Master of science in Biomedical Engineering

Programme mnemonic
MA-IRCB
› Focus *Professional* : M-IRCBS

Studies level
Master 120 credits

Learning language
english

Schedule
office hours

Studies category / subcategory
Sciences and technics / Sciences and technics

Campus
Solbosch

Programme objectives

With their unique multidisciplinary background at the crossroads of biomedicine and engineering, graduates of this programme can design and implement equipment that meets the complex combined requirements of technology and the living world. Biomedical engineers play a fundamental part in bringing together the scientific and technological approaches of the engineering and biomedical industries. This versatile Master programme is a response to the constant evolution of medical technologies in areas such as biomechanics, instruments, or biomedical imaging. This means that biomedical engineering is a promising sector, supporting the development of an innovative industry that draws from life and health sciences.

The Master in Biomedical Engineering revolves around three main components:

1. Biomechanics
2. Biomedical instruments
3. Biomedical imaging and computing

The 'biomechanics' component places emphasis on design, choice of materials, and production of prosthetics, micro-surgical instruments, and implants, as well as on the mechanical analysis of biological systems such as the musculoskeletal system with and without prosthetics.

The 'biomedical instruments' component relates to developing sensors and stimulators—essentially by using analogue and digital electronics and micro-electronics—to create implantable and non-implantable medical devices.

The 'biomedical imaging and computing' component deals with the acquisition, processing, validation, and interpretation of biomedical data. Classes cover the various types of modern imaging systems, and students learn to use the images produced for a variety of applications: diagnostic assistance, surgery scheduling, or surgical navigation.

In all fields of biomedical engineering, the future will belong to multidisciplinary teams. Biomedical engineers play a fundamental part in bringing together the scientific and technological approaches used in the engineering and biomedical industries.

Programme's added value

This programme was created as a response for the growing demand of engineers who can understand, interpret, and provide solutions to the technical needs of the medical community; the Master in Biomedical Engineering is the most recent programme available to students, with the first graduates earning their degree in July of 2007. This high-level programme combines traditional engineering skills and cutting-edge biomedical skills.

The programme is accredited by Belgium's public authority that regulates the title of 'Engineer' (jointly with the agency in charge of evaluating higher education programmes), and has been awarded the EUR-ACE label.

By learning engineering and biomedicine at ULB, students ensure they receive a high-level pluridisciplinary education. Learning a variety of skills is essential in order to design and implement biomedical equipment that can meet the complex requirements of technology and the living world.

Teaching methods

The programme alternates between various teaching methods (from lecture classes to project-based learning), leaving much room—around half of the programme's total hours—for workshops and laboratory classes as well as visits to companies and research centres.

In order to promote the students' personal growth as well as their teamwork skills during their five years of studies, the

Master in Biomedical Engineering places particular emphasis on transdisciplinary projects that involve all subjects in the programme, in both fields: biomedical and engineering.

Students work on projects in the 1st year of the Master, choosing one specific area of speciality. They can complete either a computer-aided design project related to biomechanics or biomedical instruments, or a biomedical imaging project. Alternatively, selected students may also take part in a

biomedical project on development cooperation, or a 'team leader' project.

In the final year, in addition to the dissertation—in which students elaborate on a topic related to their speciality—, the programme lets students complete a work placement in a hospital or a company, in Belgium or abroad; this immerses them in an environment similar to what they might experience when they start working as biomedical engineers.

Succeed in your studies

Choose

The information and guidance counsellors at the InfOR-études [https://www.ulb.be/en/studies-info-desk-1] service will help you choose your studies throughout the year.

Succeed

Take part in preparatory courses [https://www.ulb.be/en/studies-info-desk-1] or get help to succeed [https://www.ulb.be/en/studies-info-desk-1] , before or during your studies.

Get help

Apply for financial aid, look for accommodation or a student job, get support [https://www.ulb.be/fr/aides-services-et-accompagnement/aid-services-and-support-1] for your specific needs.

