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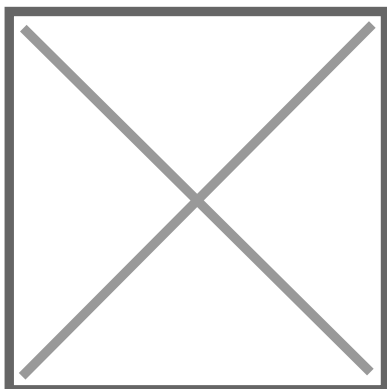
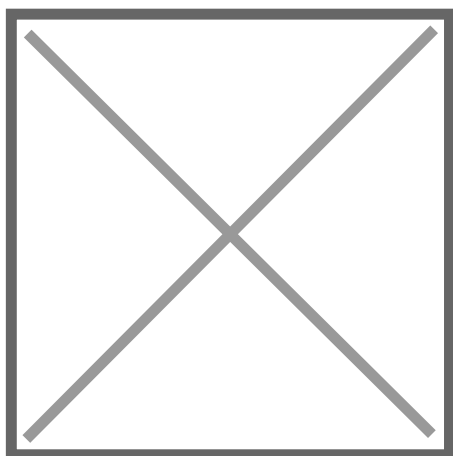
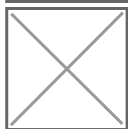
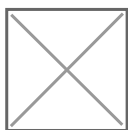
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Le mail de partage a bien été envoyé.

Add to Compare

M1 International track in electrical engineering



Master's degree

Specialisation Electrical Engineering

Enrolment type

Full-time academic programmes Life-long learning

Language(s) of instruction

English

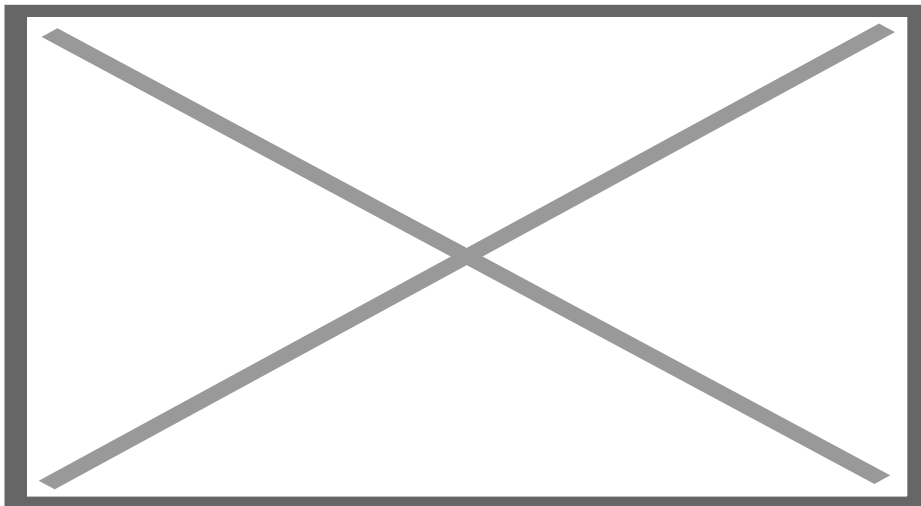
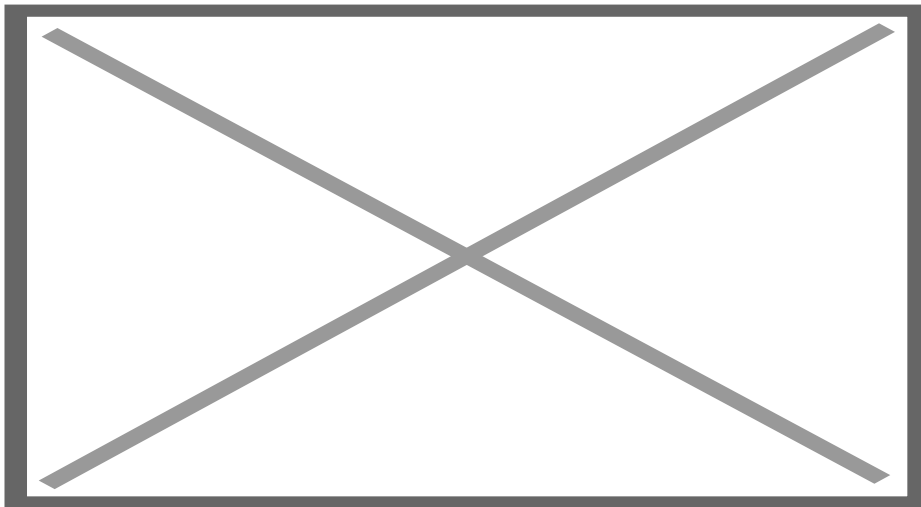
The M1 International Track in Electrical Engineering offers a multidisciplinary program at the crossroads of mechatronics, embedded systems, computer vision, artificial intelligence, and advanced electronics.

