

# Master of Science in Chemical and Materials Engineering

## Focus Professional

The main training focuses in Chemistry and Materials Science are :

- > Synthesis and characterization of chemical and material compounds
- > Study of the structure-properties relationship of molecules and materials
- > Instrumentation, modeling and (bio)process design
- > Fluid dynamics, transport phenomena and industrial processes
- > Recycling, environment and pollution control
- > Introduction to the safety of industrial installations and to the biotechnologies

The Master program (120 ECTS - 2 years) is characterized by a broad common core (56 ECTS spread over the two years) covering different fields of chemical and materials engineering, including the materials fundamental properties and environmental technologies.

Two options are available (30 ECTS spread over the two years):

- > **Process Technology** : to gain expertise in process control, from the development and use of modeling tools to process implementation.
- > **Materials Science** : advanced teaching on multiple aspects from design and synthesis of products and materials to their elaboration and the study of their properties.

Students will complete their programme either with an internship and/or with optional learning units for at least 10 ECTS. If they wish, they can also follow an Entrepreneurship module.

Finally, a master's thesis dissertation (24 ECTS) needs to be carried out in one of the laboratories, and can be in collaboration with an industry, a research center or a cooperation unit.

## Bloc 1 | M-IRMAE | MA-IRMA

### Common Core - Compulsory courses - Block 1

CHIM-H401	<b>Parameter estimation and modeling</b>   Philippe BOGAERTS (Coordinator) and Benoît SCHEID ⌚ 5 credits [lecture: 36h, tutorial classes: 24h] 📅 first term 🗨 English
CHIM-H406	<b>Organic chemistry : reactions and mechanisms</b>   Kristin BARTIK (Coordinator) and Elisabeth VAN DIJK ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨 English
CHIM-H407	<b>Molecular structural characterization and analysis</b>   Gilles BRUYLANTS (Coordinator) and Sebastiaan EELTINK ⌚ 5 credits [lecture: 36h, tutorial classes: 12h, practical work: 12h] 📅 second term 🗨 English
CHIM-H412	<b>Microstructural design and characterization of inorganic materials</b>   Stephane GODET (Coordinator) ⌚ 6 credits [lecture: 36h, practical work: 36h] 📅 first term 🗨 English
CHIM-H419	<b>Surface treatment : processing and analysis</b>   Iris DE GRAEVE (Coordinator) and Tom Hauffman ⌚ 4 credits [lecture: 24h, tutorial classes: 12h, practical work: 12h] 📅 first term 🗨 English
CHIM-Y400	<b>Electrochemistry</b>   Annick HUBIN (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨 English
CHIM-Y401	<b>Polymer materials</b>   Niko Paul VAN DEN BRANDE (Coordinator) ⌚ 6 credits [lecture: 24h, practical work: 48h] 📅 second term 🗨 English
CHIM-Y402	<b>Unit operations</b>   Joeri DENAYER (Coordinator) and Tom VAN ASSCHE ⌚ 7 credits [lecture: 36h, tutorial classes: 36h, practical work: 12h] 📅 first term 🗨 English

### Common Core - Compulsory project - Block 1

One course chosen from the following

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 \(chef de projet\)](#) | Peter BERKE (Coordinator)

🕒 5 credits [project: 150h] 📅 first and second terms 🗨️ French

PROJ-H422  
(optional)

[Research project on sustainable chemical processes and materials](#) | Michel VERBANCK (Coordinator) and Hubert RAHIER

