

Master of science in Civil Engineering

Focus Professional

The programme aims at developing general skills for civil engineering applications, including the design and structural mechanics aspects, the mastering of geomaterials, project management skills, or integrated water resources management.

To reach these objectives, the MA programme is centered on the design methodology. Acquiring the required technological skills is based on the scientific knowledge and competencies developed during the BA.









Among the main axes of the programme, an emphasis is put on the simulation tools for structures and materials, which allow modelling physical reality by state of the art models treated mathematically or computationally.

Geotechnical and environmental aspects also require specific approaches for natural materials (soils, rocks) that have to be dealt with in any construction project.









The courses, exercises and lab sessions are complemented with many projects and a Master Thesis. Three options (three modules) are available in MA2: structures, construction and geomaterials, water resources.

Bloc 1 | M-IRCNE | MA-IRCN









Compulsory common courses - Fundamentals in civil engineering - Block 1

- ARCH-Y400 **Design of concrete structures** | Sven DE SUTTER (Coordinator)
 5 credits [lecture: 24h, practical work: 36h]  first term  English
- ARCH-Y405 **Design of steel structures**
 5 credits [lecture: 24h, practical work: 36h]  first term  English
- CNST-H401 **Prestressed concrete** | Stéphanie STAQUET (Coordinator)
 3 credits [lecture: 18h, practical work: 18h]  second term  English
- CNST-H406 **Geotechnical engineering** | Alessia Cuccurullo (Coordinator) and Pierre GERARD
 5 credits [lecture: 24h, practical work: 36h]  first term  English

Compulsory common courses - Challenges in large civil engineering structures - Block 1

- CNST-H418 **Non linear modeling of materials and structures** | Thierry MASSART (Coordinator)
 4 credits [lecture: 24h, practical work: 24h]  second term  English
- CNST-H420 **Dynamics of structures** | Arnaud DERAEMAEKER (Coordinator)
 4 credits [lecture: 24h, practical work: 24h]  second term  English
- CNST-H421 **Structural analysis and finite elements** | Peter BERKE (Coordinator) and Lincy Pyl
 5 credits [lecture: 36h, tutorial classes: 24h]  first term  English
- CNST-Y400 **Experimental techniques for characterization of construction materials** | Dimitrios ANGELIS (Coordinator)
 4 credits [lecture: 24h, practical work: 24h]  first term  English

Compulsory common courses - Transversal skills and industrial applications - Block 1

- CNST-H422 **Sustainability in construction** | Didier Snoeck (Coordinator)
 4 credits [lecture: 24h, practical work: 24h]  second term  English
- CNST-Y403 **Digitalization in construction** | Olivier Remy (Coordinator) and Rajan Dessai Filomeno Coelho
 4 credits [lecture: 24h, practical work: 24h]  first term  English
- PROJ-H406 **Design project in civil engineering** | Lincy Pyl (Coordinator), Youri CARLSON and Pierre GERARD
 9 credits [lecture: 8h, project: 250h]  second term  English
- PROJ-H407 **Research Methods in Civil Engineering** | Arnaud DERAEMAEKER (Coordinator), Dimitrios ANGELIS and Marijke Huysmans
 3 credits [lecture: 12h, personal assignments: 60h]  second term  English

Project management - Block 1

Project management

One course chosen from the following

CNST-H423
(optional)

Architecture, engineering and construction project management | Philippe BOUILLARD (Coordinator)

5 credits [lecture: 36h, practical work: 24h]  second 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) | Peter BERKE (Coordinator)

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

Master of science in Civil Engineering

Focus Professional

Bloc 2 | M-IRCNE | MA-IRCN

Thesis - Block 2

MEMO-H501 **Master thesis civil engineering** | Arnaud DERAEMAER (Coordinator) and Danny VAN HEMELRIJCK
 ⌚ 24 credits [mfe/tfe: 600h] 📅 academic year 🗨️ English

Semi-elective blocks - Block 2

2 blocks amongst the 3 must be chosen.

Semi-elective Blocks

Choose 2 blocks out of these 3

18 to 20 credits chosen from the following

An alternative chosen from the three following

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|---------------------------------|--|
| <p>CNST-H530 (optional)</p> | <p>Innovative design of civil engineering structures</p> <p>Integrated structural design Thierry MASSART (Coordinator) and Matthieu MALLIE ⌚ 6 credits [lecture: 24h, practical work: 48h] 📅 second term 🗨️ English</p> |
| <p>CNST-Y404 (optional)</p> | <p>Lightweight composite structures Eric MOUSSIAUX (Coordinator) and Tine Tysmans ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨️ English</p> |
| <i>or</i> | |
| <p>CNST-H517 (optional)</p> | <p>Geotechnologies for sustainable developments</p> <p>Avanced geomechanics Pierre GERARD (Coordinator) and Alessia Cuccurullo ⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 🗨️ English</p> |
| <p>CNST-Y501 (optional)</p> | <p>Groundwater modelling Marijke Huysmans (Coordinator) ⌚ 5 credits [lecture: 12h, tutorial classes: 24h, personal assignments: 24h] 📅 first term 🗨️ English</p> |
| <i>or</i> | |
| <p>CNST-H409 (optional)</p> | <p>Reliability and monitoring in civil engineering</p> <p>Robustness of Structures and Reliability of materials Peter BERKE (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨️ English</p> |
| <p>CNST-Y405 (optional)</p> | <p>Structural health monitoring, maintenance and repair Dimitrios ANGELIS (Coordinator) ⌚ 4 credits [lecture: 36h, practical work: 12h, personal assignments: 24h] 📅 second term 🗨️ English</p> |

Elective Courses - Block 2

Select a number of credits to complete the 120 ECTS of the Master program from one or more of these packages. The individual courses of the semi-elective blocks above (other than the blocks selected by the student) can be included in the choice of electives, and are considered on equal footing with the courses in the list below.

