UCLouvain

# BBMC2M

*2024 - 2025*

# BBMC2M - Introduction

## Introduction

### Introduction

*From the academic year 2020-2021, this master's degree will be taught mainly in English. Nevertheless, access to the teaching focus requires good mastery of French.*

The Master's degree develops the knowledge necessary for an experimental approach to any question relating to the structure, functioning and exploitation for biotechnological purposes of living cells and their molecular components.

It forms

- biochemists, capable of understanding the structure, functioning and evolution of macromolecules that form the basis of the structure, functioning and programming of living organisms;
- Molecular and cellular biologists who understand how cells interact with each other, how they grow, adapt, differentiate and die.

### Your profile

You

- wish to develop know-how and technical and experimental skills in biochemistry and molecular and cellular biology;
- are interested in living cells, their molecular components and the field of biotechnology;
- wish to contribute to research in biochemistry, molecular and cellular biology;
- wish to join a company active in the field of biotechnology, whether in the agri-food, pharmaceutical or biomedical sector.

### Your future job

By touching the very essence of life, biology is the cornerstone of many scientific disciplines: analysis of genetic information, genome sequencing, biotechnology, etc.

Along with chemistry, it contributes to the design of new products. In interaction with physics, it generates new methods for the detection of diseased cells, for example cancer cells.

Our graduates exercise their skills in scientific, fundamental or applied research in research instit with•ure9.3bade3oateorie, it experitse ] TJ 1 0 0 -1 0 33

# BBMC2M - Teaching profile

## Learning outcomes

**Students on the Master in Biochemistry and Molecular and Cell Biolog y** programme must acquire knowledge and technical expertise which enable them to gain advanced understanding of and deal experimentally with issues relating to the structure, working and use for biotechnical purposes of living cells and their molecular components. Not only will they simply learn, but, more importantly, they will be able to learn independently

- as biochemists : how macromolecules work and develop, since they are the molecular foundations of the structure, functioning and programming of living beings;
- as molecular and cellular biologists : how, both as a single cell or as a component of multicellular organisms, cells interact, how they convert the special features and/or changes in their environment into biochemical and/or genetic regulation signals, how they grow, adapt, become differentiated and die.

The **research focus** prepares students to become researchers.Specialized courses deal with issues that are at the edge of human knowledge. There is emphasis on experimentation and academic communication, both written and oral. The programme includes a placement or training in a laboratory outside UCL, preferably abroad.

The **professional focus in** biotechnology enables students who wish to go on to work in industry to have the opportunity of a work placement so that they can play an active part in the work of a company in the biotechnology sector and begin to gain a reputation. The programme comprises courses on biotechnology as well as introductory courses on the creation and management of companies.

The **teaching focus** is a specially adapted programme designed for teachers at higher levels in secondary education.

On successful completion of this programme, each student is able to :

1. conceive the fundamental processes governing the structure, functioning and evolution of living cells and their molecular components in microorganisms, plants and animals

1.1 demonstrate mastery of factual knowledge on the main themes of biochemistry and molecular and cellular biology. This includes in particular:

• the organization of genomes and their evolution

• signaling and cellular communication pathways

• molecular mechanisms of gene regulation

• the molecular mechanisms underlying protein function

• the mechanisms of proliferation, differentiation

7. understand ethical questions in life sciences

7.1 critically put into perspective the impact of science and technology on the evolution of societies

7.2 evaluate the ethical and societal issues of new biotechnologies and experimental practices in biology, involving, among other things, animal experimentation

7.3 recognize scientific fraud and plagiarism as unacceptable behavior in science

8. if he chooses the In-depth goal, enrich his knowledge, perfect his training in the experimental approach, technologies and written and oral scientific communication with a view to a career in research

8.1 demonstrate experience acquired through practical training on targeted scientific questions within host laboratories in different universities in the Wallonia-Brussels federation

8.2 use the skills acquired during the Master's degree in a new and supportive environment within a national or international research institution

9. if he chooses the Specialized purpose, enrich his knowledge in the field of biotechnologies and confront the reality of the company

9.1 demonstrate the acquisition of cutting-edge methodological and technological approaches in relation to entrepreneurial practices

9.2 use the skills acquired during the Master's degree in a new and promising environment within a company in the broad sense, whether it is a laboratory in an industry in the pharmaceutical sector, the biotechnology sector, or a consultancy organization, a management or research programming office

10. if he chooses the Didactic aim, mobilize the necessary skills to effectively begin the profession of upper secondary teaching, in biology, and be able to progress positively there.

10.1 intervene in a school context, in partnership with different stakeholders.

10.2 teach in authentic and varied situations.

10.3 exercise a reflective outlook and project oneself into a logic of continuous development.

--> For more details, consult the Aggregation of upper secondary education (biological sciences).

## Programme structure

The program includes common subjects of at least 54 credits, a finality (30 credits) and elective courses.

The student chooses one of the following focuses : research, professional (biotechnology) or teaching.