🕒 5 credits [project: 150h] 📅 second term 🗨️ English

*An option chosen from (the same in bloc 1 and bloc 2) :*

M-IRMAE-P

[Option Process technology](#) > *page*

M-IRMAE-M

[Option Materials science](#) > *page*

# Master of Science in Chemical and Materials Engineering

Focus Professional

## Bloc 2 | M-IRMAE | MA-IRMA

### Common core - compulsory courses - Block 2

- CHIM-H409 [Environmental technology](#) | Michel VERBANCK (Coordinator)  
⌚ 3 credits [lecture: 24h, practical work: 12h] 📅 first term 🗨 English
- CHIM-H414 [Biotechnology : from biomolecules to biofabrication](#) | Mohammadamin SHAVANDI (Coordinator)  
⌚ 3 credits [lecture: 24h, tutorial classes: 12h] 📅 first term 🗨 English
- MEMO-H509 [Master thesis in chemical and materials engineering](#) | Kristin BARTIK (Coordinator) and Guy VAN ASSCHE  
⌚ 24 credits [personal assignments: 600h] 📅 academic year 🗨 English
- PHYS-H524 [Reliability and risk analysis of industrial installations](#) | Pierre-Etienne LABEAU (Coordinator)  
⌚ 4 credits [lecture: 24h, tutorial classes: 18h, practical work: 6h] 📅 first term 🗨 English

*An option chosen from (the same in bloc 1 and bloc 2) :*

- M-IRMAE-P [Option Process technology](#) > *page*
- M-IRMAE-M [Option Materials science](#) > *page*

# Master of Science in Chemical and Materials Engineering

Options | MA-IRMA

## Option Process technology | M-IRMAE-P

### Bloc 1

#### Compulsory courses - Block 1

- CHIM-H402 (option) **Modeling and design of multiphase systems and reactors** | Pierre COLINET (Coordinator) and Senthil PARIMALANATHAN  
 6 credits [lecture: 24h, tutorial classes: 36h, practical work: 12h] second term English
- CHIM-Y404 (option) **Heterogeneous catalysis** | Joeri DENAYER (Coordinator)  
 4 credits [lecture: 24h, practical work: 24h] second term English
- CHIM-Y405 (option) **Sustainable chemical processes** | Ken Broeckhoven (Coordinator) and Tom VAN ASSCHE  
 4 credits [lecture: 24h, tutorial classes: 24h] second term English

### Bloc 2

#### Compulsory courses - Block 2

- CHIM-H514 (option) **Simulation and design tools** | Frédéric DEBASTE (Coordinator) and Tom VAN ASSCHE  
 4 credits [lecture: 24h, practical work: 24h] first term English
- CHIM-H530 (option) **(Bio)chemical process design and control** | Philippe BOGAERTS (Coordinator) and Benoît HAUT  
 4 credits [lecture: 24h, tutorial classes: 24h] second term English
- CHIM-H531 (option) **Design of chemical plants** | Frédéric DEBASTE (Coordinator) and Tom VAN ASSCHE  
 5 credits [lecture: 24h, tutorial classes: 12h, practical work: 12h, field trips: 12h] second term English

#### One course to choose from the two following

*One course chosen from the following*

- CHIM-H518 (option/optional) **Molecular Nanosystems: from principles to applications** | Gilles BRUYLANTS (Coordinator)  
 3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] second term English
- CHIM-Y085 (option/optional) **Micro and nanobiotechnology** | Gert DESMET (Coordinator)  
 3 credits [lecture: 13h, personal assignments: 26h] second term English

#### Elective courses - Block 2

##### Option 1: Internship

*A total of ten credits chosen from the following*

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

##### Option 2: Elective courses

Students must give priority to the master's specific electives offered below.

Provided prior approval is obtained from the Curriculum council AND the course coordinator, students are allowed to select courses outside this list :

- 1) from the Materials Science profile of the MSc in chemical and material engineering;
- 2) not more than 6 ECTS in all other VUB and ULB master curricula.

