UCLouvain

BIRC2M

2021 - 2022

Master [120] in Chemistry and Bioindustries

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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Learning outcomes

Master in Chemistry and Bio-industries 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 applied chemistry and bio-industries.

The future bioengineers acquire the knowledge and skills required to become:

• professionals able to tackle and diagnose problems in applied chemistry and bio-industries: production and quality, traceability, new processes, bioengineering with a high level of innovation, etc.;

• scientists able to understand complex processes on different scales, used to multidisciplinary approaches (chemistry, physico-chemistry, microbiology, etc.) and consultation with other specialists;

• innovators able to develop new methods in applied chemistry and biology: biotechnologes, nanotechnologies, catalysis, remediation, etc.

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 :

1. To explore a body of knowledge (knowledge, methods and techniques, models and processes) in natural and human sciences which serves as the foundation from which to operate with expertise in the fields of applied chemistry and bioindustries.

1.1 To build an advanced knowledge base in the field of applied chemistry and bioindustries and more specifically in the following disciplines [1]:

• Analytical chemistry
• Organic analysis
• Biochemical analysis
• Physical chemistry and physico-chemical calculations
• Chemistry of colloids and surfaces
• Reactor design

1.2 To build highly specialised scientific knowledge in one of the following bioengineering specialisations [2]:

• Science, technology and food quality
• Biomolecular and cell engineering
• Nanobiotechnologies, materials and catalysis
• Environmental technologies: water, soil, air
• Information analysis and management in biological engineering

1.3 To master procedural skills in conducting experiments: analytical chemistry techniques, organic and biochemical analysis techniques, technical analysis of complex matrices, chemometrics or biometrics, as well as specific techniques in relation to their choice of specialisation[3].

1.4 To apply their knowledge critically 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.

1.5 To apply multiple strands of knowledge to resolve a multidisciplinary problem in the field of applied chemistry or bioindustries in order to develop relevant and innovative solutions.

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[1] Refers to the choice of the Master (core subjects and professional focus). The knowledge of some of these disciplines will have been partially acquired in the Bachelor's degree (in the advanced minor).

[2] Refers to the option / module choice in the Master.

[3] Refers to mastering all the laboratory and field techniques used for the characterisation or monitoring of a system.

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 environmental sciences.

2.1 To build an advanced knowledge base (e.g.: concepts, laws, technologies) and tools (e.g. modelling, programming) in engineering sciences:

• Chemometrics and Biometrics
• Biochemical and microbial engineering
• Thermodynamics
• Process engineering: unit operations
• Reactor design

2.2 To build and master highly specialised knowledge and tools in one of the following bioengineering specialisations:

• Science, technology and food quality
• Biomolecular and cell engineering
• Nanobiotechnologies, materials and catalysis
• Environmental technologies: water, soil, air

• 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.

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 of Reference for Languages published by the Council of Europe), both verbally and in writing, adapting to their conversational partners and the context.

6.1 To understand and use scientific articles and advanced technical documents in French and English.

6.2 To communicate information, ideas, solutions and conclusions as well as the knowledge and underlying principles, in a clearly structured, substantiated, concise and comprehensive way (as appropriate) both verbally and in writing according to the standards of communication specific to the context and by adapting their presentation according to the level of expertise of the audience.

6.3 To develop logic diagrams to concisely pose complex global questions.

6.4 To communicate the state of knowledge in a specific field concisely and critically.

6.5 To communicate results and conclusions, and to support a message, in an appropriate manner using scientific tables, graphs and diagrams.

6.6 To communicate effectively and respectfully with various stakeholders, demonstrating listening skills, empathy and assertiveness.

6.7 To argue and convince: to understand the points of view of various stakeholders and present their arguments accordingly.

6.8 To master the IT and technological tools essential for professional communication.

6.9 To learn English to level C1 according to the European Framework.

7. To act critically and responsibly by taking account of sustainable development issues and operating with a humanistic outlook.

The majority of these skills are not developed exclusively through specific activities, but rather as a result of the multiple and diverse situations encountered throughout the course, the educational programmes and the way in which it is run, as well as through the university environment.

7.1 To demonstrate intellectual independence of thought, to examine knowledge and professional practices and trends critically.

7.2 To make decisions and act in society with respect for ethical values and in compliance with laws and conventions.

7.3 To make decisions and act responsibly by factoring in sustainable development values.

7.4 To make decisions and act with respect for humanistic values, cultural openness and solidarity, especially in North–South relations.

7.5 To assume professional responsibilities and act in a managerial capacity vis-à-vis their colleagues.

8. To demonstrate independence and be proactive in acquiring new knowledge and developing new skills in order to adapt to changing or uncertain situations and to grow, to build a professional project within a continuing development approach.

The majority of these skills are not developed exclusively through specific activities, but rather as a result of the multiple and diverse situations encountered throughout the course, the educational programmes and the way in which it is run, as well as through the university environment.

8.1 To manage their work independently: to set priorities, anticipate and plan all the activities in time, including in the face of changing, uncertain or urgent situations.

8.2 To manage stress and frustrations in urgent, changing, inconsistent or uncertain situations.

8.3 To question and know themself: to undergo self-assessment, by analysing their successes and failures, to identify strengths and weaknesses and their personal performance in relation to the context.

8.4 To grow personally and professionally: to build a professional project in line with their own values and aspirations, to manage their motivation and involvement in bringing the project to fruition, to persevere in complex situations.

8.5 To independently identify and absorb new knowledge and skills essential for learning to understand new contexts quickly.

