GBIO2M
2019 - 2020

Master [120] in Biomedical Engineering

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In english
Dissertation/Graduation Project: YES - Internship: optional
Activities in other languages: YES
Activities on other sites: optional
Main study domain: Sciences de l'ingénieur et technologie
Organized by: Ecole Polytechnique de Louvain (EPL)
Programme acronym: gbio2m - Francophone Certification Framework: 7

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Introduction

This Master's degree programme educates engineers capable of using a large set of skills (analytical, modelling, design and inventiveness) in order to face future technological challenges in the scientific and technical fields linked to biomedical engineering and this in ever evolving European and global contexts.

Upon completion of this Master’s degree programme, you will have fundamental knowledge in all areas of biomedical engineering (bioinstrumentation, biomaterials, imaging and medical physics, mathematical modelling, artificial organs and rehabilitation, bioinformatics and biomechanics) as well as cutting edge knowledge of one or more major fields of study.

A series of video portraits of young engineers in biomedical engineering wants to be discovered on the "job description" page of the faculty.

Your Profile

You:

• Have developed a marked interest in the biomedical field and its technological outputs (as a result of your undergraduate studies);
• Seek targeted information about current scientific or technological issues as well as the national and international job market;
• Want to play a role in development, production or management in the healthcare field.

Your Programme

This Master's degree offers:

• Knowledge of the main scientific and industrial issues in the fields of applied biomedical engineering;
• Classes that emphasize theories and practice to develop advanced professional knowledge;
• The choice of one of more major fields of study in biomedical engineering;
• The chance to complete an internship in a hospital, in industry or in a research centre;
• The possibility of completing part of your master's degree abroad (in Europe or elsewhere) and in certain cases the granting of a dual master’s degree (diploma granted jointly by UCL and the institution where you studied abroad).
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 on 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).

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

1. Demonstrate mastery of a solid body of knowledge and skills in basic science and engineering science allowing them to understand and solve biomedical engineering problems (Axis 1).
   1.1 Identify and use biomedical engineering concepts, laws and reasoning to solve problems in a variety of areas:
   - Develop algorithms and software particularly for dealing with biomedical data; analyse biological data and medical images
   - Biomaterials (interfaces, biocompatibility, etc.)
   - Biomechanics, motor control and medical robotics (for surgery and rehabilitation)
   - Clinical engineering
   1.2 Identify and use the modelling and calculation tools necessary to solve problems raised by the fields mentioned above
   1.3 Validate problem solving results, notably those expressed in orders of magnitude:
   - in particular validate models by comparing them to theoretical or experimental results

2. Organise and carry out a procedure in applied engineering related to the development of a product and/or a service that meets a need or solves a particular problem in the field of biomedical engineering (Axis 2).
   2.1 Analyse a problem, take stock of its functionalities and constraints; create a specifications note that takes into account technical and economic limits.
   2.2 Model a problem and design one or more technical solutions using mechanical, electric, electronic and computerised approaches with the specifications note in mind.
   2.3 Evaluate and classify solutions with regard to all the criteria in the specifications note: efficiency, feasibility, quality, ergonomics, security, biocompatibility, etc.
   2.4 Test a solution though a mock up, a prototype and/or a numerical model.
   2.5 Formulate recommendations to improve a technical solution either to reject it or to explain necessary improvements to make the product operational.

3. Organise and carry out a research project to understand a physical phenomenon or new problem related to biomedical engineering (Axis 3).
   3.1 Document and summarize the existing body of knowledge.
   3.2 Suggest a model and/or an experimental device allowing for the simulation and testing of hypotheses related to the phenomenon being studied.
   3.3 Write a summary report explaining the potentialities of the theoretical and/or technical innovation resulting from the research project.
   3.4 Contribute as part of a team to the planning and completion of a project while taking into account its objectives, allocated resources, and constraints (Axis 4).
   3.1 Frame and explain the project’s objectives (in terms of performance indicators) while taking into account its issues and constraints (resources, budget, deadlines). Understand the principal mechanisms that govern the healthcare economy as well as the financing of social security.
   4.2 Collaborate on a work schedule, deadlines and roles, for example the division of labour among students.
   4.3 Work in a multidisciplinary environment with peers holding different points of view: manage any resulting disagreement or conflicts.
   4.4 Make team decisions and assume the consequences of these decisions (whether they are about technical solutions or the division of labour to complete a project).

4. Communicate effectively (speaking or writing in French or a foreign language) with the goal of carrying out assigned projects (Axis 5).
   5.1 Identify the needs of the client or the user: question, listen and understand all aspects of their request and not just the technical aspects.
   5.2 Present your arguments and convince your interlocutors (doctors, therapists, technicians, colleagues, clients, superiors) of your technological choices by adopting their language.
   5.3 Communicate through graphics and diagrams: interpret a diagram, present results, structure information.
   5.4 Read and analyse different technical documents (rules, plans, specification notes).
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.

Programme structure

The Master’s degree programme includes:

- a core curriculum (35 credits) including a Master thesis and an additional industrial project;
- a set of courses in the Professional focus (30 credits);
- one or more major courses;
- elective courses to round out the programme

A project with an industrial focus (5 credits) is completed at the beginning of the programme (1st year) while the Master thesis is normally completed at the end of the programme (2nd year). It is recommended that students take courses from the Professional focus (30 credits) at the beginning of their Master’s programme (1st year). However, students may take these courses in the 1st or 2nd year as long as they have completed the course prerequisites. This is particularly the case for students who completed part of their education abroad.

