

# Master of science in Electrical Engineering

## Focus electronics and information technologies

The Master is defined around 4 axes:

- > Electronics and microelectronics
- > Telecommunication
- > Multimedia
- > Automatic control

### Bloc 1 | M-IRELE | MA-IREL

## Compulsory courses

ELEC-H401	<b>Modulation and coding</b>   Francois HORLIN (Coordinator) ⌚ 5 credits [lecture: 36h, practical work: 24h] 📅 second term 🗨 English
ELEC-H409	<b>Digital architectures and design</b>   Dragomir MILOJEVIC (Coordinator) ⌚ 4 credits [lecture: 12h, practical work: 36h] 📅 first term 🗨 English
ELEC-H415	<b>Communication channels</b>   Philippe DE DONCKER (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 36h, project: 12h] 📅 second term 🗨 English
ELEC-H417	<b>Communication networks : protocols and architectures</b>   Jean-Michel DRICOT (Coordinator) ⌚ 5 credits [lecture: 36h, practical work: 24h] 📅 first term 🗨 English
ELEC-H473	<b>Microprocessor architecture</b>   Dragomir MILOJEVIC (Coordinator) ⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 🗨 English
ELEC-Y400	<b>Analog electronics</b>   Piet WAMBACQ (Coordinator) ⌚ 5 credits [lecture: 36h, tutorial classes: 24h] 📅 first term 🗨 English
ELEC-Y412	<b>Image processing</b>   Adrian MUNTEANU (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 18h, practical work: 30h] 📅 second term 🗨 English
ELEC-Y413	<b>Signal theory</b>   Gert VANDERSTEEN (Coordinator) ⌚ 4 credits [lecture: 36h] 📅 first term 🗨 English
ELEC-Y418	<b>Sensors and Microsystem electronics</b>   Maarten Kuijk (Coordinator) ⌚ 5 credits [lecture: 30h, tutorial classes: 30h] 📅 second term 🗨 English
ELEC-Y430	<b>Digital signal processing</b>   Nicolaos DELIGIANNIS (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨 English
ELEC-Y503	<b>Measurement and Data Driven Modelling</b>   John LATAIRE (Coordinator) ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 second term 🗨 English
MATH-H407	<b>Control system design</b>   Emanuele GARONE (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] 📅 first term 🗨 English

### One course chosen from the following

ELEC-Y404 (optional)	<b>Operating systems and security</b>   Bruno Tiago DA SILVA GOMES (Coordinator) ⌚ 4 credits [lecture: 12h, project: 90h] 📅 first and second terms 🗨 English
PROJ-H415 (optional)	<b>Project Electronics and Telecommunication</b>   Francois HORLIN (Coordinator) ⌚ 4 credits [project: 96h] 📅 academic year 🗨 English A choisir parmi : <ul style="list-style-type: none"> <li>&gt; Projet scientifique</li> <li>&gt; Chef d'équipe</li> <li>&gt; CODEPO</li> <li>&gt; ECO Marathon</li> <li>&gt; Plydaire</li> </ul>

# Master of science in Electrical Engineering

## Focus electronics and information technologies

### Bloc 2 | M-IRELE | MA-IREL

## Master Thesis (compulsory)

### Master thesis

MEMO-H503

**Master thesis in Electrical Engineering** | Philippe DE DONCKER (Coordinator), Maarten Kuijk and Roger VOUNCKX

⌚ 24 credits [mfe/tfe: 600h] 📅 academic year 🗨 English

## Options - Block 2

*An alternative chosen from the three following*

### Option nano, opto-electronics and embedded systems

ELEC-H505  
(optional)

**Advanced digital architecture** | Dragomir MILOJEVIC (Coordinator) and Jan Tobias Mühlberg

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

ELEC-Y411  
(optional)

**High-frequency Electronics and Antenna** | Yves ROLAIN (Coordinator) and Gert VANDERSTEEN

⌚ 5 credits [lecture: 24h, tutorial classes: 18h, project: 36h] 📅 first term 🗨 English