International/Openness

Exchanges

Students in the Master programme may also take part in an exchange programme (for one term or an entire year), such as Erasmus or another programme.

Work placement

In the 2nd year of the Master, students may complete a work placement that will immerse them in a professional environment for at least 12 weeks. This places them in direct and active contact with the professional world, earning them real-world experience and engineering skills. The work placement takes place in a company or in a hospital unit, in Belgium or abroad. It can also take place in an academic research group, but only abroad.

Examples of work placement settings

Companies: Baxter, Biocartis, Cardiatis, Cardio3, Centexbel, Cochlear, Endo Tools Therapeutics, Euranova, IBA, IMEC, Inoue, Intuitim, Johnson & Johnson Medical, Kisano, Materlialise, Medisoft, MedPole, Mobelife, Siemens, Synergia Medical, Volcano, 3Win, etc.

Hospitals: Erasme hospital, Brugmann hospital, Jules Bordet institute

Abroad (in companies, hospitals, or academic research groups): Brain Innovation (Maastricht, Netherlands), Withings (Paris, France), Image Guided Therapy (Pessac, France), Alfred Hospital (Melbourne, Australia), Pitié-Salpêtrière hospital (Paris, France), Harvard University (Cambridge, USA), University College London (London, UK)

Partnerships

A strong partnership exists between the Master in Biomedical Engineering and the Faculty of Medicine as well as ULB's network of partner hospitals, who have cutting-edge equipment. A number of professors in the Faculty of Medicine also give specific classes on biomedicine as part of this Master programme.

In addition, the programme has formed partnerships with other Belgian universities (Vrije Universiteit Brussel, Université Catholique de Louvain, Université de Liège), which creates opportunities for more courses. Other opportunities include students taking part in 3 events (5 credits): the Biomedical Days (three days of talks hosted by a panel of speakers from the industrial sector, organised jointly with UCL and ULg), the National Day on Biomedical Engineering—including a biomedical job fair —, and the European Course on Laparoscopic Surgery.

Job opportunities

Biomedical engineering is among the industries with the highest growth rates, and more jobs are created each year—especially in the field of innovation. In 2013, over 10,000 patent applications were filed with the European Patent Office in the area of medical technologies, which is more than in any other technical area. Among these applications, 41% were filed by EU countries and 39% by the USA. Innovation is happening at such a rapid pace that new medical technologies are replaced by improved versions 18 to 24 months after their introduction. This means that graduates of this programme can naturally work as experts, project managers, or even project leaders, in R&D departments, consulting firms, and academic research units, where they can design, develop, and optimise any number of medical devices for clinical or research use.

Nearly 25,000 companies are active in medical technology in Europe, totalling over 575,000 employees, while the industry employs 520,000 in the USA. As for the pharmaceutical industry, it employs 675,000 people in Europe. This makes for a high level of demand for workers with advanced qualifications in the medical technology industry in general, and in our countries in particular. The Master in Biomedical Engineering was created in response to this high demand.

Graduates can apply to large companies with a long history in developing and producing medical equipment, but also—and especially—to SMEs. Making up 95% of the medical technology industry in Europe, SMEs are boosted by the considerable size of the market for medical technologies. This market is estimated at 100 billion euros in the Europe, while the region has a positive trade balance of 15,2 billion euros. Imports/exports by country are presented below, with Belgium among the top exporters.

Our country offers many job opportunities for biomedical engineers. For instance, Belgium's medical equipment industry employs some 18,000 people for a total turnover of 3.4 billion euros; the industry is growing at a rate of 4% (2010), and Belgium has over 380 companies specialised in medical devices, 70% of which are SMEs.

This Master programme is versatile enough that graduates have a wealth of professional opportunities, including in other areas than biomedical engineering. Depending on their choice of specialisation—each of which provides advanced technical

training—, graduates of the Master in Biomedical Engineering can also work in other, more traditional areas such as mechanical engineering, electronics, or computer science. Lastly, as the programme is firmly rooted in applied medicine, biomedical engineers can also work in hospitals, including in managerial positions.