The M1 International Track in Electrical Engineering offers a multidisciplinary program at the crossroads of mechatronics, embedded systems, computer vision, artificial intelligence, and advanced electronics.

This first year of the Master's degree combines both theoretical courses and hands-on laboratory work, as well as an interdisciplinary project fostering autonomy and innovation. Students acquire solid skills in mechanics, electronics, signal processing, machine learning, and human-machine interaction, enabling them to design and integrate innovative intelligent systems.

[Télécharger la fiche détaillée](#)

[Apply Now](#)





Information

- [Overview](#)
- [Application requirements](#)
- [Schedule](#)

Présentation

Skills

At the end of the Master 1 program, students will have acquired the following competencies:

Scientific and Technical Competencies

Master the fundamentals of programming, electronics, and embedded systems.

Design and analyze mechatronic and robotic systems.

Develop applications in computer vision, signal processing, and statistical learning.

Integrate communicating systems (networks, digital communication, IoT).

Explore advanced technologies such as photonics, nanotechnology, and mixed reality.

Transversal Competencies

Manage an interdisciplinary project and work effectively in a team.

Develop skills in innovation, autonomy, and critical thinking.

Understand the industrial, scientific, and societal challenges of intelligent systems.

Objectives

Provide a multidisciplinary education covering mechatronic systems, embedded electronics, computer vision, artificial intelligence, and immersive technologies.

Develop students' ability to design, model, and integrate complex systems that combine hardware (sensors, actuators, circuits) and software (algorithms, programming, AI).

Foster scientific and technical autonomy through interdisciplinary projects.

Prepare students for further studies in Master 2 and for professional careers in robotics, applied AI, embedded systems, and Industry 4.0.

Admission

Admission Route

Physics

Engineering Sciences

Capacity

Available Places

28

Target Audience and Entry Requirements

Target Audience

Students holding a Bachelor's degree (Licence 3 or equivalent) in:

Engineering Sciences

Electronics, Electrical Engineering, Automation

Computer Science, Applied Mathematics

Applied Physics, Mechanics

International students seeking a multidisciplinary education in mechatronics and AI.

Professionals resuming studies (VAE or continuing education) in the field of industrial and digital technologies.

Recommended Prerequisites

Strong background in mathematics (algebra, analysis, probability).

Basic knowledge of programming.

Fundamental understanding of electronics and applied physics.

Motivation for interdisciplinary projects and innovation.

Période(s) de candidature

Inception Platform

From 03/02/2026 to 30/06/2026

From 15/07/2026 to 15/08/2026

Supporting documents

Compulsory supporting documents

Rank of previous year and size of the promotion.

Motivation letter.

All transcripts of the years / semesters validated since the high school diploma at the date of application.

Certificate of English level.

Curriculum Vitae.

Additional supporting documents

Copy diplomas.

Certificate of English level (compulsory for non-English speakers).

VAP file (obligatory for all persons requesting a valuation of the assets to enter the diploma).

Supporting documents :

- Residence permit stating the country of residence of the first country
- Or receipt of request stating the country of first asylum
- Or document from the UNHCR granting refugee status
- Or receipt of refugee status request delivered in France
- Or residence permit stating the refugee status delivered in France
- Or document stating subsidiary protection in France or abroad
- Or document stating temporary protection in France or abroad.

Programme

Bloc 1 : Formation générale et disciplinaire

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Programming	3	Semestre 1	8		16			
■								

Programming

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 8

Practical study : 16

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Algorithmics

Programme/contents

Object-oriented programming basics

Object modelling

Extensibility and reusability

Dynamic Modelling

Design Methodologies

Advanced algorithmics and Computational

Complexity

P and NP

Space-Bounded Complexity Classes

Probabilistic Complexity Classes.

