UCLouvain

BIRC2M

2024 - 2025

Master [120] in Chemistry and Bioindustries

• 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.

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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 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.

Year 1 :
core subjects programme

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]

Year
1 2

Stage d'insertion socio-professionnelle (10 credits)

Stage d'insertion socio-professionnelle ou unités d'enseignement à choisir dans le programme alternatif

			Year 1	Year 2
LBIR2050	Challenges of sustainable development and transition	Valentin Couvreur Nathalie Delzenne Valérie Swaen (coord.)	FR [q2] [30h] [5 Credits]	

Year
1 2

			Year 1	Year 2
⊠ LINGE1322	Computer science: Analysis and Design of Information Systems	Jean Vanderdonckt	FR [q2] [30h+15h] [5 Credits] 2	

				Year 1	2
LGBIO2060	Modelling of biological systems	Hari Teja Kalidindi (compensates Philippe Lefèvre) Laurent Opsomer (compensates Philippe Lefèvre)	EN [q1] [30h+30h] [5 Credits] *> French-friendly*	x	

OPTIONS

From 23 to 25credit(s)

> Option 1C - Food & quality *[en-prog-2024-birc2m-lbirc201o]*
> Option 2C - Biomolecules & cells *[en-prog-2024-birc2m-lbirc202o]*
> Option 3C - Nano(bio)materials and catalysis *[en-prog-2024-birc2m-lbirc203o]*
> Option 4C - Environmental Technology *[en-prog-2024-birc2m-lbirc204o]*
> Option 10C - Data Science *[en-prog-2024-birc2m-lbirc210o]*
> Option 12C - Sustainability engineering *[en-prog-2024-birc2m-lbirc206o]*
> Busniness Creation (Option 13C) *[en-prog-2024-birc2m-lbirc213o]*
> Option 18C : Human health *[en-prog-2024-birc2m-lbirc205o]*

OPTION 1C - FOOD & QUALITY [24.0]

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
△ ⊕ Not offered in 2024-2025 or the following year
Activity with requisites
Open to incoming exchange students
Not open to incoming exchange students
[FR] Teacge students

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
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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...)

Content:

				Year 1	Year 2
LBRAI2219	Systems Biology Modelling	Valentin Couvreur (compensates Mathieu Javaux) Xavier Draye (coord.) Guillaume Lobet	[FR] [q2] [30h] [3 Credits] > *English-friendly*		x
LBRTI2101B	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert			

OPTION 18C : HUMAN HEALTH [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
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...) Not open to incoming exchange students

Year

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			

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.

BIRC2M - Information

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	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