Structural and functional biochemistry	x
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				Year	
				1	2
⌘ LINGE1322	Computer science: Analysis and Design of Information Systems	Jean Vanderdonckt	📄 [q2] [30h+15h] [5 Credits] 🌐	x	
⌘ LINMA2472	Algorithms in data science				

Year

1 2

<p>⌘ LGBIO2060</p>	<p>Modelling of biological systems</p>	<p>Hari Teja Kalidindi (compensates Philippe Lefèvre) Laurent Opsomer (compensates Philippe Lefèvre)</p>	<p>[q1] [30h+30h] [5 Credits]  > <i>French-friendly</i></p>	<p>x</p>
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OPTIONS

From 23 to 25 credit(s)


> OS anqueab > [Option 1C: Food & quality](#) [en-prog-2024-birc2m-lbirc201o]



OPTION 2C - BIOMOLECULES & CELLS [24.0]

- 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
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OPTION 3C - NANO(BIO)MATERIALS AND CATALYSIS [24.0]

- 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
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OPTION 10C - DATA SCIENCE [25.0]

- 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:

● LBRAI2219	Systems Biology Modelling	Valentin Couvreur (compensates Mathieu Javaux) Xavier Draye (coord.) Guillaume Lobet	(FR) [q2] [30h] [3 Credits] 🌐 > <i>English-friendly</i>	x
● LBRTI2101B	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert		

OPTION 12C - SUSTAINABILITY ENGINEERING [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...)

Year

1 2

Content:

● LBIR1362	Environmental Economics	Frédéric Gaspard	(FR) [q2] [30h+7.5h] [3 Credits]	🌐	x
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○ 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] 🌐
○ LBIR1340	Basis of quantum mechanics and spectroscopy	Eric Gaigneaux (coord.) Xavier Gonze	FR [q2] [22.5h+22.5h] [3 Credits] 🌐 > English-friendly
○ LBIR1341	Laboratories, seminars and integrated practice of analytical chemistry	Arnaud Detaille (compensates Christine Dupont) Christine Dupont (coord.) Thibaut Huybrechts (compensates Christine Dupont)	FR [q1] [30h+45h] [5 Credits] 🌐
○ LBIR1342	Analyse de composés organiques dans des matrices complexes	Sonia Collin	FR [q2] [30h+45h] [5 Credits] 🌐
○ LBIR1346	Surface and colloid chemistry	Christine Dupont Aurélien vander Straeten (compensates Christine Dupont)	FR [q2] [30h] [3 Credits] 🌐
○ 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] 🌐
○ LBIR1352P	General genetics <i>Le cours magistral étant commun, les partims M et P du cours LBIR1352 ne peuvent être cumulés.</i>	Philippe Baret Annika Gillis Jacques Mahillon	FR [q2] [30h+7.5h] [3 Credits] 🌐
○ LBIR1355	microbial metabolism and biomolecules synthesis	Laure-Alix Clerbaux Michel Ghislain (coord.)	FR [q2] [22.5h+15h] [3 Credits] 🌐
○ LBIR1360	Firm management and organisation	Pierre De Muelenaere	EN [q1] [30h+7.5h] [3 Credits] 🌐 > French-friendly

○ Specifics courses (10 credits)

○ LBIR1130	Introduction to Earth sciences	Pierre Delmelle (coord.) Sophie Opfergelt	FR [q2] [30h+30h] [6 Credits] 🌐
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Pierre Delmelle (coord.)

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 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.

BIRC2M - 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	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor in Bioengineering		Direct access	
Autre Bachelier du domaine des sciences et technologies		Access based on application	Le ou la futur-e étudiant-e prend contact avec le Conseiller aux études .
Others Bachelors of the French speaking Community of Belgium			
Bachelier en Sciences de l'ingénieur, orientation bioingénieur		Direct access	
		Access based on application	

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 animale - 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	Access	Remarks
"Licenciés"			
Masters			
		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

