

GBIO2M - Teaching profile

Learning outcomes

Nowadays, more and more engineers are bringing their ingenuity and analytical skills to the healthcare field. The objective of the Master's degree programme in biomedical engineering is to graduate engineers being capable of meeting the scientific and technological challenges of biomedical engineering in an ever-changing global and European context. Inherently multidisciplinary, this programme builds upon a strong collaboration between the sector of Sciences and Technologies, and the sector of Health Sciences.

Building up on students' existing knowledge in basic sciences (physics, chemistry, mathematics) and life science (biology, anatomy, biochemistry and physiology), this Master's degree programme offers the opportunity to develop multidisciplinary skills in a wide range of topics. Graduated students will be able to understand and model living systems and ultimately be able to design analytical or therapeutic tools (for example, developing new biomedical technologies).

Graduated students will have fundamental knowledge of the main fields of biomedical engineering: bioinstrumentation, biomaterials, imaging and medical physics, mathematical modelling, artificial organs and rehabilitation, bioinformatics and biomechanics. They will further acquire advanced training in one or more of these fields of expertise.

By choosing among several elective courses, students can opt either for polyvalent profile or one being more specialised. Fields of particular interest include (1) software development and algorithms for biomedical data; (2) biomaterials (implants, etc.); (3) biomechanics and medical robotics; (4) medical imaging and medical physics; (5) clinical engineering (i.e. engineering jobs in the hospital).

- 5.5 Draft documents that take into account contextual requirements and social conventions as well as the vocabulary specific to biomedical disciplines.
- 5.6 Make a convincing oral presentation (in French or English) using modern communication techniques.
- 6. Demonstrate rigor, openness and critical and ethical awareness in your work: using the technological and scientific innovations at your disposal validate the socio-technical relevance of a hypothesis or a solution (Axis 6).
- 6.1 Rigorously apply the standards of biomedical engineering (terms, units of measure, quality standards and security).
- 6.2 Find solutions that go beyond strictly technical issues by considering sustainable development and the socio-economic ethics of a project, particularly concerning the consequences of a medical or therapeutic practice;
- 6.3 Demonstrate critical awareness of a technical solution in order to verify its robustness and minimize the risks that may occur during implementation.
- 6.4 Evaluate oneself and independently develop necessary skills for "lifelong learning" in the field.

Year

				1	2
○ LGBIO2990	<p>Master Thesis</p> <p><i>The graduation project can be written and presented in French or English, in consultation with the supervisor. It may be accessible to exchange students by prior agreement between the supervisors and/or the two universities.</i></p>		EN [q1+q2] [] [25 Credits] 🌐		x
○ LGBIO2220	<p>Industrial project in biomedical engineering</p>	<p>Sophie Demoustier (compensates Philippe Lefèvre) Renaud Ronsse Renaud Ronsse (compensates Philippe Lefèvre)</p>	<p>EN [q1+q2] [30h+30h] [5 Credits] 🌐</p> <p>> <i>French-friendly</i></p>		

PROFESSIONAL FOCUS [30.0]

- 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 \(objectives, methods, evaluation...\)](#)

The "professional focus" block of the Master in biomedical engineering offers a series of courses describing the main field of biomedical engineering, from bioinformatics to biomechanics and imaging. It thus consolidates the "general" profile of the program. Students can expect to acquire a deep level of knowledge in each of the disciplines, owing to the large volume of credits devoted to this block.

Year




1 2

WESP2234

Clinical decision making

Andrea Penaloza-Baeza
Annie Robert (coord.)
Kiswendsida
Clovis Sawadogo

PR5998 01 30 995998 11 1 113 07333 0.9q33 0.9q33 0.

				Year	
				1	2
⊗ LGBIO2020	Bioinstrumentation <i>For GBIO2M students - LGBIO2020 cannot be taken in this option, it must be validated in the finality.</i>	André Mouraux Dounia Mulders (compensates Michel Verleysen)	EN [q2] [30h+30h] [5 Credits]  > French-friendly	x	x
⊗ LMAPR2013	Science and engineering of metals and ceramics	Pascal Jacques	EN [q1] [30h+30h] [5 Credits]  > French-friendly	x	x
⊗ LMAPR2014	Physics of Functional Materials	Xavier Gonze Luc Piraux Samuel Poncé Gian-Marco Rignanese	EN [q1] [37.5h+22.5h] [5 Credits]  > French-friendly	x	

MAJOR IN BIOMECHANICS AND MEDICAL ROBOTICS

The goal of this major is to provide students with the necessary body of knowledge to understand and develop technologies related to biomechanics (fluids and solids) and medical robotics (surgical assistance and rehabilitation). This major is particularly well-suited for students holding a bachelor in mechanics.

MAJOR IN MEDICAL PHYSICS AND MEDICAL IMAGING

The goal of this major is to provide students with the necessary body of knowledge to understand and develop technologies related to medical physics and medical imaging. This major is particularly well-suited for students holding a bachelor in electricity or applied chemistry and physics.