If during the student’s former education, he or she already followed a course being part of the programme (either mandatory or elective) or followed an equivalent activity (pending approval by the programme jury), he or she may replace this activity by elective courses (pending the fulfillment of the programme rules). The student will also verify that he/she has obtained the minimum number of credits required for the approval of the diploma as well as for the approval of their major (in order to include their academic distinctions in the diploma appendix).

These types of programmes will be submitted for approval by the relevant Master’s degree programme jury.

For a programme-type, and regardless of the focus, options/or elective courses selected, this master will carry a minimum of 120 credits divided over two annual units, corresponding to 60 credits each.
GBIO2M Detailed programme

Programme by subject

**CORE COURSES [35.0]**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Year</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGBIO2990</td>
<td>Master Thesis</td>
<td>28</td>
<td>1</td>
<td>x</td>
</tr>
<tr>
<td>LGBIO2220</td>
<td>Industrial project in biomedical engineering</td>
<td>5</td>
<td>1 or 2</td>
<td>x x</td>
</tr>
</tbody>
</table>

**Societies, Cultures, Religions (2 credits)**

The students select one course between:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Year</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTECO2100</td>
<td>Sociétés, cultures, religions : Biblical readings</td>
<td>2</td>
<td>1</td>
<td>x</td>
</tr>
<tr>
<td>LTECO2300</td>
<td>Sociétés, cultures, religions : Ethical questions</td>
<td>2</td>
<td>1</td>
<td>x</td>
</tr>
<tr>
<td>LTECO2200</td>
<td>Sociétés-cultures-religions : Human Questions</td>
<td>2</td>
<td>1 or 2</td>
<td>x x</td>
</tr>
</tbody>
</table>

**MASTER [120] IN BIOMEDICAL ENGINEERING, PROFESSIONAL FOCUS [30.0]**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Year</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGBIO2010</td>
<td>Bioinformatics</td>
<td>5</td>
<td>1</td>
<td>x</td>
</tr>
<tr>
<td>LGBIO2020</td>
<td>Bioinstrumentation</td>
<td>5</td>
<td>1</td>
<td>x</td>
</tr>
<tr>
<td>LGBIO2030</td>
<td>Biomaterials</td>
<td>5</td>
<td>1</td>
<td>x</td>
</tr>
<tr>
<td>LGBIO2040</td>
<td>Biomechanics</td>
<td>5</td>
<td>2</td>
<td>x</td>
</tr>
</tbody>
</table>

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.

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGBIO2050</td>
<td>Medical Imaging</td>
<td>Anne Bol, John Lee, Benoît Macq, Frank Peeters</td>
<td>5</td>
<td>1q</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGBIO2060</td>
<td>Modelling of biological systems</td>
<td>Philippe Lefèvre</td>
<td>5</td>
<td>1q</td>
</tr>
</tbody>
</table>
OPTIONS

Students MUST choose at least one major from the 5 biomedical engineering majors. They MAY further choose one or more other majors from those in biomedical engineering, or management and business creation. He completes his program by choosing from a list of elective courses.

Majors in biomedical engineering

> Major in Clinical Engineering
> Major in acquisition and processing of biomedical data
> Major in Biomaterials
> Major in Biomechanics and medical robotics
> Major in Medical physics and medical imaging

Majors in business creation and management

> Business risks and opportunities
> Major in small and medium sized business creation

Elective courses

> Elective courses in Genetic engineering
> Elective courses in biochemical engineering
> Elective courses in pharmaceutical engineering
> Elective courses in statistics
> Elective courses: transversal skills and contacts with industry
> Elective courses available for Master students in Biomedical Engineering

MAJOR IN CLINICAL ENGINEERING

The objective of this major is to provide students with the necessary body of knowledge to work as an engineer in a hospital or in a biomedical products company. It covers areas related to the management of medical technologies, quality control, etc.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Hours</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGBIO2110</td>
<td>Introduction to Clinical Engineering</td>
<td>3</td>
<td>30h</td>
<td></td>
</tr>
<tr>
<td>LMECA2711</td>
<td>Quality management and control</td>
<td>5</td>
<td>30+30h</td>
<td></td>
</tr>
</tbody>
</table>