ELEC-Y415  
(optional)

**Software and engineering for embedded systems** | Bruno Tiago DA SILVA GOMES (Coordinator)

⌚ 5 credits [lecture: 20h, tutorial classes: 10h, project: 60h] 📅 second term 🗨 English

ELEC-Y515  
(optional)

**Nano-Electronics Devices & Technologies** | Bertrand Parvais (Coordinator) and Johan STIENS

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

ELEC-Y548  
(optional)

**Photonics** | Francis BERGHMANS (Coordinator) and Hugo THIENPONT

⌚ 4 credits [lecture: 36h] 📅 first term 🗨 English

*or*

### Option information and communication technology systems

ELEC-H422  
(optional)

**Wireless communication channels** | Philippe DE DONCKER (Coordinator)

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

ELEC-H423  
(optional)

**Mobile and wireless networks** | Jean-Michel DRICOT (Coordinator)

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

ELEC-H522  
(optional)

**Digital communications** | Francois HORLIN (Coordinator)

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

ELEC-Y512  
(optional)

**Computer vision** | David Blinder (Coordinator)

⌚ 4 credits [lecture: 18h, tutorial classes: 12h, project: 36h] 📅 first term 🗨 English

ELEC-Y591  
(optional)

**Machine Learning and Big Data Processing** | Nicolaos DELIGIANNIS (Coordinator) and Adrian MUNTEANU

⌚ 5 credits [lecture: 24h, tutorial classes: 18h, project: 30h] 📅 second term 🗨 English

INFO-Y093  
(optional)

**Image and video technology** | Peter SCHELKENS (Coordinator)

⌚ 3 credits [lecture: 15h, tutorial classes: 30h] 📅 first term 🗨 English

or

## Option measuring, modeling and control

ELEC-H509  
(optional)

**Optimization-based Control Design** | Emanuele GARONE (Coordinator)

⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 first term 🗣 English

ELEC-Y416  
(optional)

**Advanced Measurement and Data Driven Modeling** | John LATAIRE (Coordinator)

⌚ 4 credits [lecture: 24h, tutorial classes: 24h] 📅 first term 🗣 English

ELEC-Y417  
(optional)

**Selected Topics in Nonlinear System Identification** | Yves ROLAIN (Coordinator) and Dries PEUMANS

⌚ 3 credits [lecture: 18h, project: 42h] 📅 first term 🗣 English

ELEC-Y513  
(optional)

**Identification of dynamical systems** | John LATAIRE (Coordinator)

⌚ 5 credits [lecture: 18h, tutorial classes: 30h, project: 30h] 📅 first term 🗣 English

ELEC-Y591  
(optional)

**Machine Learning and Big Data Processing** | Nicolaos DELIGIANNIS (Coordinator) and Adrian MUNTEANU

⌚ 5 credits [lecture: 24h, tutorial classes: 18h, project: 30h] 📅 second term 🗣 English

MATH-H503  
(optional)

**Model-Based and Data-Driven Fault Detection and Isolation** | Michel KINNAERT (Coordinator)

⌚ 3 credits [lecture: 18h, practical work: 18h] 📅 second term 🗣 English

## Electives MA2 including optional internships

*A total of 12 credits chosen from the following*

ELEC-H503  
(optional)

**Artificial organs** | Antoine NONCLERCQ (Coordinator)

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

ELEC-H504  
(optional)

**Network Security** | Jean-Michel DRICOT (Coordinator)

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

ELEC-H507  
(optional)

**Photonic communication systems** | Simon-Pierre GORZA (Coordinator)

⌚ 5 credits [lecture: 36h, tutorial classes: 24h] 📅 first term 🗣 English

ELEC-H550  
(optional)

**Embedded System Security** | Jan Tobias Mühlberg (Coordinator)

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

ELEC-Y516  
(optional)

**Lasers** | Guy VERSCHAFFELT (Coordinator) and Nathalie VERMEULEN

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

ELEC-Y521  
(optional)