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From 20 to 30credit(s)

Year

1 2

Content:

Required courses (10 credits)

● LELEC2885	Image processing and computer vision	Christophe De Vleeschouwer (coord.) Laurent Jacques	FR [q1] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X
● LGBIO2070	Engineering challenges in protontherapy	Guillaume Janssens John Lee Edmond Sterpin	FR [q2] [30h+30h] [5 Credits] 🌐 > French-friendly	X	X

Elective courses

From 10 to 20credit(s)

⌘ LMECA2645	Major technological hazards in industrial activity.	Aude Simar	FR [q2] [30h] [3 Credits] 🌐	X	X
⌘ LPHYS2102	Ionizing Radiation Detection and Nuclear Instrumentation	Eduardo Cortina Gil	EN [q1+q2] [26h+26h] [5 Credits] 🌐	X	X
⌘ LPHYS2504	Use, management and control of radioelements	Pascal Froment	EN [q2] [22.5h] [3 Credits] 🌐	X	X
⌘ LPHY2360	Physique atomique, nucléaire et des radiations	Eduardo Cortina Gil	FR [q1] [22.5h] [2 Credits] 🌐	X	X
⌘ WMNUC2100	Master and complementary master	Véronique Roelants Thierry Vander Borghet (coord.)	FR [q1] [15h] [2 Credits] 🌐	X	X
⌘ WRDTH3120	Fundamental of dosimetry	Edmond Sterpin	EN [q1] [20h] [3 Credits] 🌐	X	X
⌘ WRDTH3160	Technology, Dosimetry and Treatment Planning in Radiotherapy	Edmond Sterpin (coord.)	FR [q1] [20h+60h] [5 Credits] 🌐	X	X
⌘ WRPR2001	Notions de base de radioprotection	Pascal Carlier François Jamar (coord.) Renaud Lhommel	FR [q1] [10h+5h] [2 Credits] 🌐	X	X
⌘ WRPR2330	Utilisation des radioisotopes et des molécules marquées en biologie	Bernard Gallez (coord.) Thierry Vander Borghet	FR [q2] [15h+15h] [3 Credits] 🌐	X	

MAJOR IN INTERDISCIPLINARY PROGRAM IN ENTREPRENEURSHIP - INEO

Commune à la plupart des masters de l'EPL, cette option a pour objectif de familiariser l'étudiant-e avec les spécificités de l'entrepreneuriat et de la création d'entreprise afin de développer chez lui les aptitudes, connaissances et outils nécessaires à la création d'entreprise.

Cette option rassemble des étudiants de différentes facultés en équipes interdisciplinaires afin de créer un projet entrepreneurial. La formation interdisciplinaire en entrepreneuriat (INEO) est une option qui s'étend sur 2 ans et s'intègre dans plus de 30 Masters de 9 facultés/écoles de l'UCLouvain. Le choix de l'option INEO implique la réalisation d'un mémoire interfacultaire (en équipe) portant sur un projet de création d'entreprise. L'accès à cette option, ainsi qu'à chacun des cours, est limité aux étudiant-es sélectionnés sur dossier. Toutes les informations sur <https://uclouvain.be/fr/etudier/ineo>.

L'étudiant.e qui choisit de valider cette option doit sélectionner au minimum 20 crédits et au maximum 25 crédits. Cette option n'est pas accessible en anglais et ne peut être prise simultanément avec l'option « Enjeux de l'entreprise ».

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Year

1 2

Content:

Required courses

● LINEO2001	Théorie de l'entrepreneuriat	Frank Janssen	(FR) [q1] [30h+20h] [5 Credits] 🌐	X	
● LINEO2002	Aspects juridiques, économiques et managériaux de la création d'entreprise	Yves De Cordt Marine Falize	(FR) [q1] [30h+15h] [5 Credits] 🌐	X	
● LINEO2003	Plan d'affaires et étapes-clefs de la création d'entreprise <i>Les séances du cours LINEO2003 sont réparties sur les deux blocs annuels du master. L'étudiant doit les suivre dès le bloc annuel 1, mais ne pourra inscrire le cours que dans son programme de bloc annuel 2.</i>	Frank Janssen	(FR) [q2] [30h+15h] [5 Credits] 🌐		X
● LINEO2004	Séminaire d'approfondissement en entrepreneuriat	Frank Janssen	(FR) [q2] [30h+15h] [5 Credits] 🌐		

COURS AU CHOIX EN CONNAISSANCES SOCIO-ÉCONOMIQUES

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Year

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o Content:

⊗ LFSA2995	Company Internship	Dimitri Lederer Jean-Pierre Raskin	10 [q1+q2] [30h] [10 Credits] 🌐	X	X
⊗ LEPL2021	Innovation classes for transition and sustainable development	Benoît Macq Xavier Marichal (compensates Benoît Raucent)	5 [q1] [30h+15h] [5 Credits] 🌐	X	X

OTHER ELECTIVE COURSES**OTHER ELECTIVE COURSES**

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Year

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⊗ Content:

Les étudiant-es peuvent également inscrire à leur programme tout cours faisant partie des programmes d'autres masters de l'EPL moyennant l'approbation du jury restreint.