Elective courses

LSTAT2330 and WESP2123 are mutually exclusive, so as WFSP2218 and LBIRA2101.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Hours</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBIRA2101</td>
<td>Biometry : analysis of the variance</td>
<td>4</td>
<td>30+15h</td>
<td></td>
</tr>
<tr>
<td>LINGI1341</td>
<td>Computer networks</td>
<td>5</td>
<td>30+30h</td>
<td></td>
</tr>
<tr>
<td>LINGI2172</td>
<td>Databases</td>
<td>6</td>
<td>30+30h</td>
<td></td>
</tr>
<tr>
<td>LSTAT2110</td>
<td>Data Analysis</td>
<td>5</td>
<td>30+7.5h</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
<td>Instructor(s)</td>
<td>Credits</td>
<td>Year</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------</td>
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<td>------</td>
</tr>
<tr>
<td>LSTAT2310</td>
<td>Statistical quality control.</td>
<td>Bernard Francq (compensates Bernadette Govaerts) Bernadette Govaerts</td>
<td>4</td>
<td>1q</td>
</tr>
<tr>
<td>LSTAT2330</td>
<td>Statistics in clinical trials.</td>
<td>Catherine Legrand Annie Robert</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LSTAT2360</td>
<td>Seminar in data management: basic</td>
<td>Céline Bugli</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>WESP2123</td>
<td>Principes des essais cliniques</td>
<td>Laurence Habimana Annie Robert (coord.) Françoise Smets</td>
<td>4</td>
<td>1q</td>
</tr>
<tr>
<td>WESP2234</td>
<td>Strategy of the medical decision</td>
<td>Laurence Habimana Annie Robert (coord.)</td>
<td>3</td>
<td>1q</td>
</tr>
<tr>
<td>WESP2218</td>
<td>Analyse longitudinale : régression linéaire, logistique et de Poisson</td>
<td>Annie Robert</td>
<td>4</td>
<td>1q</td>
</tr>
<tr>
<td>WFS2260</td>
<td>Management humain et comportement organisationnel</td>
<td>Pierre Meurens Sophie Thunus (coord.)</td>
<td>5</td>
<td>2q</td>
</tr>
</tbody>
</table>
MAJOR IN ACQUISITION AND PROCESSING OF BIOMEDICAL DATA

The objective of this major is to provide students with the necessary body of knowledge to acquire and analyze biomedical data, i.e. either raw signal data or large bases of pre-processed data. This major is especially well-suited for students holding a bachelor in computer science, electricity or applied mathematics.

○ Mandatory
Δ Courses not taught during 2019-2020
◆ Periodic courses not taught during 2019-2020
◆ Periodic courses taught during 2019-2020
◆ Activity with requisites

Students selecting this major may choose
De 20 à 30 CREDITS parmi

○ Contenu:

Required courses (10 credits)

○ LELEC2531 Design and Architecture of digital electronic systems Jean-Didier Legat 30h+30h 5 Credits 1q x x
○ LELEC2900 Signal processing Laurent Jacques Benoit Macq Luc Vandendorpe 30h+30h 5 Credits 2q x x

Elective courses

The classes LSTAT2320 and LBIRC2106 are mutually exclusive as are the classes LSTAT 2120 and LBIRA2101.
De 10 à 20 CREDITS parmi

◆ LELEC2532 Design and Architecture of analog electronic systems David Bol Denis Flandre 30h+30h 5 Credits 2q x x
◆ LELEC2811 Instrumentation and sensors David Bol (coord.) Laurent Francis 30h+30h 5 Credits 1q x x
◆ LELEC2870 Machine Learning : regression, dimensionality reduction and data visualization John Lee (compensates Michel Verleysen) 30h+30h 5 Credits 1q x x
◆ LINGI2251 Software Quality Assurance Charles Pecheur 30h+15h 5 Credits 2q x x
◆ LINGI2261 Artificial intelligence: representation and reasoning Yves Deville 30h+30h 6 Credits 1q x x
◆ LINGI2262 Machine Learning :classification and evaluation Pierre Dupont 30h+30h 5 Credits 2q x x
◆ LINMA2361 Nonlinear dynamical systems Pierre-Antoine Absil 30h +22.5h 5 Credits 1q x x
◆ LINMA2370 Modelling and analysis of dynamical systems Jean-Charles Delvenne (coord.) Denis Dochain 30h +22.5h 5 Credits 1q x x
◆ LINMA2471 Optimization models and methods II François Glineur 30h +22.5h 5 Credits 1q x x
◆ LINMA2875 System Identification Julien Hendrickx 30h+30h 5 Credits 2q x x
◆ LSTAT2320 Design of experiment. Patrick Bogaert Bernadette Govaerts 22.5h 5 Credits 2q x x
◆ LSTAT2110 Data Analysis Johan Segers 30h+7.5h 5 Credits 2q x x
◆ LBIRC2106 Chemometrics Bernadette Govaerts 22.5h +15h 3 Credits 1q x x
◆ LSTAT2120 Linear models Christian Hafner 30h+7.5h 5 Credits 1q x x
◆ LBIRA2101 Biometry : analysis of the variance Xavier Draye (coord.) Bernadette Govaerts 30h+15h 4 Credits 1q x x
◆ LGBIO2072 Mathematical models in neuroscience Frédéric Crevecoeur 30h+30h 5 Credits 1q x x
MAJOR IN BIOMATERIALS

The goal of this major is to provide students with the necessary body of knowledge to understand and develop technologies related to biomaterials (implants, biocompatibility, etc.). This major is particularly well-suited for students holding a bachelor in applied chemistry and physics AND biomedical engineering.