Contacts

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https://polytech.ulb.be/fr/les-etudes/masters/biomedical

Jury President
Johan GYSELINCK

Jury Secretary
Simon-Pierre GORZA

Master of science in Biomedical Engineering
Focus Professional

The programme is based on the standard three-year format: the third year of the Bachelor programme, followed by two years of a Master programme. Courses are given on the three following main subjects: biomechanics, biomedical instruments, and biomedical imaging. The 3rd year of the Bachelor programme provides basic knowledge in biomedicine and engineering. Then, the 1st year of the Master programme covers the basic material for all three main subjects, while the 2nd year has students choose a series of courses that align more closely with their interests in one of these subjects. Students may also choose to specialise in courses required to become an expert in medical radiophysics; this speciality will give them insight into the use and impact of ionising radiation (radiotherapy, scanners etc.) on living tissue.

Bachelor – Year 3

In addition to a common core of courses, 30 credits are specific to biomedical engineering: these specialised courses provide basic knowledge in biomedicine (biology, physiology, biochemistry, anatomy) and engineering (instruments, computing, and automation), later developed in the Master programme.

Master – Year 1

Courses are centred around a 'biomedicine' module (25 credits) and an 'engineering' module (30 credits), which cover the basics of the programme's three core subjects (biomechanics, instruments, imaging) in order to help students choose a specialisation in year 2 based on their personal interests.

The programme is completed by a specific project related to biomedical engineering (5 credits), which can take the form of a biomedical imaging project or a biomechanics project. Alternatively, selected students may complete one of two other types of projects: a biomedical project on development cooperation (see www.ulb.ac.be/facs/polytech/cooperation-Mission.html to learn more about these projects), and a 'team leader' project, where they will supervise a group of 1st-year Bachelor students for their own final project.

Master – Year 2

For the final year, the programme includes a dissertation, which counts for 20 credits, and three series of classes (modules), each of which is specialised in one of the three main subjects (biomechanics, instrumentation, imaging). By choosing at least 20 credits' worth of courses in two of the three modules, students can align their studies with their interests. Another possibility is to specialise in medical radiophysics, in order to prepare for additional training as an expert in this medical radiophysics.

Students may also complete a work placement (10 credits) in a company or a hospital, in Belgium or abroad, with an additional module and a free module, totalling at least 60 credits. In addition, students take part in 3 events (5 credits): the Biomedical Days (three days of talks hosted by a panel of speakers from the industrial sector, organised jointly with UCL and ULg), the National Day on Biomedical Engineering—including a biomedical job fair—, and the European Course on Laparoscopic Surgery.

Some courses are given in English (the actual number of hours depends on each student's choice of electives).

Bloc 1 | M-IRCBS | MA-IRCB

ENGINEERING SCIENCE

ELEC-H310 — Digital electronics | Dragomir MILOJEVIC (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] | second term | English

ELEC-H402 — Analog electronics | François QUITIN (Coordinator)
5 credits [lecture: 24h, practical work: 36h] | second term | English

ELEC-H424 — Active medical devices | Antoine NONCLERCQ (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] | second term | English

INFO-H500 — Image acquisition and processing | Olivier DEBEIR (Coordinator)
5 credits [lecture: 24h, practical work: 24h] | first term | English

MEDI-H503 — Orthopaedic Biomechanics | Bernardo INNOCENTI (Coordinator)
5 credits [lecture: 48h, tutorial classes: 12h] | second term | English

STAT-H400 — Multivariate data analysis | Adrien Foucart (Coordinator)
5 credits [lecture: 24h, tutorial classes: 24h] | first term | English

BIOMEDICAL SCIENCE

BIME-H406 — Molecular biology and microbiology | Anne OP DE BEECK (Coordinator), Rachel DEPLUS and Yvan De Launoit
5 credits [lecture: 48h, practical work: 12h] | first term | English