### 10 to 15 credits chosen from the following

CHIM-H415 (option/optional)	<b>Ceramics</b>   Hubert RAHIER (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 second term 🗨 English
CHIM-H504 (option/optional)	<b>Engineering aspects of circular economy</b>   Prakash VENKATESAN (Coordinator) ⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 🗨 English
CHIM-H520 (option/optional)	<b>Environmental engineering : Current methods and practices</b>   Michel VERBANCK (Coordinator) ⌚ 3 credits [lecture: 12h, practical work: 12h] 📅 first term 🗨 English
CHIM-H522 (option/optional)	<b>Recycling of inorganic materials</b>   Prakash VENKATESAN (Coordinator) ⌚ 5 credits [lecture: 36h, tutorial classes: 12h, practical work: 12h] 📅 second term 🗨 English
CHIM-H533 (option/optional)	<b>Biocompatible and nanostructured materials</b>   Stephane GODET (Coordinator) ⌚ 5 credits [lecture: 36h, tutorial classes: 12h, practical work: 12h] 📅 second term 🗨 English
CHIM-H534 (option/optional)	<b>Materials selection</b>   Stephane GODET (Coordinator) ⌚ 3 credits [lecture: 12h, practical work: 24h] 📅 first term 🗨 English
CHIM-Y080 (option/optional)	<b>Nanochemistry and nanotechnology</b>   Wim DE MALSCHE (Coordinator) and Guy VAN ASSCHE ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 second term 🗨 English
CHIM-Y511 (option/optional)	<b>Advanced thermal analysis</b>   Guy VAN ASSCHE (Coordinator) ⌚ 3 credits [lecture: 12h, practical work: 24h] 📅 second term 🗨 English
CNST-Y400 (option/optional)	<b>Experimental techniques for characterization of construction materials</b>   Dimitrios ANGELIS (Coordinator) ⌚ 3 credits [lecture: 30h, tutorial classes: 6h] 📅 first term 🗨 English
MECA-Y404 (option/optional)	<b>Fuel cells and batteries</b>   Annick HUBIN (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨 English
MECA-Y5061 (option/optional)	<b>Manufacturing Technology I</b> ⌚ 3 credits [lecture: 12h, tutorial classes: 24h] 📅 first term 🗨 English
MECA-Y5062 (option/optional)	<b>Manufacturing Technology 2</b>   Tim BROECKHOVEN (Coordinator) ⌚ 3 credits [lecture: 18h, tutorial classes: 12h, personal assignments: 18h] 📅 second term 🗨 English
STAG-H504 (option/optional)	<b>Internship (40 days)</b>   Lincy Pyl (Coordinator) ⌚ 6 credits [work placement: 180h] 📅 first term 🗨 English

## Option 3: Entrepreneurship

### 10 to 15 credits chosen from the following

GEST-H501 (option/optional)	<b>Logistics Engineering and Management</b>   Alassane Ballé NDIAYE (Coordinator) ⌚ 5 credits [lecture: 12h, tutorial classes: 36h] 📅 first term 🗨 English
GEST-S421 (option/optional)	<b>Entrepreneurial ecosystems</b>   Judith BEHRENS (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨 English
GEST-S423 (option/optional)	<b>IP Management and Technology Transfer (Chaire Solvay)</b>   Bruno VAN POTTELSBERGHE (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 12h] 📅 second term 🗨 English
GEST-S471 (option/optional)	<b>Management and sustainable development : constraints and opportunities</b>   Eric MONAMI (Coordinator) ⌚ 5 credits [lecture: 36h, seminars: 36h] 📅 second term 🗨 English
GEST-S484 (option/optional)	<b>Innovation strategy</b>   Manuel HENSMANS (Coordinator) ⌚ 5 credits [lecture: 36h] 📅 second term 🗨 English



- GEST-S516**  
(option/optional) **Seminar of emerging technologies** | Marc BECQUET (Coordinator)  
⌚ 5 credits [seminars: 24h] 📅 second term 🗨 English
- GEST-Y500**  
(option/optional) **Entrepreneurship** | Nikolay DENTCHEV (Coordinator)  
⌚ 3 credits [lecture: 15h, tutorial classes: 9h, personal assignments: 62h] 📅 first term 🗨 English
- GEST-Y501**  
(option/optional) **Business Management and Entrepreneurship** | Marc GOLDCHSTEIN (Coordinator)  
⌚ 3 credits [lecture: 33h] 📅 first term 🗨 English
- GEST-Y502**  
(option/optional) **Business Aspects of Technology: Factory of the Future** | Thomas Crispeels (Coordinator)  
⌚ 3 credits [lecture: 27h, personal assignments: 59h] 📅 first term 🗨 English