Students who enrol in the specialized "biotechnology" program have the opportunity to follow the interdisciplinary training in business creation (INEO) as part of their master's program. However, this training is only accessible following a selection procedure based on an application file and an interview. At the end of this training, the student will have acquired and developed analytical and reflective tools that will help him/her to understand entrepreneurial processes, create or take over a business or develop entrepreneurial projects within existing organizations.

## BBMC2M Programme

## Detailed programme by subject

### *CORE COURSES*

The core study is taught in English with the exception of some social studies courses, English-speaking students are invited to take LSC2220.

- 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

## LIST OF FOCUSES

The research focus is fully taught in English.

The professional focus is accessible to English-speaking students but they will have to choose their courses carefully because some are taught in French.

The teaching focus aims to teach in secondary education in the French Community of Belgium, therefore it is accessible only to students who have a good knowledge of French.

> Research Focus *[ en-prog-2024-bbmc2m-lbbmc200a ]*
> Teaching Focus *[ en-prog-2024-bbmc2m-lbbmc200d ]*
> Professional Focus : Biotechnology *[ en-prog-2024-bbmc2m-lbbmc200s ]*

## RESEARCH FOCUS [30.0]

- Mandatory
- Optional
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### Content:

| | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|
| LBBMC2205 | Research internship - Part 1 | Bernard Hallet | [EN] [q2] [25h+40h] [20 Credits] | | x |
| LBBMC2203 | Research Training Seminar | Henri Batoko<br>Françoise Gofflot<br>Charles Hachez<br>Bernard Hallet<br>Pierre Morsomme<br>Patrice Soumillion | [EN] [q1+q2] [40h+40h] [5 Credits] | | x |

### Elective activity(ies) (5 credits)

*to choose from the list of elective courses.*

## TEACHING FOCUS [30.0]

**IMPORTANT NOTE**: In accordance with article 138 para. 4 of the decree of 7 November 2013 concerning higher education and the academic organisation of studies, teaching practice placements will not be assessed in the September session. Students are required to make every effort to successfully complete the teaching practice in the June session, subject to having to retake the year.

Year
1 2

## *PROFESSIONAL FOCUS : BIOTECHNOLOGY [30.0]*

| | | | | Year 1 | 2 |
|---|---|---|---|---|---|
| ⊠ LBBMC2206 | Internship - Part 2 | Bernard Hallet<br>René Rezsohazy | EN [q2] [10h+10h] [10 Credits] | x | x |
| ⊠ LBRTE2201 | Human and environmental toxicology | Cathy Debier | EN [q1] [30h+7.5h] [4 Credits]<br>*> French-friendly* | x | x |
| ⊠ LBBMC2204 | Cellular and molecular pharmacology - basic concepts | Melissa Page | EN [q1] [30h] [3 Credits] | x | x |
| ⊠ LBBMC2214 | Molecular and cellular pharmacology seminar | Laure Bridoux (compensates René Rezsohazy)<br>Patrick Dumont | EN [q2] [24h] [2 Credits] | x | x |
| ⊠ LDATS2360 | Seminar in data management: basic | Céline Bugli | FR [q1] [15h+10h] [5 Credits] | x | x |

**⊠ One of the other technical courses**

| | | | | | |
|---|---|---|---|---|---|
| ⊠ LBIRC2101 | Biochemical analysis | François Chaumont<br>Pierre Morsomme (coord.) | FR [q1] [22.5h+30h] [4 Credits]<br>*> English-friendly* | x | x |
| ⊠ LBRMC2101 | Genetic engineering | François Chaumont (coord.)<br>Charles Hachez | FR [q1] [37.5h+15h] [5 Credits]<br>*> English-friendly* | x | x |
| ⊠ LBRMC2202 | Cell culture technology | David Alsteens<br>Charles Hachez (coord.)<br>Pascal Hols | EN [q1] [30h] [3 Credits]<br>*> French-friendly* | x | x |

**⊠ Other courses of the deepening modules**

**⊠ Activities of the Master's degree in Biomedical Sciences at UCLouvain**

**⊠ Activities of the Master's degree in chemistry**

[redacted]