- **Mandatory**
- **Courses not taught during 2019-2020**
- **Optional**
- **Courses taught during 2019-2020**
- **Periodic courses not taught during 2019-2020**
- **Activity with requisites**

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

Students selecting this major may choose De 20 à 30 CREDITS parmi

### Contenu:

#### Required courses KIMA students

**KIMA students must enrol in LGBIO2030 and LBIR1250 except if they took these courses during their undergraduate programme.** De 5 à 10 CREDITS parmi

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Duration</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGBIO2030</td>
<td>Biomaterials</td>
<td>Sophie Demoustier Christine Dupont</td>
<td>5 Credits</td>
<td>30h+30h</td>
<td>1q</td>
</tr>
<tr>
<td>LBIR1250</td>
<td>Biochemistry I</td>
<td>Michel Ghislain Yvan Larondelle (coord.)</td>
<td>5 Credits</td>
<td>30h+15h</td>
<td>1q</td>
</tr>
</tbody>
</table>

#### Required courses GBIO students

**GBIO students must enrol in LMAPR2481 and LMAPR1805 unless they took these courses during their undergraduate (BAC) programme.** De 5 à 10 CREDITS parmi

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Duration</th>
<th>Year</th>
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<tbody>
<tr>
<td>LMAPR1805</td>
<td>Introduction to materials science</td>
<td>Jean-Christophe Charlier Pascal Jacques Bernard Nysten Thomas Pardoen (coord.)</td>
<td>5 Credits</td>
<td>30h+30h</td>
<td>1q</td>
</tr>
<tr>
<td>LMAPR2481</td>
<td>Deformation and fracture of materials</td>
<td>Hosni IdriSSI Thomas Pardoen</td>
<td>5 Credits</td>
<td>30h+30h</td>
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</table>

#### Recommended courses

De 10 à 26 CREDITS parmi

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Duration</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBIR1355</td>
<td>Métabolisme microbial et synthèse de biomolécules</td>
<td>Michel Ghislain (coord.) Yvan Larondelle</td>
<td>3 Credits</td>
<td>22.5h +15h</td>
<td>2q</td>
</tr>
<tr>
<td>LBI01335</td>
<td>Immunology : basis and applications in biology</td>
<td>Jean-Paul Dehoux</td>
<td>3 Credits</td>
<td>25h+15h</td>
<td>1q</td>
</tr>
<tr>
<td>LELEC2560</td>
<td>Micro and Nanofabrication Techniques</td>
<td>Laurent Francis (coord.) Benoît Hackens Jean-Pierre Raskin</td>
<td>5 Credits</td>
<td>30h+30h</td>
<td>2q</td>
</tr>
<tr>
<td>LMAPR2012</td>
<td>Macromolecular Nanotechnology</td>
<td>Sophie Demoustier Karine Glinel Karine Glinel (compensates Bernard Nysten) Jean-François Gohy Bernard Nysten</td>
<td>5 Credits</td>
<td>45h+15h</td>
<td>2q</td>
</tr>
<tr>
<td>LMAPR2019</td>
<td>Polymer Science and Engineering</td>
<td>Sophie Demoustier Alain Jonas (coord.) Evelyne Van Ruymbeke</td>
<td>5 Credits</td>
<td>45h+15h</td>
<td>1q</td>
</tr>
<tr>
<td>LGBIO2071</td>
<td>Tissue Engineering</td>
<td>Greet Kerckhofs</td>
<td>5 Credits</td>
<td>30h+30h</td>
<td>1q</td>
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#### Elective courses

Max=15 CREDITS parmi

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Duration</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBIRC2101A</td>
<td>Analyse biochimique et notions de génie génétique: analyse biochimique</td>
<td>François Chaumont Charles Hachez Pierre Morsomme</td>
<td>4 Credits</td>
<td>18.5h +22.5h</td>
<td>1q</td>
</tr>
<tr>
<td>LBIRC2108</td>
<td>Biochemical and Microbial Engineering</td>
<td>Iwona Cybulksa</td>
<td>5 Credits</td>
<td>30h +22.5h</td>
<td>2q</td>
</tr>
<tr>
<td>LGBIO2020</td>
<td>Bioinstrumentation</td>
<td>André Mouraux Michel Verleysen</td>
<td>5 Credits</td>
<td>30h+30h</td>
<td>1q</td>
</tr>
<tr>
<td>LMAPR2010</td>
<td>Project in materials science and engineering</td>
<td>Pascal Jacques, Alain Jonas</td>
<td>0h+60h</td>
<td>5 Credits</td>
<td>1q</td>
</tr>
<tr>
<td>LMAPR2013</td>
<td>Physical Chemistry for Metals and Ceramics</td>
<td>Pascal Jacques</td>
<td>30h+30h</td>
<td>5 Credits</td>
<td>1q</td>
</tr>
<tr>
<td>LMAPR2014</td>
<td>Physics of Functional Materials</td>
<td>Xavier Gonze, Luc Piraux, Gian-Marco Rignanese</td>
<td>37.5h +22.5h</td>
<td>5 Credits</td>
<td>1q</td>
</tr>
<tr>
<td>LMAPR2018</td>
<td>Rheometry and Polymer Processing</td>
<td>Christian Bailly, Evelyne Van Ruymbeke</td>
<td>30h +22.5h</td>
<td>5 Credits</td>
<td>2q</td>
</tr>
<tr>
<td>LMAPR2631</td>
<td>Surface Analysis</td>
<td>Arnaud Delcorde, Bernard Nysten</td>
<td>30h+15h</td>
<td>5 Credits</td>
<td>2q</td>
</tr>
</tbody>
</table>
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.