*One course chosen from the following*

- GEST-Y503**  
(option/optional) **EUTOPIA learning unit : Technological business development project** | Thomas Crispeels (Coordinator)  
⌚ 3 credits [tutorial classes: 13h, personal assignments: 71h] 📅 academic year 🗨 English
- GEST-Y503**  
(option/optional) **EUTOPIA learning unit : Technological business development project** | Thomas Crispeels (Coordinator)  
⌚ 6 credits [tutorial classes: 24h, personal assignments: 150h] 📅 academic year 🗨 English
- LANG-H500**  
(option/optional) **English for professional purposes** | Alexander CORNFORD (Coordinator)  
⌚ 5 credits [tutorial classes: 48h, personal assignments: 12h] 📅 first and second terms 🗨 English

## Free elective courses

With the approval of the Curriculum council and the course coordinator, student may also complete their programme by choosing up to 5 credits of courses offered in the other programs of the School (including the courses of the transversal modules of the School) or in any other programmes outside the School.

### Free elective courses

With the prior approval of the Curriculum council AND the course coordinator, students may also complete their programme by choosing up to 5 credits of courses offered in the other programs of the School of Engineering (including the courses of the EPB transversal module) or in any other ULB or VUB programmes.

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

*Up to five credits chosen from the following*

- BIME-G5505**  
(option/optional) **Interfaculty and interdisciplinary program in Healthcare Innovation** | Hilde STEVENS (Coordinator)  
⌚ 5 credits [lecture: 40h, tutorial classes: 20h] 📅 second term 🗨 English
- CHIM-H504**  
(option/optional) **Engineering aspects of circular economy** | Prakash VENKATESAN (Coordinator)  
⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 🗨 English
- DROI-C5174**  
(option/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**  
(option/optional) **Summer School** | Johan GYSELINCK (Coordinator)  
⌚ 5 credits [personal assignments: 5h] 📅 academic year 🗨 English
- ELEC-Y514**  
(option/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 (option/optional)	<b>Climat: sciences et politiques</b>   Frank PATTYN (Coordinator) ⌚ 5 credits [lecture: 40h] 📅 second term 🗨️ French
ENVI-F452 (option/optional)	<b>Environmental impact analysis and management</b>   Wouter ACHTEN (Coordinator) ⌚ 5 credits [lecture: 24h, practical work: 12h, project: 24h] 📅 first term 🗨️ English/French
ENVI-F454 (option/optional)	<b>Energie: Société et environnement</b>   Michel HUART (Coordinator) and Nadine MATTIELLI ⌚ 5 credits [lecture: 30h, practical work: 12h, project: 24h] 📅 first term 🗨️ French
GEST-H501 (option/optional)	<b>Logistics Engineering and Management</b>   Alassane Ballé NDIAYE (Coordinator) ⌚ 5 credits [lecture: 12h, tutorial classes: 36h] 📅 first term 🗨️ English
GEST-H502 (option/optional)	<b>Supply Chain Performance Analytics</b>   Alassane Ballé NDIAYE (Coordinator) ⌚ 5 credits [lecture: 12h, tutorial classes: 36h, personal assignments: 12h] 📅 second term 🗨️ English
GEST-H509 (option/optional)	<b>Ethique de l'ingénieur</b> ⌚ 3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] 📅 second term 🗨️ French
GEST-S101 (option/optional)	<b>Comptabilité financière</b>   Laurent GHEERAERT (Coordinator) and Gilles GEVERS ⌚ 5 credits [lecture: 36h, tutorial classes: 8h] 📅 second term 🗨️ French
GEST-S318 (option/optional)	<b>Introduction to theoretical finance</b>   Laurent GHEERAERT (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨️ English
GEST-S421 (option/optional)	<b>Entrepreneurial ecosystems</b>   Judith BEHRENS (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨️ English
GEST-S492 (option/optional)	<b>Energy policy, sustainability &amp; management</b>   Adel EL Gammal (Coordinator), Julien BLONDEAU and Michel HUART ⌚ 5 credits [lecture: 36h, seminars: 24h] 📅 first term 🗨️ English
GEST-Y501 (option/optional)	<b>Business Management and Entrepreneurship</b>   Marc GOLDCHSTEIN (Coordinator) ⌚ 3 credits [lecture: 33h] 📅 first term 🗨️ English
LANG-H500 (option/optional)	<b>English for professional purposes</b>   Alexander CORNFORD (Coordinator) ⌚ 5 credits [tutorial classes: 48h, personal assignments: 12h] 📅 first and second terms 🗨️ English
PROJ-H421 (option/optional)	<b>Projet polydaire: expériences didactiques innovantes pour le secondaire</b>   Simon-Pierre GORZA (Coordinator) ⌚ 5 credits [project: 150h] 📅 academic year 🗨️ French