8.6 To commit to the lifelong learning which will allow them to grow socially and professionally.

Programme structure

This programme comprises a series of activities totalling 120 credits spread over two years worth 60 credits each.

The special nature of certain option courses (international programme for the option course in brewing and shared programme for the option course in Information Analysis and Management in Biological Engineering between the three Masters in Bioengineering) requires different approaches for the core subjects programme and the professional focus.

The programme is described according to three special subjects:

1.foundation special subject (applies to option course 1C, 2C, 3C and 4C),

2. Information Analysis and Management in Biological Engineering special subject (applies to option course 10C)

3.Brewing special subject (applies to option 12C).

Certain foundation special subject option courses are organized jointly with one or two of the other Masters in Bioengineering programmes. This is the reason for the special numbering of these option courses. (For example, option course 1C is also in the programme for the Master in Agronomic Science where it is called option course 1A.)

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/cpme.html (https://uclouvain.be/cpme.html)
- on how the Master in Bioengineering programmes work, please contact the Faculty Office.

BIRC2M Programme

Detailed programme by subject

CORE COURSES

- O Mandatory
- ⊠ Optional
- △ Not offered in 2021-2022
- ⊘ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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 bioingineering" will enrol at the specific commun courses called "tronc commun" of that option.

⊠ Programme for students chosing one of these options 1C, 2C, 3C, 4C, 13C and 18C (66 credits)

				Year 1	Year 2
O LBIRC2200	Master thesis		FR [q1+q2] [] [27 Credits]		x
O LBIRC2210	Master thesis' accompanying seminar	Sonia Collin Stephan Declerck (coord.) Christine Dupont Eric Gaigneaux Patrick Gerin Michel Ghislain	EN [q1+q2] [30h] [3 Credits]		x
O LBIRC2101	Biochemical analysis	François Chaumont Pierre Morsomme (coord.)	FR [q1] [22.5h+30h] [4 Credits]	x	
O LBIRC2108	Biochemical and Microbial Engineering	Iwona Cybulska	EN [q2] [30h+22.5h] [5 Credits]	x	
O LBIRC2109	Process engineering : unit operations	Frédéric Debaste (compensates Damien Debecker)	FR [q2] [52.5h+15h] [5 Credits]	x	
O LBIRC2201	Industrial project in chemical and biochemical engineering	Patrick Gerin	FR [q1] [52.5h] [5 Credits]		x
O LMAPR2430	Industrial processes for the production of base chemicals	Juray De Wilde	EN [q1] [30h+22.5h] [5 Credits]		x

O Ethics (2 credits)
The students will opt firstly for the course LTECO2300. Two other choices are also available.

⊠ LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	FR [q1] [15h] [2 Credits]	x	x
⊠ LTECO2200	Societies-cultures-religions : Human Questions	Sébastien Dehorter (compensates Régis Burnet) Dominique Martens	FR [q1 or q2] [15h] [2 Credits]	x	x
⊠ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	FR [q1] [15h] [2 Credits]	x	x

O Stage d'insertion socio-professionnelle ou unités d'enseignement à choisir dans le programme alternatif pour 10 crédits (10 credits)

⊠ LBIR2004	Masters Internship	Charles Bielders Damien Debecker (coord.) Xavier Draye Anne-Laure Jacquemart	FR [q2] [20h] [10 Credits]		x

⊠ Programme alternatif au stage d'insertion socio-professionnelle (10 credits)
6 crédits minimum à choisir parmi les unités d'enseignement suivantes et 4 crédits d'unités d'enseignement au choix libre

⊠ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits]		x
⊠ LEPL1804	Sustainable development and transition	David Bol Hervé Jeanmart Patricia Luis Alconero Xavier Marichal Jean-Pierre Raskin	FR [q1] [22.5h+15h] [3 Credits]		x

				Year 1	2
⊠ LBIR2050	Enjeux du développement durable et de la transition	Philippe Baret (coord.) Nathalie Delzenne Valérie Swaen	FR [q2] [30h+30h] [5 Credits]		x
⊠ LEPL2211	Business issues introduction	Benoît Gailly	EN [q2] [30h] [3 Credits]		x
⊠ LMAPR2001A	Project "chemical & materials engineering for a sustainable future"	Juray De Wilde Pascal Jacques Alain Jonas Patricia Luis Alconero	EN [q2] [22.5h+30h] [5 Credits]		x
⊠ LMECA2711	Quality management and control.	Nicolas Bronchart	EN [q2] [30h+30h] [5 Credits]		x

⊠ Programme for students taking Option 10C - Information Analysis and Management in Biological Engineering (65 credits)

O LBIRC2200	Master thesis		FR [q1+q2] [] [27 Credits]		x
O LBIRC2210	Master thesis' accompanying seminar	Sonia Collin Stephan Declerck (coord.) Christine Dupont Eric Gaigneaux Patrick Gerin Michel Ghislain	EN [q1+q2] [30h] [3 Credits]		x
O LBIRC2101	Biochemical analysis	François Chaumont Pierre Morsomme (coord.)	FR [q1] [22.5h+30h] [4 Credits]	x	
O LBIRC2108	Biochemical and Microbial Engineering	Iwona Cybulska	EN [q2] [30h+22.5h] [5 Credits]	x	
O LBIRC2109	Process engineering : unit operations	Frédéric Debaste (compensates Damien Debecker)	FR [q2] [52.5h+15h] [5 Credits]	x	
O LBIRC2201	Industrial project in chemical and biochemical engineering	Patrick Gerin	FR [q1] [52.5h] [5 Credits]		x
O LBRMC2201	Bioinformatics : DNA and protein sequences	Michel Ghislain	FR [q1] [30h+15h] [4 Credits]	x	

O Ethics (2 credits)

The students will opt firstly for the course LTECO2300. Two other choices are also available.