Up to 6 ECTS can be selected in the transversal module, or in other Master programmes at ULB or VUB (after academic validation).

Choose among the following list

16 to 18 credits chosen from the following

Electives : Structures

ARCH-Y402
(optional)

Spatial structures : design and analysis | Lars DE LAET (Coordinator)

⌚ 5 credits [lecture: 18h, practical work: 24h, personal assignments: 24h] 📅 second term 🗨 English

CNST-Y504
(optional)

Transformable structures for circularity | Niels DE TEMMERMAN (Coordinator)

⌚ 5 credits [lecture: 18h, practical work: 24h, personal assignments: 24h] 📅 first term 🗨 English

CNST-Y507
(optional)

Steel bridges construction | Wim HOECKMAN (Coordinator)

⌚ 3 credits [lecture: 12h, tutorial classes: 24h] 📅 second term 🗨 English

Electives : Water resources

CNST-Y402
(optional)

Surface water hydrology | Jiri NOSSENT (Coordinator), Wim THIERY and Ann VAN GRIENSVEN

⌚ 5 credits [lecture: 30h, tutorial classes: 30h] 📅 first term 🗨 English

CNST-Y502
(optional)

Urban hydrology and hydraulics | Solomon SEYOUM (Coordinator)

⌚ 5 credits [lecture: 12h, tutorial classes: 24h, personal assignments: 24h] 📅 first term 🗨 English

CNST-Y509
(optional)

Surface water modelling | Ann VAN GRIENSVEN (Coordinator)

⌚ 5 credits [lecture: 12h, practical work: 24h, personal assignments: 24h] 📅 first and second terms 🗨 English

CNST-Y510
(optional)

Water Resources Management 2 : EU and International framework | Steven John EISENREICH (Coordinator) and Nora VAN CAUWENBERGH

⌚ 5 credits [lecture: 24h, practical work: 12h, personal assignments: 12h] 📅 first term 🗨 English

CNST-Y520
(optional)

Land-Climate dynamics | Wim THIERY (Coordinator)

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

Electives : Building physics and architecture

CNST-H306
(optional)

Bioclimatic design | Ahmed Zaib KHAN MAHSUD (Coordinator)

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

CNST-Y512
(optional)

Energy performance of buildings

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

CNST-Y515
(optional)

Room acoustics

⌚ 3 credits [lecture: 12h, practical work: 24h] 📅 first term 🗨 English

Electives : Management, economics and law

CNST-Y511
(optional)

Human resources management

⌚ 6 credits [lecture: 36h, tutorial classes: 4h, personal assignments: 130h] 📅 second term 🗨 English

GEST-Y501
(optional)

Business Management and Entrepreneurship | Marc GOLDCHSTEIN (Coordinator)

⌚ 3 credits [lecture: 33h] 📅 first term 🗨 English

GEST-Y502
(optional)

Business Aspects of Technology: Factory of the Future | Thomas Crispeels (Coordinator)

⌚ 3 credits [lecture: 27h, personal assignments: 59h] 📅 first term 🗨 English

URBA-H5002
(optional)

Urban, environmental and construction law | Kim MORIC (Coordinator)

⌚ 3 credits [lecture: 24h, field trips: 12h] 📅 second term 🗨 English

Electives : Miscellanea

LANG-H500
(optional)

English for professional purposes | Alexander CORNFORD (Coordinator)

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

| | |
|--------------------------------|---|
| PROJ-H502 (optional) | Design project competition Philippe BOUILLARD (Coordinator) and Vincent GERIN ⌚ 4 credits [seminars: 30h, project: 90h] 📅 second term 🗨 English |
| URBA-H500 (optional) | Infrastructure and Mobility Philippe BOUILLARD (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 12h, field trips: 30h, personal assignments: 30h] 📅 second term 🗨 English |
| Electives : Internships | |
| STAG-H501 (optional) | Internship (60 days) Frédéric ROBERT (Coordinator) ⌚ 10 credits [work placement: 300h] 📅 first term 🗨 English |
| STAG-H505 (optional) | Internship civil engineering (2 months) Lincy Pyl (Coordinator) and Marijke Huysmans ⌚ 6 credits [work placement: 180h] 📅 academic year 🗨 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] 📅 second 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) ⌚ 5 credits [lecture: 40h] 📅 second term 🗨 French |
| ENVI-F452 (optional) | Environmental impact analysis and management Wouter ACHTEN (Coordinator) ⌚ 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: 30h, practical work: 12h, project: 24h] 📅 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** | Laurent GHEERAERT (Coordinator) and Gilles GEVERS
⌚ 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 term 🗨️ 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