## Option Materials science | M-IRMAE-M

### Bloc 1

## Option Material Science : Compulsory courses - Block 1

CHIM-H415 (option)	<b>Ceramics</b>   Hubert RAHIER (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 second term 🗨️ English
CHIM-H416 (option)	<b>Mechanics of materials</b>   Stephane GODET (Coordinator) and Thierry MASSART ⌚ 3 credits [lecture: 24h, tutorial classes: 12h] 📅 second term 🗨️ English
CHIM-H417 (option)	<b>Production of metals</b>   Annick HUBIN (Coordinator) ⌚ 3 credits [lecture: 24h, practical work: 12h] 📅 second term 🗨️ English
CHIM-H421 (option)	<b>Advanced materials</b>   Guy VAN ASSCHE (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 second term 🗨️ English

### Bloc 2

## Compulsory courses - Block 2

CHIM-H511 (option)	<b>Polymers : rheology and processing</b>   Guy VAN ASSCHE (Coordinator) ⌚ 4 credits [lecture: 36h, practical work: 12h] 📅 second term 🗨️ English
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CHIM-H532 **Forming of metals** | Stephane GODET (Coordinator)  
(option) 4 credits [lecture: 24h, practical work: 24h] second term English

CHIM-Y082 **Sustainability of materials (Incl. corrosion)** | Hubert RAHIER (Coordinator) and Guy VAN INGELGEM  
(option) 5 credits [lecture: 24h, practical work: 36h] first term English

## One course to choose from the following

*One course chosen from the following*

CHIM-H534 **Materials selection** | Stephane GODET (Coordinator)  
(option/optional) 3 credits [lecture: 12h, practical work: 24h] first term English

CNST-Y400 **Experimental techniques for characterization of construction materials** | Dimitrios ANGELIS (Coordinator)  
(option/optional) 3 credits [lecture: 30h, tutorial classes: 6h] first term English

## Elective courses - Block 2

Minimum 10 ECTS to choose from one of the following options

### Option 1 : Internship

*A total of ten credits chosen from the following*

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

### Option 2 : Elective courses

Students must give priority to the master's specific electives offered below.

Provided prior approval is obtained from the Curriculum council AND the course coordinator, students are allowed to select courses outside this list :

- 1) from the Process Technology profile of the MSc in chemical and material engineering;
- 2) not more than 6 ECTS in all other VUB and ULB master curricula.

*10 to 15 credits chosen from the following*

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

CHIM-H518 **Molecular Nanosystems: from principles to applications** | Gilles BRUYLANTS (Coordinator)  
(option/optional) 3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] second term English

CHIM-H520 **Environmental engineering : Current methods and practices** | Michel VERBANCK (Coordinator)  
(option/optional) 3 credits [lecture: 12h, practical work: 12h] first term English

CHIM-H522 **Recycling of inorganic materials** | Prakash VENKATESAN (Coordinator)  
(option/optional) 5 credits [lecture: 36h, tutorial classes: 12h, practical work: 12h] second term English

CHIM-H533 **Biocompatible and nanostructured materials** | Stephane GODET (Coordinator)  
(option/optional) 5 credits [lecture: 36h, tutorial classes: 12h, practical work: 12h] second term English

CHIM-H534 **Materials selection** | Stephane GODET (Coordinator)  
(option/optional) 3 credits [lecture: 12h, practical work: 24h] first term English

CHIM-Y080 **Nanochemistry and nanotechnology** | Wim DE MALSCHE (Coordinator) and Guy VAN ASSCHE  
(option/optional) 4 credits [lecture: 24h, practical work: 24h] second term English