⊠ LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	FR [q1] [15h] [2 Credits]	x	x
⊠ LTECO2200	Societies-cultures-religions : Human Questions	Sébastien Dehorter (compensates Régis Burnet) Dominique Martens	FR [q1 or q2] [15h] [2 Credits]	x	x
⊠ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	FR [q1] [15h] [2 Credits]	x	x

O Stage d'insertion socio-professionnelle ou unités d'enseignement à choisir dans le programme alternatif pour 10 crédits (10 credits)

⊠ LBIR2004	Masters Internship	Charles Bielders Damien Debecker (coord.) Xavier Draye Anne-Laure Jacquemart	FR [q2] [20h] [10 Credits]		x

⊠ Programme alternatif au stage d'insertion socio-professionnelle (10 credits)

6 crédits minimum à choisir parmi les unités d'enseignement suivantes et 4 crédits d'unités d'enseignement au choix libre

⊠ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits]		x
⊠ LEPL1804	Sustainable development and transition	David Bol Hervé Jeanmart Patricia Luis Alconero Xavier Marichal Jean-Pierre Raskin	FR [q1] [22.5h+15h] [3 Credits]		x
⊠ LBIR2050	Enjeux du développement durable et de la transition	Philippe Baret (coord.) Nathalie Delzenne Valérie Swaen	FR [q2] [30h+30h] [5 Credits]		x
⊠ LEPL2211	Business issues introduction	Benoît Gailly	EN [q2] [30h] [3 Credits]		x

				Year 1	2
⊠ LMAPR2001A	Project "chemical & materials engineering for a sustainable future"	Juray De Wilde Pascal Jacques Alain Jonas Patricia Luis Alconero	EN [q2] [22.5h+30h] [5 Credits]		x
⊠ LMECA2711	Quality management and control.	Nicolas Bronchart	EN [q2] [30h+30h] [5 Credits]		x

⊠ Programme du Tronc commun pour l'option 12C (67 credits)

O LBIRC2200	Master thesis		FR [q1+q2] [] [27 Credits]		x
O LBIRC2210	Master thesis' accompanying seminar	Sonia Collin Stephan Declerck (coord.) Christine Dupont Eric Gaigneaux Patrick Gerin Michel Ghislain	EN [q1+q2] [30h] [3 Credits]		x
O LBIRC2101	Biochemical analysis	François Chaumont Pierre Morsomme (coord.)	FR [q1] [22.5h+30h] [4 Credits]	x	
O LBIRC2108	Biochemical and Microbial Engineering	Iwona Cybulska	EN [q2] [30h+22.5h] [5 Credits]	x	
O LBIRC2109	Process engineering : unit operations	Frédéric Debaste (compensates Damien Debecker)	FR [q2] [52.5h+15h] [5 Credits]	x	
O LBIRE2234	Data Science and Sustainability Engineering projects	Patrick Bogaert (coord.) Pierre Defourny Emmanuel Hanert	FR [q1] [50h+10h] [6 Credits]		x
O LMAPR2430	Industrial processes for the production of base chemicals	Juray De Wilde	EN [q1] [30h+22.5h] [5 Credits]		x

O Ethics (2 credits)

The students will opt firstly for the course LTECO2300. Two other choices are also available.

⊠ LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	FR [q1] [15h] [2 Credits]	x	x
⊠ LTECO2200	Societies-cultures-religions : Human Questions	Sébastien Dehorter (compensates Régis Burnet) Dominique Martens	FR [q1 or q2] [15h] [2 Credits]	x	x
⊠ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	FR [q1] [15h] [2 Credits]	x	x

O Stage d'insertion socio-professionnelle ou unités d'enseignement à choisir dans le programme alternatif pour 10 crédits (10 credits)

⊠ LBIR2004	Masters Internship	Charles Bielders Damien Debecker (coord.) Xavier Draye Anne-Laure Jacquemart	FR [q2] [20h] [10 Credits]		x

⊠ Programme alternatif au stage d'insertion socio-professionnelle (10 credits)

6 crédits minimum à choisir parmi les unités d'enseignement suivantes et 4 crédits d'unités d'enseignement au choix libre

⊠ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits]		x
⊠ LEPL1804	Sustainable development and transition	David Bol Hervé Jeanmart Patricia Luis Alconero Xavier Marichal Jean-Pierre Raskin	FR [q1] [22.5h+15h] [3 Credits]		x
⊠ LBIR2050	Enjeux du développement durable et de la transition	Philippe Baret (coord.) Nathalie Delzenne Valérie Swaen	FR [q2] [30h+30h] [5 Credits]		x
⊠ LEPL2211	Business issues introduction	Benoît Gailly	EN [q2] [30h] [3 Credits]		x
⊠ LMAPR2001A	Project "chemical & materials engineering for a sustainable future"	Juray De Wilde Pascal Jacques Alain Jonas Patricia Luis Alconero	EN [q2] [22.5h+30h] [5 Credits]		x
⊠ LMECA2711	Quality management and control.	Nicolas Bronchart	EN [q2] [30h+30h] [5 Credits]		x

PROFESSIONAL FOCUS [30.0]

- O Mandatory
- ⊠ Optional
- △ Not offered in 2021-2022
- ⊘ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

O Content:

				Year 1	Year 2
O LBIRC2102	Spectroscopic methods of analysis - Organic analysis II	Marie-France Herent Raphaël Robiette (coord.)	FR [q1] [45h+7.5h] [5 Credits]	x	
O LBIRC2105	Physical chemistry II	Frédéric Debaste (coord.) Philippe Supiot (compensates Damien Debecker)	FR [q1] [45h+15h] [5 Credits]	x	
O LBIRC2107	Bibliographical team project: chemistry and bio-industries	Stephan Declerck Eric Gaigneaux Patrick Gerin (coord.) Michel Ghislain	FR [q1+q2] [45h] [5 Credits]	x	
O LBIRC2130	Integrated project of chemical analysis and chemometrics	Vincent Baeten Christine Dupont (coord.) Réjane Rousseau (compensates Bernadette Govaerts) Aurélien vander Straeten	FR [q1] [52.5h+67.5h] [10 Credits]	x	

O Courses to be chosen for 5 credits

⊠ Suggestions d'unités d'enseignement au choix libre pour 6 crédits minimum pour l'option 1C

				Year 1	Year 2
⊠ LBRAL2202	Technological quality control	Vincent Baeten	FR [q1] [30h] [2 Credits]	x	x
⊠ LBRAS2302	Chimie du houblon et technologies associées	Sonia Collin	FR [q1] [30h+30h] [5 Credits]	x	x
⊠ LBRAS2304	Qualités organoleptiques et microbiologiques de la bière et du vin	Sonia Collin (coord.) Marc Maudoux	FR [q1] [15h+30h] [4 Credits]	x	x
⊠ LBRTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	EN [q1] [30h+7.5h] [4 Credits]	x	x

⊠ Courses to be chosen for 5 credits minimum (suggestion for option 2C)

				Year 1	Year 2
⊠ LBBMC2106	Molecular genetics and microbial genomics	Bernard Hallet Pascal Hols	EN [q2] [36h+18h] [5 Credits]	x	
⊠ LBBMC2108	Molecular genetics and plant genomics	Henri Batoko François Chaumont Xavier Draye	EN [q2] [36h+18h] [5 Credits]	x	
⊠ LBBMC2110	Animal and human molecular genetics and genomics	Françoise Gofflot Nisha Limaye (compensates Bernard Knoops) René Rezsohazy	EN [q2] [36h+18h] [5 Credits]	x	
⊠ LBBMC2203	Research Training Seminar	Henri Batoko Françoise Gofflot Charles Hachez (compensates Bernard Knoops) Bernard Hallet Pierre Morsomme Patrice Soumillion (coord.)	EN [q1+q2] [40h+40h] [5 Credits]	x	
⊠ LBRNA2202	Nano-biotechnologies	Yves Dufrêne	FR [q2] [30h] [3 Credits]	x	

				Year 1	2
⊠ LCHM2244	Medicinal chemistry	Raphaël Frédérick Didier Lambert	EN [q2] [22.5h+7.5h] [3 Credits]	x	
⊠ LGBIO2030	Biomaterials	Sophie Demoustier Christine Dupont	EN [q1] [30h+30h] [5 Credits]	x	
⊠ LGBIO2030A	Biomaterials	Sophie Demoustier Christine Dupont	FR [q1] [30h+10h] [3 Credits]	x	
⊠ WSBIM2122	Omics data analysis	Laurent Gatto	EN [q1] [30h+10h] [3 Credits]	x	

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

⊠ LBBMC2101A	Structural and functional biochemistry	Pierre Morsomme Patrice Soumillion	FR [q1] [20h] [2 Credits]	x	
⊠ LBIR1381	Principles of Biorefining	David Cannella Damien Debecker (coord.)	EN [q1] [30h] [3 Credits]	x	
⊠ LBRMC2201	Bioinformatics : DNA and protein sequences	Michel Ghislain	FR [q1] [30h+15h] [4 Credits]	x	
⊠ LCHM2231	Chemistry and functionality of inorganic materials	Yann Garcia	EN [q2] [45h+15h] [6 Credits]	x	
⊠ LCHM2261A	Polymer Chemistry and Physical Chemistry (part 1 : Polymer Chemistry)	Charles-André Fustin Jean-François Gohy	EN [q1] [22.5h+7.5h] [3 Credits]	x	
⊠ LMAPR2013	Science and engineering of metals and ceramics	Pascal Jacques	EN [q1] [30h+30h] [5 Credits]	x	
⊠ LMAPR2016	Project in Polymer Science	Charles-André Fustin Alain Jonas	EN [q2] [0h+45h] [5 Credits]	x	
⊠ LMAPR2018	Rheology	Evelyne Van Ruymbeke	EN [q2] [30h+30h] [5 Credits]	x	
⊠ LMAPR2019	Polymer Science and Engineering	Sophie Demoustier Alain Jonas (coord.) Evelyne Van Ruymbeke	EN [q1] [45h+15h] [5 Credits]	x	

⊠ Courses to be chosen for 5 credits minimum (suggestion for option 4C)

⊠ LBIR1381	Principles of Biorefining	David Cannella Damien Debecker (coord.)	EN [q1] [30h] [3 Credits]	x	
⊠ LBRNA2201	Principles in heterogeneous catalysis	Eric Gaigneaux	FR [q1] [52.5h] [5 Credits]	x	
⊠ LENVI2007	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin (coord.) Hervé Jeanmart	EN [q1] [45h+15h] [5 Credits]	x	
⊠ LENVI2007A	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin Hervé Jeanmart	EN [q1] [30h] [3 Credits]	x	
⊠ LEPL1804	Sustainable development and transition	David Bol Hervé Jeanmart Patricia Luis Alconero Xavier Marichal Jean-Pierre Raskin	FR [q1] [22.5h+15h] [3 Credits]	x	
⊠ LMAPR2001A	Project "chemical & materials engineering for a sustainable future"	Juray De Wilde Pascal Jacques Alain Jonas Patricia Luis Alconero	EN [q2] [22.5h+30h] [5 Credits]	x	
⊠ LMECA2325	Biomass conversion	Patrick Gerin Hervé Jeanmart	EN [q1] [30h+30h] [5 Credits]	x	