Students selecting this major may choose
De 20 à 30 CREDITS parmi

### Contenu:

#### Required courses (10 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMECA2170</td>
<td>Numerical Geometry</td>
<td>Vincent Legat, Jean-François Remacle</td>
<td>5</td>
<td>1q</td>
</tr>
<tr>
<td>LMECA2355</td>
<td>Mechanical design in biomedical engineering</td>
<td>Greet Kerckhofs, Ann Vankrunkelsven (compensates Benoît Raucent)</td>
<td>5</td>
<td>1q</td>
</tr>
</tbody>
</table>

#### Elective courses

De 10 à 20 CREDITS parmi

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINMA2671</td>
<td>Advanced control and applications</td>
<td>Julien Hendrickx</td>
<td>5</td>
<td>1q</td>
</tr>
<tr>
<td>LINMA2875</td>
<td>System Identification</td>
<td>Julien Hendrickx</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LMECA2300</td>
<td>Advanced Numerical Methods</td>
<td>Philippe Chatelain, Christophe Craeye, Vincent Legat, Jean-François Remacle</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LMECA2660</td>
<td>Numerical methods in fluid mechanics</td>
<td>Laurent Briteux, Grégoire Winckelmans</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LMECA2732</td>
<td>Introduction to robotics</td>
<td>Renaud Ronsse</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LMECA2755</td>
<td>Industrial automation</td>
<td>Bruno Dehez, Paul Fisette, Renaud Ronsse</td>
<td>5</td>
<td>1q</td>
</tr>
<tr>
<td>LMECA2802</td>
<td>Multibody system Dynamics</td>
<td>Paul Fisette</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LMECA2840</td>
<td>Project in Mechanical Design II</td>
<td>Bruno Dehez, Christophe Everarts (compensates Benoît Raucent), Renaud Ronsse</td>
<td>6</td>
<td>1q, 2q</td>
</tr>
<tr>
<td>LMECA2335</td>
<td>Biorobotics</td>
<td>Renaud Ronsse</td>
<td>5</td>
<td>2q</td>
</tr>
</tbody>
</table>
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.

- Mandatory
- Δ Courses not taught during 2019-2020
- ☞ Optional
- ◆ Periodic courses not taught during 2019-2020
- ◆ Periodic courses taught during 2019-2020
- Activity with requisites

Students selecting this major may choose
De 20 à 30 CREDITS parmi

**Contenu:**

### Required courses (10 credits)

- **LELEC2885** Image processing and computer vision
  - Christophe De Vleeschouwer (coord.)
  - Laurent Jacques
  - 30h+30h
  - 5 Credits
  - 1q

- **LGBIO2070** Engineering challenges in protontherapy
  - Guillaume Janssens
  - John Lee
  - Edmond Sterpin
  - 30h+30h
  - 5 Credits
  - 2q

### Elective courses

De 10 à 20 CREDITS parmi

- **LMECA2645** Major technological hazards in industrial activity.
  - Denis Dochain
  - 30h
  - 3 Credits
  - 2q

- **LPHYS2102** Detectors and sensors
  - Eduardo Cortina Gil
  - Krzysztof Piotrzkowski
  - 22.5h + 7.5h
  - 5 Credits
  - 1q

- **LPHYS2504** Use, management and control of radio elements
  - Pascal Froment
  - 22.5h
  - 3 Credits
  - 2q

- **LPHY2360** Physique atomique, nucléaire et des radiations
  - Krzysztof Piotrzkowski
  - 22.5h
  - 2 Credits
  - x

- **WMNUC2100** Master and complementary master
  - Véronique Roelants
  - Thierry Vander Borght (coord.)
  - 15h
  - 2 Credits
  - 1q

- **WRDTH3120** Dosimétrie en radiothérapie et contrôle de qualité
  - Edmond Sterpin
  - 30h
  - 3 Credits
  - 2q

- **WRDTH3160** Dosimétrie informatisée en radiothérapie
  - Xavier Geets
  - Carine Kirkove
  - Laurette Renard
  - Edmond Sterpin (coord.)
  - 30h+60h
  - 5 Credits
  - 2q

- **WRPR2001** Notions de base de radioprotection
  - Michaël Dupont
  - François Jamar (coord.)
  - Renaud Lhomme
  - 10h+5h
  - 2 Credits
  - 1q

- **WRPR2330** Utilisation des radioisotopes et des molécules marquées en biologie
  - Bernard Gallez (coord.)
  - Thierry Vander Borght
  - 15h+15h
  - 3 Credits
  - 2q

- **WRDTH2331B** Radiobiologie et radiogénétique (partir radiobiologie)
  - 22.5h
  - 2 Credits
  - 2q
BUSINESS RISKS AND OPPORTUNITIES

This major is not available in English and may not be taken at the same time as the major « Interdisciplinary program in entrepreneurship – CPME ».

- Mandatory
- Courses not taught during 2019-2020
- Optional
- Periodic courses not taught during 2019-2020
- Periodic courses taught during 2019-2020
- Activity with requisites

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

De 16 à 20 CREDITS parmi

<table>
<thead>
<tr>
<th>Year</th>
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○ Contenu:

<table>
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<tr>
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<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Period</th>
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<tbody>
<tr>
<td>LFS1290</td>
<td>Introduction to financial and accounting management</td>
<td>Philippe Grégoire</td>
<td>4</td>
<td>2q</td>
</tr>
<tr>
<td>LFS1240</td>
<td>Elements of law for industry and research</td>
<td>Vincent Cassiers, Werner Derijcke, Bénédicte Ingels</td>
<td>3</td>
<td>1q</td>
</tr>
<tr>
<td>LFS1210</td>
<td>Organisation and human resources</td>
<td>John Cultiaux, Eline Jammaers</td>
<td>3</td>
<td>2q</td>
</tr>
<tr>
<td>LFS1230</td>
<td>Introduction to management and to business economics</td>
<td>Benoît Gailly</td>
<td>4</td>
<td>2q</td>
</tr>
<tr>
<td>LFS1245</td>
<td>Environment and business</td>
<td>Jean-Pierre Tack</td>
<td>3</td>
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</table>