BIME-H407 Introduction to medical imaging and optical microscopy | Olivier DEBEIR (Coordinator) and Simon-Pierre GORZA
5 credits [lecture: 48h, tutorial classes: 12h] first term English

BIME-H408 Histology and neurophysiology | Karelle LEROY (Coordinator), David GALL and Serge SCHIFFMANN
5 credits [lecture: 60h, practical work: 12h] first term English

BIME-H409 Human Physiology | Nicolas BAEYENS (Coordinator) and Gaël DEBOECK
5 credits [lecture: 24h, practical work: 12h] second term English

INFO-H400 Medical Information Systems | David WIKLER (Coordinator)
5 credits [lecture: 24h, tutorial classes: 24h, practical work: 12h] second term English

ENGINEERING PROJECT

1 project to chose out of these 4

Project to choose

One course chosen from the following

MECA-H409 (optional) Design methodology | Alain DELCHAMBRE (Coordinator)
5 credits [lecture: 24h, tutorial classes: 24h, personal assignments: 12h] first term English

PROJ-H417 (optional) Projet coopération au développement / Development cooperation project | Antoine NONCLERCQ (Coordinator)
5 credits [project: 150h] first and second terms French
Only on selection : see the Development Unit of the Polytechnic School of Brussels (http://polytech.ulb.be/en/international/development-cooperation)

PROJ-H418 (optional) Hands-on learning: project manager (chef de projet) | Péter BERKE (Coordinator)
5 credits [project: 150h] first and second terms French

PROJ-H419 (optional) Biomedical engineering project in image analysis | Olivier DEBEIR (Coordinator)
5 credits [project: 150h] academic year English

Master of science in Biomedical Engineering
Focus Professional

Bloc 2 | M-IRCBS | MA-IRCB

Compulsory commun courses - Block 2

MEMO-H500 Master thesis in biomedical engineering | Bernardo INNOCENTI (Coordinator)
20 credits [personal assignments: 600h] academic year English

PROJ-H500 Biomedical research and industry seminars | Olivier DEBEIR (Coordinator)
5 credits [lecture: 60h] academic year English

An alternative chosen from the five following

Option Biomechanics and instrumentation

Choose a minimum of 20 credits from the modules 594 and 595

(with a min of 5 ECTS for a module)

A total of 20 credits chosen from the following

Module 594 - Biomechanics

MECA-H501 (optional) Soft microrobotics | Pierre LAMBERT (Coordinator)
5 credits [lecture: 24h, practical work: 24h, personal assignments: 24h] academic year English

MEDI-H504 (optional) Design of Orthopaedic Medical Devices : biomechanics, design and regulation | Bernardo INNOCENTI (Coordinator)
5 credits [lecture: 48h, tutorial classes: 12h] first term English

MEDI-H508 (optional) Fluid mechanics of the cardiovascular and pulmonary systems. From physiology to applications | Benoît HAUT (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] first term English

Module 595 - Instrumentation

ELEC-H409 (optional) Digital architectures and design | Dragomir MILOJEVIC (Coordinator)
5 credits [lecture: 12h, practical work: 36h] first term English

ELEC-H410 (optional) Real-time computer systems | François QUITIN (Coordinator)
5 credits [lecture: 24h, practical work: 36h] second term English

ELEC-H503 (optional) Artificial organs | Antoine NONCLERCQ (Coordinator)
5 credits [lecture: 24h, practical work: 36h] second term English

MATH-H509 (optional) Biomedical robotics | Emanuele GARONE (Coordinator) and Bernardo INNOCENTI
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] second term English

MEDI-H507 (optional) Lab on a chip for biomedical applications | Benoit SCHEID (Coordinator) and Gert DESMET
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] second term English

or

Option Biomechanics and biomedical image analysis and informatics

Choose a minimum of 20 credits from the modules 594 and 596

(with a min of 5 credits for module)