⊠ Courses to be chosen for 5 credits minimum (suggestion for option 10C)

⊠ LBRAT2102	Spatial modelling of land dynamics	Pierre Defourny	FR [q2] [15h+15h] [3 Credits]	x	
⊠ LDATS2350	Data Mining	Robin Van Oirbeek	EN [q2] [15h+15h] [5 Credits]	x	
⊠ LECGE1333	Game theory and information in economics		EN [q2] [30h+10h] [5 Credits] △	x	
⊠ LGEO2130	Fundamentals of geographic and environmental modelling	Eric Deleersnijder Sophie Vanwambeke	EN [q2] [30h+30h] [5 Credits]	x	
⊠ LINGE1322	Computer science: Analysis and Design of Information Systems	Jean Vanderdonckt	FR [q2] [30h+15h] [5 Credits]	x	

				Year 1	2
⊠ LINMA2472	Algorithms in data science	Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel)	EN [q1] [30h+22.5h] [5 Credits]	x	
⊠ LPHYS2267	Paleoclimate dynamics and modelling	Qiuzhen Yin	EN [q2] [22.5h+7.5h] [5 Credits]	x	
⊠ LINFO2275	Data mining & decision making	Marco Saerens	EN [q2] [30h+15h] [5 Credits]	x	
⊠ LINFO1122	Program design methods	Charles Pecheur	FR [q1] [30h+30h] [5 Credits]	x	

⊠ Courses to be chosen for 5 credits minimum (suggestion for option 12C)

⊠ LBIR1381	Principles of Biorefining	David Cannella Damien Debecker (coord.)	EN [q1] [30h] [3 Credits]	x	
⊠ LMAPR2001A	Project "chemical & materials engineering for a sustainable future"	Juray De Wilde Pascal Jacques Alain Jonas Patricia Luis Alconero	EN [q2] [22.5h+30h] [5 Credits]	x	
⊠ LENVI2007	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin (coord.) Hervé Jeanmart	EN [q1] [45h+15h] [5 Credits]	x	
⊠ LENVI2007A	Renewable energy sources	Emmanuel De Jaeger Patrick Gerin Hervé Jeanmart	EN [q1] [30h] [3 Credits]	x	
⊠ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits]	x	
⊠ LMECA2325	Biomass conversion	Patrick Gerin Hervé Jeanmart	EN [q1] [30h+30h] [5 Credits]	x	

⊠ Courses to be chosen for 5 credits minimum (suggestion for option 18C)

⊠ LBBMC2104	Animal physiological biochemistry	Pierre Morsomme Melissa Page	EN [q2] [36h+18h] [5 Credits]	x	
⊠ LBBMC2110	Animal and human molecular genetics and genomics	Françoise Gofflot Nisha Limaye (compensates Bernard Knoops) René Rezsohazy	EN [q2] [36h+18h] [5 Credits]	x	
⊠ LBBMC2111	Animal and human cellular physiology	Patrick Dumont Bernard Knoops	EN [q2] [36h+18h] [5 Credits]	x	
⊠ LBRMC2202	Cell culture technology	David Alsteens Charles Hachez (coord.) Pascal Hols	FR [q1] [30h] [3 Credits]	x	
⊠ LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	EN [q1] [30h+15h] [5 Credits]	x	
⊠ LGBIO1112	Introduction to biomedical engineering	Philippe Lefèvre	FR [q2] [45h] [5 Credits]	x	
⊠ LGBIO1113	Systems Anatomy and Physiology	Catherine Behets Wydemans Olivier Cornu Greet Kerckhofs	FR [q2] [30h+15h] [5 Credits]	x	
⊠ LGBIO1114	Artificial organs and rehabilitation	Luc-Marie Jacquet Philippe Lefèvre Renaud Ronsse	FR [q2] [30h+30h] [5 Credits] △	x	
⊠ LGBIO2020	Bioinstrumentation	André Mouraux Michel Verleysen	EN [q1] [30h+30h] [5 Credits]	x	
⊠ LGBIO2060	Modelling of biological systems	Philippe Lefèvre	EN [q1] [30h+30h] [5 Credits]	x	

OPTIONS

From 23 to 25credit(s)

> Option 1C - Food & quality *[en-prog-2021-birc2m-lbirc201o]*
> Option 2C - Biomolecules & cells *[en-prog-2021-birc2m-lbirc202o]*
> Option 3C - Nano(bio)materials and catalysis *[en-prog-2021-birc2m-lbirc203o]*
> Option 4C - Environmental Technology *[en-prog-2021-birc2m-lbirc204o]*
> Option 10C - Data Science *[en-prog-2021-birc2m-lbirc210o]*
> Option 12C - Sustainability engineering *[en-prog-2021-birc2m-lbirc206o]*
> Busniness Creation (Option 13C) *[en-prog-2021-birc2m-lbirc213o]*
> Option 18C : Human health *[en-prog-2021-birc2m-lbirc205o]*

OPTION 1C - FOOD & QUALITY [24.0]