Type of assessment

Evaluation Continue non Intégrale

Embedded Systems	3	Semestre 1	8	16
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Embedded Systems

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 8

Practical study : 16

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

- Digital hardware: Combinational and sequential logic
- Computer architecture for Bachelor Level
- C or C++ language programming
- Basic knowledge about algorithmic

Programme/contents

- Design methodologies of numerical systems: processors, microcontrollers, programmable logic, HDL design
- Overview on VHDL system description and advanced VHDL
- RT methodology: datapath, FSM, ASM, ASMD, algorithm implementation on FPGA
- ARM processor

Bibliography

- S. Brown, Fundamental of digital logic with VHDL design, McGraw Hill, 2009
- P. Ashenden, The designer's guide to VHDL, Elsevier
- P. Chu, RTL Hardware design using VHDL, Wiley-Interscience, 2006
- D. Black, SystemC: from the ground up, Springer 2010

Type of assessment

Evaluation Continue non Intégrale

[French for
foreigners, soft
skills](#)

3

Semestre
1

14

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
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■

French for foreigners, soft skills

ECTS : 3

Semester: Semestre 1

Detail

Directed study: 14

Language(s) of instruction

Français

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

[Analytical and](#)

[Applied](#)

[Mechanics](#)

3	Semestre 1	10	6	8
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Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
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■

Analytical and Applied Mechanics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1. Introduction to Mechanics
2. Statics
3. Kinematics of Particles and Rigid Bodies
4. Dynamics of Particles
5. Dynamics of Rigid Bodies
6. Analytical Mechanics (Lagrange Formalism)
7. Vibrations & Mechanical Response
8. Applied Mechanics for Mechatronics & Robotics

Type of assessment

Evaluation Continue non Intégrale

Control and Automation	3	Semestre 1	10	6	8
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Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
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■

Control and Automation

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Advanced Mathematical Tools for engineering:
(Optimization and decision making)

Programme/contents

- Introduction to Automation and Control
- Architecture of Automation Systems
- Measurement Systems Specification
- Process Control
- Predictive Control, Control of Inverse Response Systems
- Sequence/Logic Control and Programmable Logic Controllers
- Hyd.

Type of assessment

Evaluation Continue non Intégrale

Signal Processing	3	Semestre 1	10	6	8
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Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	practical class	directed study/practical class
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Signal Processing

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1. Introduction to Digital Signal Processing applications
2. Signal Sampling and Quantization
3. Digital Signals and Systems
4. Discrete Fourier Transform and Signal Spectra
5. The Z-Transform
6. Digital Signal Processing Systems, Basic Filtering Types, and Digital Filter Realizations
7. Finite Impulse Response Filter Design
8. Infinite Impulse Response Filter Design
9. Adaptive Filters and Applications
10. Waveform Quantization and Compression
11. Multirate Digital Signal Processing, Oversampling Analog-To-Digital Conversion, and Undersampling of Bandpass Signals
12. Subband and Wavelet-Based Coding
13. Hardware and Software for Digital Signal Processors.

Bibliography

Signal representation/modelization and continuous systems

Type of assessment

Evaluation Continue non Intégrale

Digital Communication	3	Semestre 1	10	6	8
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Digital Communication

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

- Analog signal processing
- Modeling of continuous systems
- Electronic circuits and oscillators

Programme/contents

- Introduction to digital communication systems
- Information theory: entropy and information, channel capacity, shannon theorem,
- Multiplexing: TDMA, FDMA, Circuit commutation, Message and Packet commutation, Digital multiplex hierarchy (T-carrier and E-c).

Bibliography

-J. Penttinen, The telecommunications handbook, John Wiley & Sons, 2015

-B. Lathi, Modern digital and analog communication systems, Oxford university press, 2018 (Edition 3 available 1998)

Type of assessment

Evaluation Continue non Intégrale

Electronics	3	Semestre 1	10	6	8
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Electronics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Basic knowledge of circuit analysis: steady-state mode, transient mode, frequency mode; basic knowledge of signal processing: time-domain analysis, frequency-domain analysis.

Programme/contents

Introduction to transmission systems:

- synoptic of a transmission chain
- signal conditioning and introduction to analogue-digital conversion
- Transmission circuits:
 - filters
 - voltage multiplier and mixer
 - oscillator and voltage-controlled oscillator
 - phase-locked loop
- Sinusoidal carrier modulation:
 - double-sideband amplitude modulation (AM)
 - envelope detection and synchronous demodulation (AM)
 - special AM modulations (single or residual sideband, quadrature)
 - angular modulations: principles, bandwidth requirement (Carson's rule)
 - examples of FM and PM modulators and demodulators
 - noise in quadripoles
 - noise and modulation

Learning objectives

Understand electronic systems, analyze performance, design simple circuits.