**Laboratories in Photonics Research** | Heidi OTTEVAERE (Coordinator), Nicolas Le Thomas and Wendy Meulebrouck

⌚ 6 credits [lecture: 8h, tutorial classes: 88h] 📅 second term 🗣 English

ELEC-Y531  
(optional)

**Physical Communication** | Dries PEUMANS (Coordinator)

⌚ 6 credits [lecture: 30h, practical work: 60h] 📅 first term 🗣 English

ELEC-Y532  
(optional)

**Telecommunication Networks** | Marnix GOOSSENS (Coordinator)

⌚ 3 credits [lecture: 24h] 📅 first term 🗣 English

ELEC-Y535  
(optional)

**Capita Selecta Telecom** | Gert VANDERSTEEN (Coordinator) and Dries PEUMANS

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

ELEC-Y540  
(optional)

**Project Computer Engineering** | Bart JANSEN (Coordinator)

⌚ 3 credits [practical work: 36h] 📅 second term 🗣 English

ELEC-Y541  
(optional)

**Multiprocessors and Reconfigurable Architectures** | Abdellah TOUHAFI (Coordinator) and Bruno Tiago DA SILVA GOMES

⌚ 3 credits [lecture: 18h, practical work: 18h] 📅 academic year 🗣 English

ELEC-Y542  
(optional)

**CAE-tools for the Design of Analog Electronic Circuits** | Gert VANDERSTEEN (Coordinator)

⌚ 3 credits [lecture: 12h, practical work: 30h] 📅 first term 🗣 English

ELEC-Y543 (optional)	<b>Industrial Measurement Environments</b>   Yves ROLAIN (Coordinator) ⌚ 4 credits [lecture: 30h, practical work: 12h] 📅 second term 🗨 English
ELEC-Y546 (optional)	<b>Cryptography</b>   Ann DOOMS (Coordinator) ⌚ 3 credits [lecture: 18h, tutorial classes: 24h] 📅 second term 🗨 English
GEST-S421 (optional)	<b>Entrepreneurial ecosystems</b>   Judith BEHRENS (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗨 English
GEST-Y500 (optional)	<b>Entrepreneurship</b>   Nikolay DENTCHEV (Coordinator) ⌚ 3 credits [lecture: 15h, tutorial classes: 9h, personal assignments: 62h] 📅 first term 🗨 English
INFO-H422 (optional)	<b>Theory of information coding computing and complexity</b>   Nicolas CERF (Coordinator) and Jérémie ROLAND ⌚ 5 credits [lecture: 48h, tutorial classes: 12h] 📅 second term 🗨 English
INFO-H501 (optional)	<b>Pattern recognition and image analysis</b>   Olivier DEBEIR (Coordinator) and Christine DECAESTECKER ⌚ 5 credits [lecture: 36h, practical work: 24h] 📅 second term 🗨 English
INFO-H502 (optional)	<b>Virtual Reality</b>   Gauthier LAFRUIT (Coordinator) ⌚ 5 credits [lecture: 24h, practical work: 24h, project: 12h] 📅 first term 🗨 English
INFO-Y095 (optional)	<b>Voice, image coding, media and systems</b>   Gert VANDERSTEEN (Coordinator) and Leo VAN BIESEN ⌚ 6 credits [lecture: 42h, tutorial classes: 18h] 📅 first term 🗨 English
INFO-Y098 (optional)	<b>Capita selecta multimedia</b>   Colas SCHRETTTER (Coordinator) ⌚ 3 credits [lecture: 24h] 📅 second term 🗨 English
INFO-Y575 (optional)	<b>Cloud Artificial Intelligence Services</b>   Gert VANDERSTEEN (Coordinator) and Lesley De Cruz ⌚ 3 credits [lecture: 8h, tutorial classes: 20h, project: 30h] 📅 first and second terms 🗨 English
INFO-Y576 (optional)	<b>Cloud Machine Learning</b>   Gert VANDERSTEEN (Coordinator) and Lesley De Cruz ⌚ 3 credits [lecture: 8h, tutorial classes: 30h, project: 30h] 📅 first and second terms 🗨 English
MECA-Y502 (optional)	<b>Theory and Practice of Advanced Control</b>   Emanuele GARONE (Coordinator) and Michel KINNAERT ⌚ 4 credits [lecture: 24h, practical work: 24h] 📅 second term 🗨 English
PHYS-Y016 (optional)	<b>Optical materials</b>   Jan DANCKAERT (Coordinator), Kristiaan Neyts and Guy VERSCHAFFELT ⌚ 6 credits [lecture: 30h, tutorial classes: 30h] 📅 first term 🗨 English
STAG-H501 (optional)	<b>Internship (60 days)</b>   Frédéric ROBERT (Coordinator) ⌚ 10 credits [personal assignments: 300h] 📅 first term 🗨 English
STAG-H502 (optional)	<b>Internship (40 days)</b>   Lincy Pyl (Coordinator) ⌚ 6 credits [personal assignments: 180h] 📅 first term 🗨 English