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [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
LBRAL2102	Physiological and nutritional biochemistry	Cathy Debier Yvan Larondelle (coord.)	EN [q1] [37.5h+0h] [4 Credits]		x
LBRAL2103	Food chemistry	Sonia Collin	FR [q1] [30h+30h] [5 Credits]	x	
LBRAL2104	Food microbiology	Jacques Mahillon	EN [q2] [30h+22.5h] [4 Credits]	x	
LBRAL2201	Food technology	Iwona Cybulska (coord.) Axel Kather	EN [q2] [52.5h] [5 Credits]	x	

Suggestions d'unités d'enseignement au choix libre pour 6 crédits minimum pour l'option 1C

LBRAL2202	Technological quality control	Vincent Baeten	FR [q1] [30h] [2 Credits]	x	x
LBRAS2302	Chimie du houblon et technologies associées	Sonia Collin	FR [q1] [30h+30h] [5 Credits]	x	x
LBRAS2304	Qualités organoleptiques et microbiologiques de la bière et du vin	Sonia Collin (coord.) Marc Maudoux	FR [q1] [15h+30h] [4 Credits]	x	x
LBRTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	EN [q1] [30h+7.5h] [4 Credits]	x	x

OPTION 2C - BIOMOLECULES & CELLS [24.0]

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [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	
LBRMC2101	Genetic engineering	François Chaumont (coord.) Charles Hachez	FR [q1] [37.5h+15h] [5 Credits]	x	
LBRMC2201	Bioinformatics : DNA and protein sequences	Michel Ghislain	FR [q1] [30h+15h] [4 Credits]		x

Courses to be chosen for 12 credits minimum

LBBMC2101	Structural and functional biochemistry	Pierre Morsomme Patrice Soumillion	EN [q1] [36h+6h] [4 Credits]	x	x
LBBMC2104	Animal physiological biochemistry	Pierre Morsomme Melissa Page	EN [q2] [36h+18h] [5 Credits]	x	x
LBBMC2105	Protein engineering and directed evolution	Pierre Morsomme Patrice Soumillion	EN [q2] [36h+18h] [5 Credits]	x	x
LBRTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	EN [q1] [30h+7.5h] [4 Credits]	x	x

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

- O Mandatory
- ⊠ Optional
- △ Not offered in 2021-2022
- ⊘ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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 LBRNA2102	Material surface characterisation	David Alsteens (coord.) Pierre Eloy (compensates Christine Dupont) Eric Gaigneaux	FR [q2] [45h] [4 Credits]	x	
O LBRNA2103	Chemistry of solids	Eric Gaigneaux	FR [q1] [42h] [4 Credits]	x	
O LBRNA2201	Principles in heterogeneous catalysis	Eric Gaigneaux	FR [q1] [52.5h] [5 Credits]		x
O LBRNA2202	Nano-biotechnologies	Yves Dufrêne	FR [q2] [30h] [3 Credits]	x	
O LCHM1361	Introduction to polymer chemistry	Jean-François Gohy	FR [q2] [22.5h] [3 Credits]	x	
O LGBIO2030	Biomaterials	Sophie Demoustier Christine Dupont	EN [q1] [30h+30h] [5 Credits]		x

OPTION 4C - ENVIRONMENTAL TECHNOLOGY [24.0]

- O Mandatory
- ⊠ Optional
- △ Not offered in 2021-2022
- ⊘ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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 LBRTE2101	Applied hydro-biogeochemistry - Applied hydro-biogeochemistry	Pierre Delmelle Patrick Gerin (coord.)	EN [q1] [30h+15h] [4 Credits]		x
O LBRTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	EN [q1] [30h+7.5h] [4 Credits]		x
O LMAPR2647	Sustainable treatment of industrial and domestic waste: Fundamentals	Olivier Françoisse Patricia Luis Alconero Olivier Noiset Benoît Stenuit	EN [q1] [30h+15h] [5 Credits]	x	

Unités d'enseignement obligatoires pour l'étudiant·e qui ne les aurait pas suivi en BAC (7 credits)

O LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q2] [0h+30h] [2 Credits]	x	
O LBIR1336	Sciences du sol et excursions intégrées	Yannick Agnan (coord.) Richard Lambert Caroline Vincke	FR [q2] [30h+37.5h] [5 Credits]	x	

Year
1 2

Courses to be chosen for 11 credits minimum

L'étudiant·e inscrit aux unités d'enseignement LBIR1325B (2 crédits) et LBIR1336 (5crédits) choisit 4 crédits minimum parmi les unités d'enseignement suivantes :

⛒ LBRES2102	Engineering of the water and the pollutants in grounds and groundwaters	Marnik Vanclooster	FR [q2] [22.5h+22.5h] [4 Credits]		x
⛒ LBRES2103	Soil physics applied to Agronomy and Environment	Charles Bielders (coord.) Mathieu Javaux	FR [q1] [30h+15h] [4 Credits]		x
⛒ LGCIV2073	Hydrogeology and Geoenvironment	Pierre-Yves Bolly	EN [q1] [30h] [3 Credits]		x
⛒ LMAPR2001	Project "chemical & materials engineering for a sustainable future"	Juray De Wilde Pascal Jacques Alain Jonas Patricia Luis Alconero	EN [q2] [45h+60h] [10 Credits]		x
⛒ LMAPR2001A	Project "chemical & materials engineering for a sustainable future"	Juray De Wilde Pascal Jacques Alain Jonas Patricia Luis Alconero	EN [q2] [22.5h+30h] [5 Credits]		x

OPTION 10C - DATA SCIENCE [25.0]