Type of assessment

Evaluation Continue non Intégrale

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Photonics	3	Semestre 1	10	6	8			

Subjects	ECTS	Semester	Lecture study	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
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Photonics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

* Refresh and supplements on electromagnetism:
from Maxwell equations to optical waveguides

- Photonic integrated circuits

- Waveguides

- Integrated beam splitters, Fabry Perot cavity...

* Refresh and supplements on semiconductor
physics: from band structure theory to optical
transitions (emission, absorption)

- Light/matter interaction : absorption, stimulated
and spontaneous emission,

* Optoelectronic devices

- Lasers : two level system

- Semiconductor laser : non equilibrium statistics,
population inversion, Bernard and Durraufoug
condition, spectral properties, comparison of
homojunction, heterojunction, multiple quantum
well lasers ; comparison of Fabry Perot and
Distributed Feedback lasers.

- Optical modulator : electroabsorption,
electrorefraction, resonators, Mach Zehnder

- Photodetector: PIN photodiode

* Fabrication technique

* Lab work : numerical simulation of integrated
interferometric structures *

Learning objectives

Understanding the operation and behaviour of
semiconductor optoelectronic devices: laser,
modulator and photodetector.

Type of assessment

Evaluation Continue non Intégrale

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Introduction to Machine Learning	3	Semestre 1	10	6	8			



Introduction to Machine Learning

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1. Introduction & Motivation

2. Mathematical and Statistical Foundations

Review of linear algebra and probability relevant to ML

Loss functions and optimization (gradient descent intuition)

Metrics for regression and classification

3. Data Preparation

Data collection, cleaning, and preprocessing

Feature scaling, normalization, and encoding

Splitting data: training, validation, and test sets

Introduction to cross-validation

4. Supervised Learning Basics

Linear regression and polynomial regression

Logistic regression for binary classification

k-Nearest Neighbors (kNN)

Decision Trees: basic concept and overfitting control (pruning)

5. Model Evaluation and Selection

Metrics: accuracy, precision, recall, F1-score, ROC/AUC

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Human-Machine Interaction	3	Semestre 1	10	6	8			
■								

Human-Machine Interaction

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 8

Directed study: 6

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1. Introduction to HMI
2. Human Factors and Cognitive Ergonomics
3. Interaction Paradigms
4. Designing Interactive Systems
5. Usability and User Experience (UX)
6. Evaluation Methods
7. Human–Robot Interaction (Intro)
8. Interaction in Mixed Reality (Intro)

Type of assessment

Evaluation Continue non Intégrale

Bloc 2 Parcours

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Project / Interdisciplinary Lab	6	Semestre 2		10				

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
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Project / Interdisciplinary Lab

ECTS : 6

Semester: Semestre 2

Detail

Directed study: 10

Project : 20

Language(s) of instruction

Anglais

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

Mechatronic Design	4	Semestre 2	12	8	8
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Mechatronic Design

ECTS : 4

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

CAD software; fundamental physics

Programme/contents

Introduction to Mechatronics Design

- Why machine Elements in Mechatronics Design
- Strength under static & dynamic circumstances
- Threaded & unthreaded fasteners
- Bolted and riveted joints
- Bearings & Lubrication
- Couplings
- Belt
- Chain Drives
- Gears
- Shafts
- Thesaurus of mechanisms & linkages
- Robots and Smart machines.

Bibliography

- STANDARD HANDBOOK OF MACHINE DESIGN; Editors in chief, Joseph E. Shigley, Charles R. Mischke; ISBN 0-07-056958-4
- Mémotech plus - Ingénierie et mécanique; Claude Barlier, René Bourgeois; ISBN-13: 978-2-7135-3310-5
- Ingénierie mécanique - Transmission

Type of assessment

Evaluation Continue non Intégrale

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Modelling of Robotic Systems	4	Semestre 2	12	8	8			
■								

Modelling of Robotic Systems

ECTS : 4

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1. Introduction to Robotic Systems
2. Mathematical Foundations
3. Forward Kinematics
4. Inverse Kinematics
5. Differential Kinematics
6. Dynamics of Robotic Systems
7. Mobile Robot Modelling
8. Introduction to Robot Control (Conceptual Preview)

Type of assessment

Evaluation Continue non Intégrale

Machine Vision	4	Semestre 2	12	8	8
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Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
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■

Machine Vision

ECTS : 4

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1. Introduction to Machine Vision
2. Image Processing Basics
3. Features and Keypoints
4. Segmentation Techniques
5. Image Geometry & Camera Models
6. Motion Analysis
7. Introduction to 3D Vision (Basic Concepts)
8. Introduction to Vision with Machine Learning