A total of 20 credits chosen from the following

Module 594 - Biomechanics

MECA-H501 (optional) — Soft microrobotics | Pierre LAMBERT (Coordinator)
5 credits [lecture: 24h, practical work: 24h, personal assignments: 24h] academic year English

MEDI-H504 (optional) — Design of Orthopaedic Medical Devices : biomechanics, design and regulation | Bernardo INNOCENTI (Coordinator)
5 credits [lecture: 48h, tutorial classes: 12h] first term English

MEDI-H508 (optional) — Fluid mechanics of the cardiovascular and pulmonary systems. From physiology to applications | Benoît HAUT (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] first term English

Module 596 - Biomedical image analysis and informatics

BINF-F401 (optional) — Computational Methods for Functional Genomics | Vincent DETOURS (Coordinator)
5 credits [lecture: 36h, practical work: 24h] second term English

INFO-H501 (optional) — Pattern recognition and image analysis | Olivier DEBEIR (Coordinator) and Isabelle SALMON
5 credits [lecture: 36h, practical work: 24h] second term English

INFO-H502 (optional) — 3D graphics in VR | Daniele Bonatto (Coordinator)
5 credits [lecture: 18h, practical work: 30h, project: 12h] first and second terms English

INFO-H503 (optional) — GPU computing | Daniele Bonatto (Coordinator)
5 credits [lecture: 18h, practical work: 30h, project: 12h] second term English

INFO-H516 (optional) — Visual Media Compression | Gauthier LAFRUIT (Coordinator)
5 credits [lecture: 24h, practical work: 24h, personal assignments: 12h] second term English

MEDI-H401 (optional) — Radioprotection médicale, y compris les techniques de radiologie
2 credits [lecture: 12h, practical work: 12h] second term French

MEDI-H506 (optional) — Magnetic Resonance Imaging and Biomedical Nanotechnology | Gilles BRUYLANTS (Coordinator) and Thierry METENS
5 credits [lecture: 48h, practical work: 12h] second term English

or

Option Instrumentation and biomedical image analysis and informatics

Choose a minimum of 20 credits from the modules 595 and 596

(with a minimum of 5 credits for module)

A total of 20 credits chosen from the following

Module 595 - Instrumentation

ELEC-H409 (optional) — Digital architectures and design | Dragomir MILOJEVIC (Coordinator)
5 credits [lecture: 12h, practical work: 36h] first term English

ELEC-H410 (optional) — Real-time computer systems | François QUITIN (Coordinator)
5 credits [lecture: 24h, practical work: 36h] second term English

ELEC-H503 (optional) Artificial organs | Antoine NONCLERCQ (Coordinator)
5 credits [lecture: 24h, practical work: 36h] second term English

MATH-H509 (optional) Biomedical robotics | Emanuele GARONE (Coordinator) and Bernardo INNOCENTI
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] second term English

MEDI-H507 (optional) Lab on a chip for biomedical applications | Benoit SCHEID (Coordinator) and Gert DESMET
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] second term English

Module 596 - Biomedical image analysis and informatics

BINF-F401 (optional) Computational Methods for Functional Genomics | Vincent DETOURS (Coordinator)
5 credits [lecture: 36h, practical work: 24h] second term English

INFO-H501 (optional) Pattern recognition and image analysis | Olivier DEBEIR (Coordinator) and Isabelle SALMON
5 credits [lecture: 36h, practical work: 24h] second term English

INFO-H502 (optional) 3D graphics in VR | Daniele Bonatto (Coordinator)
5 credits [lecture: 18h, practical work: 30h, project: 12h] first and second terms English

INFO-H503 (optional) GPU computing | Daniele Bonatto (Coordinator)
5 credits [lecture: 18h, practical work: 30h, project: 12h] second term English

INFO-H516 (optional) Visual Media Compression | Gauthier LAFRUIT (Coordinator)
5 credits [lecture: 24h, practical work: 24h, personal assignments: 12h] second term English