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [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]		x
LBRTI2101B	Data Science in bioscience engineering	Patrick Bogaert Emmanuel Hanert	FR [q1] [30h] [2 Credits]	x	
LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	EN [q1] [30h+15h] [5 Credits]	x	
LSTAT2320	Design of experiment.	Patrick Bogaert Bernadette Govaerts	FR [q2] [22.5h+7.5h] [5 Credits]	x	

Courses to be chosen for 10 credits minimum

LCOMU2600	Scientific popularisation	Jerry Jacques	FR [q1] [30h] [5 Credits]		x
LELEC2870	Machine learning : regression, deep networks and dimensionality reduction	John Lee Michel Verleysen	EN [q1] [30h+30h] [5 Credits]		x
LELEC2920	Communication networks	Sébastien Lugan Benoît Macq	EN [q1] [30h+15h] [5 Credits]		x
LINFO1104	Programming language concepts	Peter Van Roy	FR [q2] [30h+30h] [5 Credits]		x
LPHYS2162	Introduction to the physics of the climate system and its modelling	Hugues Goosse Jean-Pascal van Ypersele de Strihou	EN [q1] [22.5h+22.5h] [5 Credits]		x
LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	FR [q1] [15h+15h] [4 Credits]		x
LSTAT2120	Linear models	Christian Hafner	EN [q1] [30h+7.5h] [5 Credits]		x

OPTION 12C - SUSTAINABILITY ENGINEERING [23.0]

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [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
LBIR1362	Environmental Economics	Frédéric Gaspart	FR [q2] [30h+7.5h] [3 Credits]	x	
LBIRE2131	Evaluation d'impact environnemental: diagnostic et indicateurs	Charles Bielders (coord.) Pierre Defourny	FR [q2] [22.5h] [3 Credits]	x	
LBIRE2205B	Decision tools and project management - Project Management	Frédéric Gaspart	EN [q1] [15h] [1 Credits]		x
LBIRE2235	Innovative system management for sustainability		EN [q1] [22.5h+7.5h] [3 Credits]		x
LBRAI2213	Impact evaluation in agriculture	Goedele Van den Broeck	EN [q2] [30h+8h] [4 Credits]	x	
LBRES2101	Smart technologies for environmental engineering	François Jonard Sébastien Lambot (coord.)	FR [q1] [32.5h+20h] [4 Credits]	x	
LBRTI2102	Process-based modelling in bioscience engineering	Emmanuel Hanert	EN [q1] [30h+15h] [5 Credits]		x

BUSNINESS CREATION (OPTION 13C) [24.0]

L'objectif du module CPME est de fournir aux étudiants, créateurs potentiels d'entreprise, les outils d'analyse et de réflexion qui les aideront à comprendre les processus entrepreneuriaux afin de créer ou reprendre une entreprise et de développer des projets de cette nature au sein d'organisations existantes. En outre, cette formation permet aux étudiants de se familiariser avec d'autres disciplines et d'apprendre à travailler en équipes multidisciplinaires. Les étudiants qui souhaitent suivre le module interdisciplinaire en Création d'entreprise (CPME) doivent s'y inscrire en même temps qu'à l'option dès la première année de master. En effet, le programme de ce module devra s'articuler avec celui de l'option sur les deux années de master. Attention: l'inscription à ce module fait l'objet d'une sélection. Ce n'est qu'après avoir reçu l'accord de participation à ce programme que les étudiants pourront prendre contact avec le vice-doyen pour aménager leur programme de cours personnel et répartir les cours CPME et les cours d'option sur les deux années du master.

- O Mandatory
- ⊠ Optional
- △ Not offered in 2021-2022
- ⊘ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Access to this option is limited via a selection process at the beginning of the master programme (http://www.uclouvain.be/cpme ou cpme@uclouvain.be). Students enrolled for this option do not take the course LBIRC2210 (master thesis' accompanying seminar) and are required to take another course for 3 credits.

Content:

				Year 1	Year 2
O LCPME2001	Théorie de l'entrepreneuriat	Frank Janssen	FR [q1] [30h+20h] [5 Credits]	x	
O LCPME2002	Aspects juridiques, économiques et managériaux de la création d'entreprise	Yves De Cordt Marine Falize	FR [q1] [30h+15h] [5 Credits]	x	
O LCPME2003	Plan d'affaires et étapes-clefs de la création d'entreprise	Frank Janssen	FR [q2] [30h+15h] [5 Credits]	x	x
O LCPME2004	Séminaire d'approfondissement en entrepreneuriat	Frank Janssen	FR [q2] [30h+15h] [5 Credits]	x	

Courses to be chosen for 4 credits minimum among one of the others options of this master (4 credits)

OPTION 18C : HUMAN HEALTH [24.0]

- O Mandatory
- ⊠ Optional
- △ Not offered in 2021-2022
- ⊘ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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 LBIO1237B	Immunology : basis and applications in biology - Lectures	Jean-Paul Dehoux	FR [q1] [25h] [3 Credits]		x
O LBRAL2102	Physiological and nutritional biochemistry	Cathy Debier Yvan Larondelle (coord.)	EN [q1] [37.5h+0h] [4 Credits]		x
O LBRTE2201	Human and environmental toxicology	Cathy Debier (coord.) Philippe Hantson	EN [q1] [30h+7.5h] [4 Credits]	x	
O LCHM2244	Medicinal chemistry	Raphaël Frédérick Didier Lambert	EN [q2] [22.5h+7.5h] [3 Credits]	x	
O LGBIO2030	Biomaterials	Sophie Demoustier Christine Dupont	EN [q1] [30h+30h] [5 Credits]		x
O LSTAT2330	Statistics in clinical trials.	Catherine Legrand Annie Robert	FR [q2] [22.5h+7.5h] [5 Credits]	x	

Supplementary classes

To access this Master, students must have a good command of certain subjects. If this is not the case, they must add supplementary classes at the beginning of their Master's programme in order to obtain the prerequisites for these studies.