CHIM-Y085 (option/optional)	<b>Micro and nanobiotechnology</b>   Gert DESMET (Coordinator) ⌚ 3 credits [lecture: 13h, personal assignments: 26h] 📅 second term 🗨 English
CHIM-Y404 (option/optional)	<b>Heterogeneous catalysis</b>   Joeri DENAYER (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 second term 🗨 English
CHIM-Y405 (option/optional)	<b>Sustainable chemical processes</b>   Ken Broeckhoven (Coordinator) and Tom VAN ASSCHE ⌚ 4 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨 English
CHIM-Y511 (option/optional)	<b>Advanced thermal analysis</b>   Guy VAN ASSCHE (Coordinator) ⌚ 3 credits [lecture: 12h, practical work: 24h] 📅 second term 🗨 English
CNST-Y400 (option/optional)	<b>Experimental techniques for characterization of construction materials</b>   Dimitrios ANGELIS (Coordinator) ⌚ 3 credits [lecture: 30h, tutorial classes: 6h] 📅 first term 🗨 English
MECA-Y404 (option/optional)	<b>Fuel cells and batteries</b>   Annick HUBIN (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨 English
MECA-Y5061 (option/optional)	<b>Manufacturing Technology I</b> ⌚ 3 credits [lecture: 12h, tutorial classes: 24h] 📅 first term 🗨 English
MECA-Y5062 (option/optional)	<b>Manufacturing Technology 2</b>   Tim BROECKHOVEN (Coordinator) ⌚ 3 credits [lecture: 18h, tutorial classes: 12h, personal assignments: 18h] 📅 second term 🗨 English
STAG-H504 (option/optional)	<b>Internship (40 days)</b>   Lincy Pyl (Coordinator) ⌚ 6 credits [work placement: 180h] 📅 first term 🗨 English

## Option 3: Entrepreneurship

*10 to 15 credits chosen from the following*

GEST-H501 (option/optional)	<b>Logistics Engineering and Management</b>   Alassane Ballé NDIAYE (Coordinator) ⌚ 5 credits [lecture: 12h, tutorial classes: 36h] 📅 first term 🗨 English
GEST-S421 (option/optional)	<b>Entrepreneurial ecosystems</b>   Judith BEHRENS (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨 English
GEST-S423 (option/optional)	<b>IP Management and Technology Transfer (Chaire Solvay)</b>   Bruno VAN POTTELSBERGHE (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 12h] 📅 second term 🗨 English
GEST-S471 (option/optional)	<b>Management and sustainable development : constraints and opportunities</b>   Eric MONAMI (Coordinator) ⌚ 5 credits [lecture: 36h, seminars: 36h] 📅 second term 🗨 English
GEST-S484 (option/optional)	<b>Innovation strategy</b>   Manuel HENSMANS (Coordinator) ⌚ 5 credits [lecture: 36h] 📅 second term 🗨 English
GEST-S516 (option/optional)	<b>Seminar of emerging technologies</b>   Marc BECQUET (Coordinator) ⌚ 5 credits [seminars: 24h] 📅 second term 🗨 English
GEST-Y500 (option/optional)	<b>Entrepreneurship</b>   Nikolay DENTCHEV (Coordinator) ⌚ 3 credits [lecture: 15h, tutorial classes: 9h, personal assignments: 62h] 📅 first term 🗨 English
GEST-Y501 (option/optional)	<b>Business Management and Entrepreneurship</b>   Marc GOLDCHSTEIN (Coordinator) ⌚ 3 credits [lecture: 33h] 📅 first term 🗨 English
GEST-Y502 (option/optional)	<b>Business Aspects of Technology: Factory of the Future</b>   Thomas Crispeels (Coordinator) ⌚ 3 credits [lecture: 27h, personal assignments: 59h] 📅 first term 🗨 English

*One course chosen from the following*

GEST-Y503 (option/optional)	<b>EUTOPIA learning unit : Technological business development project</b>   Thomas Crispeels (Coordinator) ⌚ 3 credits [tutorial classes: 13h, personal assignments: 71h] 📅 academic year 🗨 English
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GEST-Y503  
(option/optional)