○ One course between

De 3 à 5 CREDITS parmi

<table>
<thead>
<tr>
<th>Code</th>
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<th>Instructor(s)</th>
<th>Credits</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFS2202</td>
<td>Ethics and ICT</td>
<td>Axel Gossseries, Olivier Pereira</td>
<td>3</td>
<td>2q</td>
</tr>
<tr>
<td>LFS2280</td>
<td>Business Ethics and Compliance Management</td>
<td>Carlos Desmet</td>
<td>5</td>
<td>1q</td>
</tr>
</tbody>
</table>

○ Alternative to the major in business risks and opportunities for computer science students

Computer science students who have already taken courses in this field while pursuing their Bachelor's degree may choose between 16-20 credits from the courses offered in the management minor for computer sciences.
MAJOR IN SMALL AND MEDIUM SIZED BUSINESS CREATION

In keeping with most of the Masters’ degrees in civil engineering, the goal of this major is to familiarize the civil engineering student with the specifics of entrepreneurship and business development in order to develop the necessary abilities, knowledge and tools to create a business. It is a truly interdisciplinary initiative where students from different faculties are brought together in cross-disciplinary teams to create an entrepreneurial project. The Interdisciplinary program in entrepreneurship (CPME) is spread over two years and is integrated into more than 20 Masters (8 faculties). The program includes a collective and interdisciplinary master thesis focused on an entrepreneurial project (start-up or spin-off) and realized in teams of 3 to 4 students from 3 to 4 different faculties. The access is reserved for a small number of students by a selection procedure. Additional information may be found at www.uclouvain.be/cpme. This major is not available in English and may not be taken at the same time as the major “Business risks and opportunities”.

<table>
<thead>
<tr>
<th>Mandatory</th>
<th>Optional</th>
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<tbody>
<tr>
<td>Courses not taught during 2019-2020</td>
<td>Periodic courses not taught during 2019-2020</td>
</tr>
<tr>
<td>Periodic courses taught during 2019-2020</td>
<td>Activity with requisites</td>
</tr>
</tbody>
</table>

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

De 20 à 25 CREDITS parmi

Contenu:

Required courses for the major in small and medium sized businesses

- **LCPME2001** Entrepreneurship Theory (in French)
  - Instructor: Blanche Havenne (compensates Frank Janssen)
  - Credits: 5
  - Period: 1q

- **LCPME2002** Managerial, legal and economic aspects of the creation of a company (in French)
  - Instructor: Yves De Cordt, Marine Falize
  - Credits: 5
  - Period: 1q

- **LCPME2003** Business plan of the creation of a company (in French)
  - Instructor: Frank Janssen
  - Credits: 5
  - Period: 2q

- **LCPME2004** Advanced seminar on Entrepreneurship (in French)
  - Instructor: Frank Janssen
  - Credits: 5
  - Period: 2q

Prerequisite CPME courses

Student who have not taken management courses during their previous studies must enroll in LCPME2000.

- **LCPME2000** Venture creation financement and management I
  - Instructor: Yves De Rongé, Olivier Giacomin
  - Credits: 5
  - Period: 1q
### ELECTIVE COURSES IN GENETIC ENGINEERING

- **Mandatory**
- **Optional**
- **Courses not taught during 2019-2020**
- **Periodic courses taught during 2019-2020**
- **Activity with requisites**

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Contenu:</th>
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</thead>
<tbody>
<tr>
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<td>2</td>
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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Faculty</th>
<th>Hours</th>
<th>Credits</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBIR1352</td>
<td>General genetics</td>
<td>Philippe Baret</td>
<td>45h+15h</td>
<td>5 Credits</td>
<td>2q x x</td>
</tr>
<tr>
<td>LBIRC2101B</td>
<td>Analyse biochimique et notions de génie génétique: Notions de génie génétique</td>
<td>François Chaumont, Charles Hachez, Pierre Mosomme</td>
<td>18.5h +22.5h</td>
<td>4 Credits</td>
<td>1q x x</td>
</tr>
<tr>
<td>LBRMC2101</td>
<td>Genetic engineering</td>
<td>François Chaumont (coord.), Charles Hachez</td>
<td>30h+7.5h</td>
<td>3 Credits</td>
<td>1q x x</td>
</tr>
</tbody>
</table>

### ELECTIVE COURSES IN BIOCHEMICAL ENGINEERING

- **Mandatory**
- **Optional**
- **Courses not taught during 2019-2020**
- **Periodic courses taught during 2019-2020**
- **Activity with requisites**