⊗ Languages

Students may select from any language course offered at the ILV. Special attention is placed on the following seminars in professional development:

⊗ LALLE2500

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.

GBIO2M - Information

Access Requirements

Bachelor in Engineering	For others institutions	Access based on application	degree may have an adapted master programme. See personalized access
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Non university Bachelors

> Find out more about [links](#) to the university

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			

Masters

Master in Engineering	Direct access
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Holders of a non-University 2nd cycle degree

> Find out more about [links](#) to the university

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 of the admission procedure requires to submit an application online: <https://uclouvain.be/en/study/inscriptions/futurs-etudiants.html>

[Selection criteria are summarized here \(epl-admission@uclouvain.be\)](mailto:epl-admission@uclouvain.be).

Admission and Enrolment Procedures for general registration

Teaching method

Methods that promote multidisciplinary

The Master's degree programme in biomedical engineering is by nature interdisciplinary since it lies at the interface between engineering and biomedical sciences. It is grounded on a solid course programme that provides students with knowledge of the main areas in biomedical engineering as well as various majors in related disciplines.

Various teaching strategies

The teaching methods used in the Master's degree programme in biomedical engineering are consistent with that of the Bachelor's degree programme in engineering sciences: active learning, an equal mix of group work and individual work, and emphasis on the development of non-technical skills.

A major characteristic of the programme is the immersion of students in research laboratories (for class laboratories, case studies, projects, theses) exposing them to advanced methods and allowing them to learn by questioning. This process is very central for a research perspective.

Half of the student workload in the last year consists in the Master thesis fulfillment and offers students the possibility to deeply investigate. Given its size and context it provides a true initiation into the working life of an engineer or researcher.

Diverse learning situations

Learning is achieved by various pedagogical methods such as internships, case studies, classes, projects, exposure to cutting edge research and meetings with key industrial players in the field.

This variety of teaching techniques allows students to learn in an iterative and progressive way.

The business creation major is based on an interactive teaching method and is oriented toward problem-based learning. Throughout the program, students work in multidisciplinary teams to participate in group projects. The Master's thesis is multidisciplinary in nature so that groups of three students, ideally from different academic departments, can work on a business creation project.

Evaluation

The evaluation methods comply with the [regulations concerning studies and exams](#). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

Student work is evaluated according to University rules (see the rules for evaluating coursework and exams) namely written and oral exams, laboratory exams, individual or group work, public presentations of projects and theses defences. Professors provide details about evaluation methods used in their courses at the beginning of each semester.

For more information on evaluation methods, students may consult the relevant evaluation descriptions.

To obtain a passing grade, the marks received for the teaching units are offset by their respective credits.

Mobility and/or Internationalisation outlook

Over the years, EPL has developed over a hundred partnerships with partners in more than 36 countries (EU and non-EU) to offer exchange programmes to its students. We also offer the possibility of obtaining Double degrees, Joint Degrees or Dual Masters in several fields. The EPL is currently participating in two Erasmus Mundus programmes: [FAME](#) and [STRAINS](#).

In addition to exchange programmes under the Erasmus+ programme, numerous agreements have been established with a wide range of universities through various partner networks such as:

- [TIME](#) network (Top Industrial Managers in Europe).
- [CLUSTER](#) network
- [Magalhães](#) network
- [Circle U.](#) network through several networks and European University Alliance

So, there's no shortage of opportunities to gain an additional qualification and/or spend part of the year abroad during your two-year Master's degree! It's the perfect opportunity to discover or improve your knowledge of a foreign language, tackle subjects from a new angle and gain unique experience in Europe or the rest of the world.

If you would like more information, please visit the dedicated pages of the [EPL International Office](#) to discover all the destinations, testimonials from former students and all the procedures to follow to make these opportunities a success.

Possible trainings at the end of the programme

Accessible PhD curricula : by virtue of its training towards and via research, the Master in biomedical engineering gives its students an excellent preparation towards PhD studies. Instructors involved in the Master are members of various doctoral schools, which are there to welcome students who wish to further their studies via a PhD.

Contacts

Curriculum Management

Entity

Structure entity	SST/EPL/GBIO
Denomination	(GBIO)
Faculty	Louvain School of Engineering (EPL)
Sector	Sciences and Technology (SST)
Acronym	GBIO
Postal address	Place du Levant 3 - bte L5.03.02 1348 Louvain-la-Neuve Tel: +32 (0) 10 47 25 86 - Fax: +32 (0) 10 47 25 98

Academic supervisor: [Sophie Demoustier](#)

Jury

- Président du Jury: [Claude Oestges](#)
- Secrétaire du Jury: [Sophie Demoustier](#)

Useful Contact(s)

- [Isabelle Dargent](#)