## Modules transversaux

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 six credits chosen from the following*

BIME-G5505 (optional)	<b>Interfaculty and interdisciplinary program in Healthcare Innovation</b>   Hilde STEVENS (Coordinator) ⌚ 5 credits [lecture: 40h, tutorial classes: 20h] 📅 second term 🗨 English
CHIM-H504 (optional)	<b>Engineering aspects of circular economy</b>   Prakash VENKATESAN (Coordinator) ⌚ 5 credits [lecture: 24h, practical work: 36h] 📅 second term 🗨 English
DROI-C5174 (optional)	<b>Approche interdisciplinaire du droit de la propriété intellectuelle/Interdisciplinary Approach to In</b>   Julien CABAY (Coordinator) ⌚ 5 credits [lecture: 24h] 📅 first term 🗨 English/French

EDUC-H601 (optional)	<b>Summer School</b>   Johan GYSELINCK (Coordinator) ⌚ 5 credits [personal assignments: 5h] 📅 academic year 🗣 English
ELEC-Y514 (optional)	<b>Sustainability : an interdisciplinary Approach</b>   Cathy MACHARIS (Coordinator) and Waldo Galle ⌚ 6 credits [lecture: 36h, practical work: 24h, personal assignments: 100h] 📅 academic year 🗣 English
ENVI-F405 (optional)	<b>Climat: sciences et politiques</b>   Frank PATTYN (Coordinator) and Louise Knops ⌚ 5 credits [lecture: 40h] 📅 second term 🗣 French
ENVI-F452 (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 (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 (optional)	<b>Logistics Engineering and Management</b>   Alassane Ballé NDIAYE (Coordinator) ⌚ 5 credits [lecture: 12h, tutorial classes: 36h] 📅 first term 🗣 English
GEST-H502 (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 (optional)	<b>Ethique de l'ingénieur</b> ⌚ 3 credits [lecture: 12h, tutorial classes: 12h, practical work: 12h] 📅 second term 🗣 French
GEST-S101 (optional)	<b>Comptabilité financière</b>   Laurent GHEERAERT (Coordinator) and Gilles GEVERS ⌚ 5 credits [lecture: 36h, tutorial classes: 8h] 📅 second term 🗣 French
GEST-S318 (optional)	<b>Introduction to theoretical finance</b>   Laurent GHEERAERT (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗣 English
GEST-S421 (optional)	<b>Entrepreneurial ecosystems</b>   Judith BEHRENS (Coordinator) ⌚ 5 credits [lecture: 24h, tutorial classes: 24h] 📅 second term 🗣 English
GEST-S492 (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 (optional)	<b>Business Management and Entrepreneurship</b>   Marc GOLDCHSTEIN (Coordinator) ⌚ 3 credits [lecture: 33h] 📅 first term 🗣 English
LANG-H500 (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 (optional)	<b>Projet polydaire: expériences didactiques innovantes pour le secondaire</b>   Simon-Pierre GORZA (Coordinator) ⌚ 5 credits [project: 150h] 📅 academic year 🗣 French