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Contenu:</th>
</tr>
</thead>
<tbody>
<tr>
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<thead>
<tr>
<th>Course Code</th>
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<th>Faculty</th>
<th>Hours</th>
<th>Credits</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBRL2102</td>
<td>Physiological and nutritional biochemistry</td>
<td>Cathy Debier, Yvan Larondelle (coord.)</td>
<td>45h</td>
<td>5 Credits</td>
<td>1q x x</td>
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<tr>
<td>LBRL2104</td>
<td>Food microbiology</td>
<td>Jacques Mahillon</td>
<td>30h+22.5h</td>
<td>5 Credits</td>
<td>2q x x</td>
</tr>
<tr>
<td>LBRMC2202</td>
<td>Cell culture technology</td>
<td>David Alsteens, Charles Hachez (coord.), Pascal Hols</td>
<td>30h</td>
<td>3 Credits</td>
<td>1q x x</td>
</tr>
<tr>
<td>LBRNA2202</td>
<td>Nano-biotechnologies</td>
<td>Yves Dufrêne</td>
<td>30h</td>
<td>3 Credits</td>
<td>2q x x</td>
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<tr>
<td>LBRTE2201</td>
<td>Human and environmental toxicology</td>
<td>Cathy Debier (coord.), Philippe Hantson</td>
<td>37.5h +7.5h</td>
<td>5 Credits</td>
<td>1q x x</td>
</tr>
</tbody>
</table>

### ELECTIVE COURSES IN PHARMACEUTICAL ENGINEERING

- **Mandatory**
- **Optional**
- **Courses not taught during 2019-2020**
- **Periodic courses taught during 2019-2020**
- **Activity with requisites**

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Contenu:</th>
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<tbody>
<tr>
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<tr>
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<th>Faculty</th>
<th>Hours</th>
<th>Credits</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINMA2300</td>
<td>Analysis and control of distributed parameter systems</td>
<td>Denis Dochain</td>
<td>30h+30h</td>
<td>5 Credits</td>
<td>1q x x</td>
</tr>
<tr>
<td>LMAPR2118</td>
<td>Fluid-fluid separations</td>
<td>Patricia Luis Alconero, Denis Mignon</td>
<td>30h +22.5h</td>
<td>5 Credits</td>
<td>2q x x</td>
</tr>
<tr>
<td>LMAPR2330</td>
<td>Reactor Design</td>
<td>Juray De Wilde</td>
<td>30h+30h</td>
<td>5 Credits</td>
<td>2q x x</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
<td>Instructor(s)</td>
<td>Credits</td>
<td>Year</td>
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<td>------</td>
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</tr>
<tr>
<td>LMAPR2380</td>
<td>Solid-fluid separation</td>
<td>Tom Leyssens, Patricia Luis Alconero</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>LMAPR2430</td>
<td>Industrial processes for the production of base chemicals</td>
<td>Juray De Wilde</td>
<td>5</td>
<td>1</td>
<td></td>
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<tr>
<td>WFARM1008</td>
<td>Design of the drug</td>
<td>Giulio Muccioli, Véronique Préat (coord.)</td>
<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>WFARM1232</td>
<td>General Pharmacology</td>
<td>Emmanuel Hermans</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>WFARM1307</td>
<td>Physical pharmacy</td>
<td>Tom Leyssens</td>
<td>2</td>
<td>1</td>
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</tbody>
</table>
## ELECTIVE COURSES IN STATISTICS

This module in statistics offers courses being useful for data processing (analysis laboratory, clinical research, quality management, etc.). Students taking at least 45 credits in this module and among courses in statistics from the majors of the Master (labels LBIRA, LBIRC, LSTAT, WESP, WFSP) will later get a direct access to the second year of the Master in Statistics: Biostatistics [120 credits]. More information about this program bridge via info-stat-actu@uclouvain.be

<table>
<thead>
<tr>
<th>Year</th>
<th>Content:</th>
</tr>
</thead>
<tbody>
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### Courses

<table>
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<th>Instructor(s)</th>
<th>Credits</th>
<th>Period(s)</th>
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<tbody>
<tr>
<td>LSTAT2020</td>
<td>Statistical softwares and basic statistical programming</td>
<td>Céline Bugli</td>
<td>4</td>
<td>1q</td>
</tr>
<tr>
<td>LSTAT2040</td>
<td>Statistical analysis</td>
<td>Benjamin Colling</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LSTAT2130</td>
<td>Introduction to Bayesian statistics</td>
<td>Philippe Lambert</td>
<td>4</td>
<td>2q</td>
</tr>
<tr>
<td>LSTAT2170</td>
<td>Times series</td>
<td>Rainer von Sachs</td>
<td>5</td>
<td>2q</td>
</tr>
<tr>
<td>LSTAT2210</td>
<td>Advanced linear models</td>
<td>Lieven Desmet (compensates Catherine Legrand)</td>
<td>4</td>
<td>1q</td>
</tr>
<tr>
<td>LSTAT2220</td>
<td>Analysis of survival and duration data</td>
<td>Ingrid Van Keilegom</td>
<td>4</td>
<td>1q</td>
</tr>
</tbody>
</table>

## ELECTIVE COURSES: TRANSVERSAL SKILLS AND CONTACTS WITH INDUSTRY

The student selects between 3 and 22 credits (max 27 if the student selects the internship) in this list below or in the courses of the major "business risks and opportunities". An alternative is to select the Major in small and medium sized business creation.