**EUTOPIA learning unit : Technological business development project** | Thomas Crispeels (Coordinator)

⌚ 6 credits [tutorial classes: 24h, personal assignments: 150h] 📅 academic year 🗨 English

LANG-H500  
(option/optional)

**English for professional purposes** | Alexander CORNFORD (Coordinator)

⌚ 5 credits [tutorial classes: 48h, personal assignments: 12h] 📅 first and second terms 🗨 English

## Free elective courses

With the approval of the Curriculum council and the course coordinator, student may also complete their programme by choosing up to 5 credits of courses offered in the other programs of the School (including the courses of the transversal modules of the School) or in any other programmes outside the School.

### Free elective courses

With the prior approval of the Curriculum council AND the course coordinator, students may also complete their programme by choosing up to 5 credits of courses offered in the other programs of the School of Engineering (including the courses of the EPB transversal module) or in any other ULB or VUB programmes.

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

#### *Up to five credits chosen from the following*

BIME-G5505  
(option/optional)

**Interfaculty and interdisciplinary program in Healthcare Innovation** | Hilde STEVENS (Coordinator)

⌚ 5 credits [lecture: 40h, tutorial classes: 20h] 📅 second term 🗨 English

CHIM-H504  
(option/optional)

**Engineering aspects of circular economy** | Prakash VENKATESAN (Coordinator)

⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 🗨 English

DROI-C5174  
(option/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  
(option/optional)

**Summer School** | Johan GYSELINCK (Coordinator)

⌚ 5 credits [personal assignments: 5h] 📅 academic year 🗨 English

ELEC-Y514  
(option/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  
(option/optional)

**Climat: sciences et politiques** | Frank PATTYN (Coordinator)

⌚ 5 credits [lecture: 40h] 📅 second term 🗨 French

ENVI-F452  
(option/optional)

**Environmental impact analysis and management** | Wouter ACHTEN (Coordinator)

⌚ 5 credits [lecture: 24h, practical work: 12h, project: 24h] 📅 first term 🗨 English/French

ENVI-F454  
(option/optional)

**Energie: Société et environnement** | Michel HUART (Coordinator) and Nadine MATTIELLI

⌚ 5 credits [lecture: 30h, practical work: 12h, project: 24h] 📅 first term 🗨 French

GEST-H501  
(option/optional)

**Logistics Engineering and Management** | Alassane Ballé NDIAYE (Coordinator)

⌚ 5 credits [lecture: 12h, tutorial classes: 36h] 📅 first term 🗨 English

GEST-H502  
(option/optional)

**Supply Chain Performance Analytics** | Alassane Ballé NDIAYE (Coordinator)

⌚ 5 credits [lecture: 12h, tutorial classes: 36h, personal assignments: 12h] 📅 second term 🗨 English

GEST-H509  
(option/optional)

**Ethique de l'ingénieur**

⌚ 3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] 📅 second term 🗨 French



- GEST-S101  
(option/optional) **Comptabilité financière** | Laurent GHEERAERT (Coordinator) and Gilles GEVERS  
⌚ 5 credits [lecture: 36h, tutorial classes: 8h] 📅 second term 🗨️ French
- GEST-S318  
(option/optional) **Introduction to theoretical finance** | Laurent GHEERAERT (Coordinator)  
⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨️ English
- GEST-S421  
(option/optional) **Entrepreneurial ecosystems** | Judith BEHRENS (Coordinator)  
⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨️ English
- GEST-S492  
(option/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  
(option/optional) **Business Management and Entrepreneurship** | Marc GOLDCHSTEIN (Coordinator)  
⌚ 3 credits [lecture: 33h] 📅 first term 🗨️ English
- LANG-H500  
(option/optional) **English for professional purposes** | Alexander CORNFORD (Coordinator)  
⌚ 5 credits [tutorial classes: 48h, personal assignments: 12h] 📅 first and second terms 🗨️ English
- PROJ-H421  
(option/optional) **Projet polydaire: expériences didactiques innovantes pour le secondaire** | Simon-Pierre GORZA (Coordinator)  
⌚ 5 credits [project: 150h] 📅 academic year 🗨️ French