MEDI-H401 (optional) Radioprotection médicale, y compris les techniques de radiologie
2 credits [lecture: 12h, practical work: 12h] second term French

MEDI-H506 (optional) Magnetic Resonance Imaging and Biomedical Nanotechnology | Gilles BRUYLANTS (Coordinator) and Thierry METENS
5 credits [lecture: 48h, practical work: 12h] second term English

or

Option Biomedical image analysis and informatics

Choisir un minimum de 20 crédits dans le module 596

Module 596 - Biomedical image analysis and informatics

A total of 20 credits chosen from the following

BINF-F401 (optional) Computational Methods for Functional Genomics | Vincent DETOURS (Coordinator)
5 credits [lecture: 36h, practical work: 24h] second term English

INFO-H501 (optional) Pattern recognition and image analysis | Olivier DEBEIR (Coordinator) and Isabelle SALMON
5 credits [lecture: 36h, practical work: 24h] second term English

INFO-H502 (optional) 3D graphics in VR | Daniele Bonatto (Coordinator)
5 credits [lecture: 18h, practical work: 30h, project: 12h] first and second terms English

INFO-H503 (optional) GPU computing | Daniele Bonatto (Coordinator)
5 credits [lecture: 18h, practical work: 30h, project: 12h] second term English

MEDI-H506 (optional) Magnetic Resonance Imaging and Biomedical Nanotechnology | Gilles BRUYLANTS (Coordinator) and Thierry METENS
5 credits [lecture: 48h, practical work: 12h] second term English

or

Option Medical radiophysics

Choose a minimum of 25 credits

A total of 25 credits chosen from the following

INFO-H501 (optional) — Pattern recognition and image analysis | Olivier DEBEIR (Coordinator) and Isabelle SALMON
5 credits [lecture: 36h, practical work: 24h] second term English

MEDI-H401 (optional) — Radioprotection médicale, y compris les techniques de radiologie
2 credits [lecture: 12h, practical work: 12h] second term French

MEDI-H502 (optional) — Eléments de physique et chimie nucléaire | Nicolas PAULY (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] first term French

PHYS-H407 (optional) — Nuclear measurement techniques | Nicolas PAULY (Coordinator)
5 credits [lecture: 24h, practical work: 36h] second term English

PHYS-H409 (optional) — Physical principles of magnetic resonance imaging | Thierry METENS (Coordinator)
3 credits [lecture: 22h, tutorial classes: 2h, practical work: 6h] second term English

PHYS-H501 (optional) — Introduction to medical physics | Nicolas PAULY (Coordinator) and Stéphane SIMON
3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] first term English

PHYS-H516 (optional) — Physical aspects of radiation protection | Stéphane SIMON (Coordinator) and Nicolas PAULY
3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] first term French

PHYS-H518 (optional) — Radiobiology, biological and genetic effects of radiations | Nicolas PAULY (Coordinator) and Sébastien Penninckx
1 credit [lecture: 12h] second term French

PHYS-H519 (optional) — Legal and regulatory aspects of radiation protection | Thibault VANAUDENHOVE (Coordinator)
1 credit [lecture: 12h] second term French

PHYS-H520 (optional) — Effets médicaux de l'exposition aux rayonnements ionisants | Nicolas PAULY (Coordinator) and Philippe MARTINIVE
1 credit [lecture: 12h] second term French

Electives courses

Choose a module

Electives courses for Option Biomechanics and instrumentation or Option Biomechanics and biomedical image analysis and informatics or Option Instrumentation and biomedical image analysis and informatics or Option Biomedical image analysis and informatics

Choose 2 to 15 credits (max 5 credits in EPB, Faculté de Médecine, Faculté des sciences de la motricité, Modules transversaux)

2 to 15 credits chosen from the following

BIME-G5505 (optional) — Interfaculty and interdisciplinary program in Healthcare Innovation | Hilde STEVENS (Coordinator)
5 credits [lecture: 40h, tutorial classes: 20h] second term English