**⊠ Activities of the BBMC master's degree at UNamur**

**⊠ Upgrading activities**

| | | | | | |
|---|---|---|---|---|---|
| ⊠ LBIO1237 | Immunology : basis and applications in biology | Jean-Paul Dehoux | FR [q1] [25h+15h] [3 Credits] | x | x |
| ⊠ LBIO1322 | Integrated tutorials in biochemistry and molecular biology | Bernard Hallet<br>Patrice Soumillion | FR [q2] [5h+45h] [5 Credits] | x | x |
| ⊠ LBIO1333 | Integrated animal biology: circulation, respiration, digestion and excretion | Patrick Dumont<br>Françoise Gofflot<br>René Rezsohazy | FR [q2] [30h+10h] [3 Credits] | x | x |
| ⊠ LBIO1342 | Plant morphogenesis | François Chaumont | FR [q2] [20h+15h] [3 Credits] | x | x |
| ⊠ LBIO1240 | Plant physiology | Xavier Draye<br>Stanley Lutts | FR [q1] [40h+15h] [4 Credits] | x | x |
| ⊠ LBIO1332 | Molecular Biology of Development | Françoise Gofflot<br>René Rezsohazy | FR [q1] [30h+10h] [3 Credits] | x | x |
| ⊠ LBIO1236 | Integrated animal biology : coordination, perception and locomotion | Frédéric Clotman (compensates Bernard Knoops)<br>Patrick Dumont<br>Patrick Dumont (compensates Bernard Knoops)<br>Françoise Gofflot | FR [q2] [40h+10h] [4 Credits] | x | x |
| x ⊠ LCH[redacted]1111B | General chemistry | Benjamin Elias<br>Alexandru Vlad | FR [q1] [45h+45h] [8 Credits] | x | x |
| ⊠ LCHM1331 | Inorganic chemistry I | Sophie Hermans | FR [q1] [37.5h+7.5h] [4 Credits] | x | x |
| ⊠ LCHM1321A | Analytical chimistry | Christine Dupont<br>Yann Garcia | FR [q1] [30h] [3 Credits] | x | x |
| ⊠ LCHM1361 | Introduction to polymer chemistry | Jean-François Gohy | FR [q2] [22.5h] [2 Credits] | x | x |

Year
1 2

# INEO, INTERDISCIPLINARY TRAINING IN ENTREPRENEURSHIP

- Mandatory
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- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

*This option lasts 2 years and is integrated into more than 30 Masters programs in 9 faculties/schools of the UCLouvain. The choice of this option implies the realization of an interfaculty dissertation (in team) on a business creation project. Access is limited to students selected on the basis of a portfolio. More info. via https://uclouvain.be/en/study/ineo*

*Admission to this CPME option is subject to selection, please submit your application in due time https://uclouvain.be/fr/etudier/ineo/admission.html*

*Courses in this option cannot be taken individually outside of the option.*

*From 20 to 25credit(s)*

## Content:

| | | | | Year 1 | Year 2 |
|---|---|---|---|---|---|
| LINEO2021 | Financer son projet<br>*Ce cours est obligatoire pour les étudiants qui n'ont pas de prérequis en gestion (les étudiants qui ont suivi la mineure en gestion, ou la mineure en esprit d'entreprendre sont dispensés de ce cours).* | Philippe Grégoire<br>Olivier Vercruysse | [q2] [30h+15h] [5 Credits] | x | |
| LINEO2001 | Théorie de l'entrepreneuriat | | [q1] [30h+20h] [5 Credits] | x | |
| LINEO2002 | Aspects juridiques, économiques et managériaux de la | Yves De Cordt<br>Marine Falize | [q1] [30h+15h] [5 Credits] | x | |
| LINEO2004 | Séminaire d'approfondissement en entrepreneuriat | | | | |

## Additional courses

## 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.

# BBMC2M - Information

| | | |
|---|---|---|
| | | être adapté en fonction de la formation antérieure. |
| **Bachelors of the Dutch speaking Community of Belgium** | | |
| Bachelor in biologie | Access based on application | |
| Bachelors in de biochemie en de biotechnologie<br>Bachelor in biologie | Access based on application | |
| **Foreign Bachelors** | | |
| | Access based on application | |

## Non university Bachelors

> Find out more about links to the university

| Diploma | Access | Remarks |
|---|---|---|
| BA - technologue de laboratoire médical - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation agro-industries et biotechnologies - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation agronomie des régions chaudes - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation environnement - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation forêt et nature - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation systèmes alimentaires durables et locaux - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation techniques et gestion agricoles - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation techniques et gestion horticoles - crédits supplémentaires entre 45 et 60<br>BA en agronomie, orientation technologie animalière - crédits supplémentaires entre 45 et 60<br>BA en chimie, orientation biochimie - crédits supplémentaires entre 45 et 60<br>BA en chimie, orientation biotechnologie - crédits supplémentaires entre 45 et 60<br>BA en chimie, orientation chimie appliquée - crédits supplémentaires entre 45 et 60<br>BA en chimie, orientation environnement - crédits supplémentaires entre 45 et 60 | Les enseignements supplémentaires éventuels peuvent être consultés dans le module complémentaire. | Type court |

## Holders of a 2nd cycle University degree

| Diploma | Special Requirements | Access | Remarks |
|---|---|---|---|
| **"Licenciés"** | | | |
| | | Direct access | |
| **Masters** | | | |
| | | Direct access | |

## Holders of a non-University 2nd cycle degree

## 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.

The first step in the procedure is to submit a file online ( see https://uclouvain.be/en/study/inscriptions/futurs-etudiants.html).
Students who wish to be admitted on the basis of a dossier are invited to consult the criteria for the evaluation of application.

## Admission and Enrolment Procedures for general registration