Type of assessment

Evaluation Continue non Intégrale

Mixed Reality	4	Semestre 2	12	8	8
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Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
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Mixed Reality

ECTS : 4

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1. Introduction to XR (Extended Reality)

2. Perception & Human Factors

3. Hardware & Sensors

4. 3D Interaction & User Interfaces

5. 3D Content Creation

6. AR & MR Core Techniques

7. VR Experience Development

Type of assessment

Evaluation Continue non Intégrale

Integrated	4	Semestre	12	8	8
Circuit Design		2			



Integrated Circuit Design

ECTS : 4

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

Manufacture of integrated circuits:

- CMOS, bipolar and biCMOS
- integrated devices
 - II Design of analogue integrated circuits:
- sub-circuits (CMOS): switches, active resistor, current source, current mirror, voltage/current reference
- amplifiers: inverters, differential amplifiers, cascoded amplifiers, output amplifiers
- simple operational amplifier (stability, frequency compensation), two-stage, cascoded folded structure, telescopic structure
- III Design of CMOS digital integrated circuits:
- basic elements: inverter model, elementary gates, delays
- Combinatorial compound elements: static complex gates, transmission gates
- Synchronous: non-overlapping 2-phase clock, shift register, memories
- Labs:
 - introduction to Cadence (CAD)
 - design of a differential amplifier
 - design of a 2-stage amp op
 - design of a multiplier
 - simulation of basic logic gates.

Learning objectives

To provide basic knowledge of the design of analogue and digital integrated circuits, to make students aware of manufacturing-related defects in integrated circuits and to use CAD tools (SPICE, Cadence). The consequences of changing technologies on the performance of integrated circuits will be presented.

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Nanotechnology	3	Semestre 2	12	8	8			
■								

Nanotechnology

ECTS : 3

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

A basic understanding of quantum mechanics is recommended.

Programme/contents

From micro to nanoelectronics

Nano-optics

Scanning probe microscopy

Electron transmission microscopy

Learning objectives

Highlight the interdisciplinary nature of nanotechnologies in the fields of physics and chemistry, electronics, computer science, and data processing.

Type of assessment

Evaluation Continue non Intégrale

Information Theory	4	Semestre 2	12	8	8			
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Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	practical class	directed study/practical class
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■

Information Theory

ECTS : 4

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

Lesson IT-01. Measures and chain rules I; Lesson IT-02. Measures and chain rules II; Lesson IT-03. Fundamental inequalities I; Lesson IT-04. Fundamental inequalities II; Lesson IT-05. Weak typicality/AEP/JAEP; Lesson IT-06. Entropy rates of random processes; Lesson IT-07. Data compression/Source coding theorem/Huffman; Lesson IT-08. Data transmission/Channel capacity; Lesson IT-09. Data transmission/Noisy channel coding theorem; Lesson IT-10. Data transmission/Joint source-channel coding theorem; Lesson IT-11. Strong typicality/AEP/JAEP + strong vs weak; Lesson IT-12. Rate-distorsion theory/theorem; Lesson IT-13. Statistics/Large deviations/Fisher/CRB; Lesson IT-14. Machine learning/Information-theoretic methods.

Learning objectives

The objectives of this course are to establish a rigorous mathematical foundation for information theory by developing the principal information measures, their chain rules, the fundamental inequalities that govern them, and the notions of weak and strong typicality, together with the analysis of entropy rates in random processes. The course further aims to formalize the principles underlying the optimal representation and transmission of information, drawing on the main source-coding theorems—including Huffman coding—channel capacity theory, the noisy-channel coding theorem, the joint source–channel coding theorem, and the framework of rate–distortion theory. Finally, it seeks to articulate the connections between information theory, statistics, and machine learning through the study of large-deviation principles, Fisher information and Cramér–Rao

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Networking	7	Semestre 2	12	8	8			
■								

Networking

ECTS : 7

Semester: Semestre 2

Detail

Lecture: 12

Practical study : 8

Directed study: 8

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

Three parts: addressing and routing for network interconnection, data transport between remote machines, and application-level communication protocols.

Learning objectives

Understand the main functions of the TCP/IP communication model

Type of assessment

Evaluation Continue non Intégrale

Teaching Location(s)

ORSAY

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EVRY

Contact

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Hedi TABIA

<http://www.universite-paris-saclay.fr/formation/master/electronique-energie-electrique-automatique/m1-international-track-electrical-engineering>