BIME-Y500 (optional) — Regulatory affairs for medical devices | David Bouchez (Coordinator)
5 credits [lecture: 48h, project: 12h] second term English

BIME-Y501 (optional) — Clinical evaluation of medical devices
5 credits [lecture: 24h, tutorial classes: 12h, project: 24h] first term English

BING-H5000 (optional) — Introduction à la bioinformatique et à ses applications | Dimitri GILIS (Coordinator) and Fabrizio PUCCI
5 credits [lecture: 36h, practical work: 24h] first term French

CHIM-F4001 (optional) Rational drug design and PKPD modeling | Jean-Christophe LELOUP (Coordinator) and Martine PREVOST
5 credits [lecture: 36h, tutorial classes: 12h, project: 24h] second term English

ELEC-H417 (optional) Communication networks : protocols and architectures | Jean-Michel DRICOT (Coordinator)
5 credits [lecture: 36h, practical work: 24h] first term English

ELEC-H516 (optional) Industrial Automation | Dragomir MILOJEVIC (Coordinator)
3 credits [lecture: 12h, practical work: 24h] first term English

ENVI-L4110 (optional) Compartiments environnementaux, production, consommation et leurs impacts sur la santé | Olivier VANDENBERG (Coordinator) and Valérie ROORYCK
5 credits [lecture: 12h, practical work: 48h] second term French

GEST-S423 (optional) IP Management and Technology Transfer (Chaire Solvay) | Elise Petit (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h] second term English

INFO-H509 (optional) Geo-Spatial and web technologies | Mahmoud SAKR (Coordinator)
5 credits [lecture: 24h, practical work: 12h] second term English

INFO-H515 (optional) Big Data: Distributed Data Management and Scalable Analytics | Dimitrios SACHARIDIS (Coordinator) and Gianluca BONTEMPI
5 credits [lecture: 24h, tutorial classes: 12h, project: 24h] second term English

MATH-H503 (optional) Model-Based and Data-Driven Fault Detection and Isolation | Michel KINNAERT (Coordinator)
4 credits [lecture: 24h, practical work: 24h] second term English

MECA-H409 (optional) Design methodology | Alain DELCHAMBRE (Coordinator)
5 credits [lecture: 24h, tutorial classes: 24h, personal assignments: 12h] first term English

MECA-H411 (optional) Mechanical Vibrations | Arnaud DERAEMAEKER (Coordinator) and Wout Weijtjens
5 credits [lecture: 36h, tutorial classes: 24h] first term English

STAG-H500 (optional) Internship (3 months) | Frédéric ROBERT (Coordinator)
10 credits [work placement: 300h] first term English

Elective courses for Option Medical Radiophysics

A total of ten credits chosen from the following

BIME-G5505 (optional) Interfaculty and interdisciplinary program in Healthcare Innovation | Hilde STEVENS (Coordinator)
5 credits [lecture: 40h, tutorial classes: 20h] second term English

ENVI-L4110 (optional) Compartiments environnementaux, production, consommation et leurs impacts sur la santé | Olivier VANDENBERG (Coordinator) and Valérie ROORYCK
5 credits [lecture: 12h, practical work: 48h] second term French

GEST-S423 (optional) IP Management and Technology Transfer (Chaire Solvay) | Elise Petit (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h] second term English

MATH-F502 (optional) Imagerie et problèmes inverses | Ignace LORIS (Coordinator)
5 credits [lecture: 24h, tutorial classes: 12h] second term French

MATH-H410 (optional) Monte Carlo methods | Pierre-Etienne LABEAU (Coordinator) and Matteo Zanetti
3 credits [lecture: 24h, personal assignments: 12h] first term English

STAG-H500 (optional) Internship (3 months) | Frédéric ROBERT (Coordinator)
10 credits [work placement: 300h] first term English

Free elective courses

Students have also the opportunity to choose courses among the courses of the 'transversal modules' of the School.
English : LANG-H500