- O Mandatory
- ⊠ Optional
- △ Not offered in 2021-2022
- ⊘ Not offered in 2021-2022 but offered the following year
- ⊕ Offered in 2021-2022 but not the following year
- △ ⊕ Not offered in 2021-2022 or the following year
- Activity with requisites
- [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 chimie et bioindustries (45 credits)

O LANGL2480	English Communication Skills for Bioengineers	Ahmed Adrioueche Maïté Dupont Dominique François Lucille Meyers Hila Peer (compensates Marie Van Reet) Charlotte Peters Adrien Pham (coord.) Anne-Julie Toubeau	EN [q2] [30h] [2 Credits]
O LBIR1315	Probability and statistics II	Patrick Bogaert	FR [q1] [22.5h+22.5h] [3 Credits]
O LBIR1325A	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Mathieu Javaux Marnik Vanclooster	FR [q1] [37.5h+22.5h] [5 Credits]

LBIR1340	Fondements de mécanique quantique et de spectroscopie	Eric Gaigneaux (coord.) Xavier Gonze	FR [q2] [22.5h+22.5h] [3 Credits]
LBIR1341	Laboratories, seminars and integrated practice of analytical chemistry	Christine Dupont (coord.) Thibaut Huybrechts (compensates Christine Dupont)	FR [q1] [30h+45h] [5 Credits]
LBIR1342	Analyse de composés organiques dans des matrices complexes	Cécile Chenot Sonia Collin	FR [q2] [30h+45h] [5 Credits]
LBIR1346	Surface and colloid chemistry	Christine Dupont (coord.) Aurélien vander Straeten (compensates Christine Dupont)	FR [q2] [30h] [3 Credits]
LBIR1349	Chimie analytique I	Christine Dupont (coord.) Yann Garcia (coord.)	FR [q1] [30h+15h] [3 Credits]
LBIR1350	General Microbiology	Jacques Mahillon	FR [q2] [37.5h+15h] [4 Credits]
LBIR1351	Introduction to systems analysis	Philippe Baret	FR [q1] [10h+20h] [3 Credits]
LBIR1352A	Génétique générale - partim A	Philippe Baret	FR [q2] [30h+7.5h] [3 Credits]
LBIR1355	Métabolisme microbien et synthèse de biomolécules	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]

Specifics courses (10 credits)

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

Activités au choix libre (4 credits)
The students have a free choice of courses within one of the bachelor programs in Sciences and Technolgy Sector : https://uclouvain.be/fr/etudier/les-facultes.html

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

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.

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

SUMMARY

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	
Bachelors of the Dutch speaking Community of Belgium			
		Direct access	Les conditions d'accès seront définies au cas par cas en fonction des prérequis nécessaires.
		Access based on application	
Foreign Bachelors			
		Access based on application	Les conditions d'accès seront définies au cas par cas en fonction des prérequis nécessaires.
		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	Les enseignements supplémentaires éventuels peuvent être consultés dans le module complémentaire.	Type court

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 30 et 45
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

Admission on the basis of a submitted dossier may be granted either directly or on the condition of completing additional coursework 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) :

- 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 subjects available : chemistry (BIRC), agronomy (BIRA), environment (BIRE).

2nd cycle (Master) :

â€¢ choice of three Masters in Bioengineering with a professional focus, together with twelve option courses 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 twelve option courses, which partly overlap at the level of the three 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 chemistry and bioindustry**. 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 (management, design of new processes etc) combine different kinds of tools (field observation, laboratory analysis, databases, chimiometrics etc) and various scales in space (from the molecular to plots of land and farms, from an agricultural region to a sub-continent and beyond) 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 chemistry, applied biology and bioindustry;
- 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 applied chemistry and biology. 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 (e.g. biotechnology and nanotechnology). 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 (https://uclouvain.be/fr/decouvrir/rgee.html). 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.

Mobility and/or Internationalisation outlook

The programme for the Master in Chemistry and Bio-industries offers a wide range of opportunities to study at other institutions, in Belgium, Europe and elsewhere.

The Faculty would like to highlight the strengths of this programme, particularly the potential for research and the fact that it is very much a part of a complete University. The shape of the option courses available has also been influenced by the different fields of activity in which bioengineers work.

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 agreements outside ERASMUS as well as membership of thematic networks. The AGRO Faculty is also a member of the ATHENS network.

In particular, the programme of the Master in Chemistry and Bio-industries offers an option course on brewing, organized in cooperation with the University of Lorraine (France). The precise terms for the exchange of course and students between the two institutions are still being negotiated and will be announced as soon as possible.

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 Chemistry.

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 University Development Commission (Commission Universitaire au Développement â€“ CUD) in the same field.
- **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
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: Stephan Declerck (https://uclouvain.be/repertoires/stephan.declerck)

Jury

- Président: Charles Bielders (https://uclouvain.be/repertoires/charles.bielders)
- Secrétaire du Jury de la 2ième année de master: Quentin Ponette (https://uclouvain.be/repertoires/quentin.ponette)

Useful Contact(s)

- - Informations pour les étudiants: Eric Gaigneaux (https://uclouvain.be/repertoires/eric.gaigneaux)