### Courses

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Transversal skills and contacts with industry</td>
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<td>2</td>
<td>Max=8 CREDITS parmi</td>
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### Internship

<table>
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<th>Course Title</th>
<th>Instructor(s)</th>
<th>Credits</th>
<th>Period(s)</th>
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<tbody>
<tr>
<td>LFSA2995</td>
<td>Company Internship</td>
<td>Jean-Pierre Raskin</td>
<td>10</td>
<td>1 + 2q</td>
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### Communication

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<th>Credits</th>
<th>Period(s)</th>
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<tbody>
<tr>
<td>LALLE2500</td>
<td>Professional development seminar German</td>
<td>3</td>
<td>1 + 2q</td>
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<tr>
<td>LALLE2501</td>
<td>Professional development seminar-German</td>
<td>5</td>
<td>1 + 2q</td>
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### Group dynamics

<table>
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<th>Credits</th>
<th>Year</th>
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</thead>
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<tr>
<td>LEPL2351</td>
<td>Dynamique des groupes - Q1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>LEPL2352</td>
<td>Dynamique des groupes - Q2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

### Other non-disciplinary courses

The student may further select maximum 8 credits in other disciplines.
ELECTIVE COURSES AVAILABLE FOR MASTER STUDENTS IN BIOMEDICAL ENGINEERING

The elective courses being recommended and available for Master students in biomedical engineering are listed here above, in the majors and other lists of elective courses. However, a student can further suggest other courses that would be relevant for his/her personal curriculum, pending that this is compliant with the rules for setting up a personal Master program.

Course prerequisites

A document entitled en-prerequis-2019-gbio2m.pdf specifies the activities (course units - CU) with one or more pre-requisite(s) within the study programme, that is the CU whose learning outcomes must have been certified and for which the credits must have been granted by the jury before the student is authorised to sign up for that activity.

These activities are identified in the study programme: their title is followed by a yellow square.

As the prerequisites are a requirement of enrolment, there are none within a year of a course.

The prerequisites are defined for the CUs for different years and therefore influence the order in which the student can enrol in the programme’s CUs.

In addition, when the panel validates a student’s individual programme at the beginning of the year, it ensures the consistency of the individual programme:

• It can change a prerequisite into a corequisite within a single year (to allow studies to be continued with an adequate annual load);
• It can require the student to combine enrolment in two separate CUs it considers necessary for educational purposes.

For more information, please consult regulation of studies and exams.

The programme’s courses and learning outcomes

For each UCLouvain training programme, a reference framework of learning outcomes specifies the competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme’s reference framework of learning outcomes in the document “In which teaching units are the competences and learning outcomes in the programme’s reference framework developed and mastered by the student?”

The document is available by clicking this link after being authenticated with UCL account.
GBIO2M - Information

Admission

General and specific admission requirements for this program 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

• Specific Admission Requirements
• University Bachelors
• Non university Bachelors
• Holders of a 2nd cycle University degree
• Holders of a non-University 2nd cycle degree
• Adults taking up their university training
• Access on the file
• Admission and Enrolment Procedures for general registration

Specific Admission Requirements

This programme is taught in English with no prerequisite in French. The student is supposed to have at least a B2 level in the European Framework of Reference. A certificate is required for the holders of a non-Belgian degree, see selection criteria of the "Personalized access".

University Bachelors

<table>
<thead>
<tr>
<th>Diploma</th>
<th>Special Requirements</th>
<th>Access</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC Louvain Bachelors</td>
<td></td>
<td>Direct Access</td>
<td>Students who have neither major nor minor in the field of their civil engineering Master's degree may have an adapted master programme.</td>
</tr>
<tr>
<td>Bachelor in Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others Bachelors of the French speaking Community of Belgium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor in Engineering</td>
<td></td>
<td>Direct Access</td>
<td>Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil engineering master degree may have an adapted programme.</td>
</tr>
<tr>
<td>Bachelor en sciences de l'ingénieur - orientation ingénieur civil</td>
<td></td>
<td>Direct Access</td>
<td>L'étudiant n'ayant suivi au préalable ni la majeure, ni la mineure dans la discipline de son master ingénieur civil peut se voir proposer par le jury un adaptation de son programme de master.</td>
</tr>
<tr>
<td>Bachelors of the Dutch speaking Community of Belgium</td>
<td></td>
<td>Access with additional training</td>
<td>Students who have no specialisation in the field of their civil engineering master degree may have an adapted master programme with up to 60 additional credits.</td>
</tr>
<tr>
<td>Bachelor in engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Bachelors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor in engineering</td>
<td>Bachelors degree of Cluster Institution</td>
<td>Direct Access</td>
<td>Students with a Bachelor's degree in engineering sciences who have not taken the equivalent of a minor in the field of their civil engineering master degree may have an adapted master programme with up to 60 additional credits.</td>
</tr>
</tbody>
</table>

Non university Bachelors

> Find out more about links to the university

Holders of a 2nd cycle University degree

<table>
<thead>
<tr>
<th>Diploma</th>
<th>Special Requirements</th>
<th>Access</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Licenciés&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Masters

| Master in Engineering    | Direct Access        |             |                       |

Holders of a non-University 2nd cycle degree

> Find out more about links to the university

Adults taking up their university training

> See the website Valorisation des acquis de l'expérience

It is possible to gain admission to all masters courses via the validation of professional experience procedure.

Access on the file

Reminder: all Masters (apart from Advanced Masters) are also accessible on file.

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.

Admission and Enrolment Procedures for general registration
Teaching method

Methods that promote multidisciplinarity
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

Since its creation, the Louvain School of Engineering (EPL) has participated in diverse exchange programs that were put into place at the European level and beyond.

Possible trainings at the end of the programme

Accessible complementary Master’s degrees: currently under examination.
Accessible PhD curriculum: 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

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Entity
Structure entity
Denomination
Facility
Sector
Acronym
Postal address

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