Engineering and society : PROJ-H421 - GEST-H509 - BIME-G5505 - PHYS-F517

Sustainability : GEST-S492 - ENVI-F405 - CHIM-H504 - ENVI-F452 - ENVI-F454 - ELEC-Y514

Finance, accounting, management, marketing, logistics and quality : GEST-S101 - GEST-S318 - GEST-S421 - GEST-Y501 GEST-H501 - GEST-H502

Participation to a summer school : EDUC-H601

Free elective courses

Up to six credits chosen from the following

BIME-G5505 (optional)
Interfaculty and interdisciplinary program in Healthcare Innovation | Hilde STEVENS (Coordinator)
5 credits [lecture: 40h, tutorial classes: 20h] second term English

CHIM-H504 (optional)
Engineering aspects of circular economy | Prakash VENKATESAN (Coordinator)
5 credits [lecture: 24h, practical work: 36h] first term English

DROI-C5174 (optional)
Approche interdisciplinaire du droit de la propriété intellectuelle/Interdisciplinary Approach to In | Julien CABAY (Coordinator)
5 credits [lecture: 24h] first term English/French

EDUC-H601 (optional)
Summer School | Johan GYSELINCK (Coordinator)
5 credits [personal assignments: 5h] academic year English

ELEC-Y514 (optional)
Sustainability : an interdisciplinary Approach | Cathy MACHARIS (Coordinator) and Waldo Galle
6 credits [lecture: 36h, practical work: 24h, personal assignments: 100h] academic year English

ENVI-F405 (optional)
Climat: sciences et politiques | Frank PATTYN (Coordinator) and Julien VANDEBURIE
5 credits [lecture: 40h] second term French

ENVI-F452 (optional)
Environmental impact analysis and management | Wouter ACHTEN (Coordinator) and Edgar Towa Kouokam
5 credits [lecture: 24h, practical work: 12h, project: 24h] first term English/French

ENVI-F454 (optional)
Energie: Société et environnement | Michel HUART (Coordinator) and Nadine MATTIELLI
5 credits [lecture: 24h, tutorial classes: 24h, practical work: 12h] first term French

GEST-H501 (optional)
Logistics Engineering and Management | Alassane Ballé NDIAYE (Coordinator)
5 credits [lecture: 12h, tutorial classes: 36h] first term English

GEST-H502 (optional)
Supply Chain Performance Analytics | Alassane Ballé NDIAYE (Coordinator)
5 credits [lecture: 12h, tutorial classes: 36h, personal assignments: 12h] second term English

GEST-H509 (optional)
Ethique de l'ingénieur
3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] second term French

GEST-S101 (optional)
Comptabilité financière | Gilles GEVERS (Coordinator) and Laurent GHEERAERT
5 credits [lecture: 36h, tutorial classes: 8h] second term French

GEST-S318 (optional)
Introduction to theoretical finance | Laurent GHEERAERT (Coordinator)
5 credits [lecture: 24h, tutorial classes: 24h] second term English

GEST-S421 (optional)
Entrepreneurial ecosystems | Judith BEHRENS (Coordinator)
5 credits [lecture: 24h, tutorial classes: 24h] second term English

GEST-S492 (optional)
Energy policy, sustainability & management | Adel El Gammal (Coordinator), Julien BLONDEAU and Michel HUART
5 credits [lecture: 36h, seminars: 24h] first term English

GEST-Y501 (optional)
Business Management and Entrepreneurship | Marc Goldchstein (Coordinator)
3 credits [lecture: 33h] first and second terms English

LANG-H500 (optional)
English for professional purposes | Alexander CORNFORD (Coordinator)
5 credits [tutorial classes: 48h, personal assignments: 12h] first and second terms English

PROJ-H421 (optional)
Projet polydaire: expériences didactiques innovantes pour le secondaire | Simon-Pierre GORZA (Coordinator)
5 credits [project: 150h] academic year French