Université Paris-Saclay

Share

Email destinataire :

Vous devez renseigner un email valide

Envoyer

Une erreur est survenue. Merci de réessayer ultérieurement

Le mail de partage a bien été envoyé.

Add to Compare

M2 Advanced Materials, Structure and Energy for sustainable construction

Master's degree
Specialisations Energy | Civil Engineering
Enrolment type
Formation initiale
Language(s) of instruction
English

The Department Génie Civil and Environment of ENS Paris-Saclay proposes a research-oriented Master program entitled « **Materials, Structures and Energy for Sustainable Construction »**. Its comprises two M2 programs:

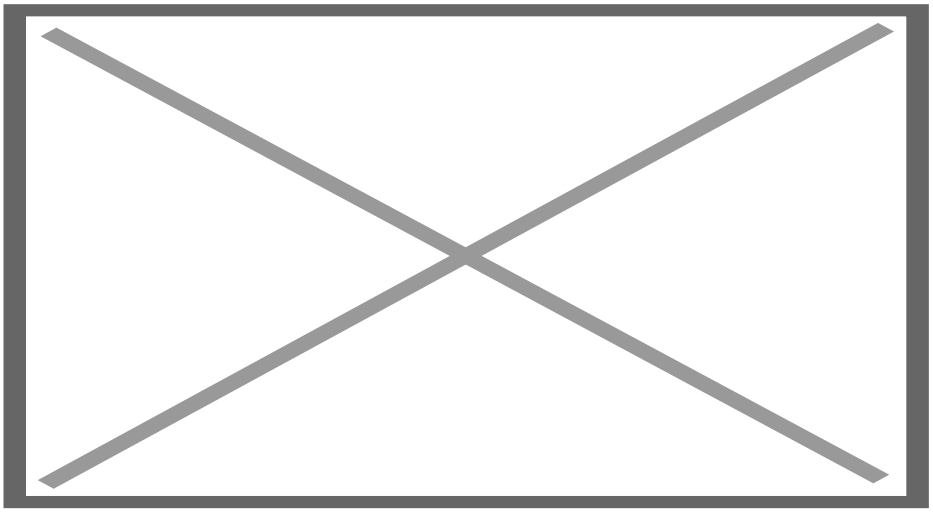
- Program **Modeling and Computing for Construction Engineering**,
- Program **Materials for Sustainable Construction and Environment**.

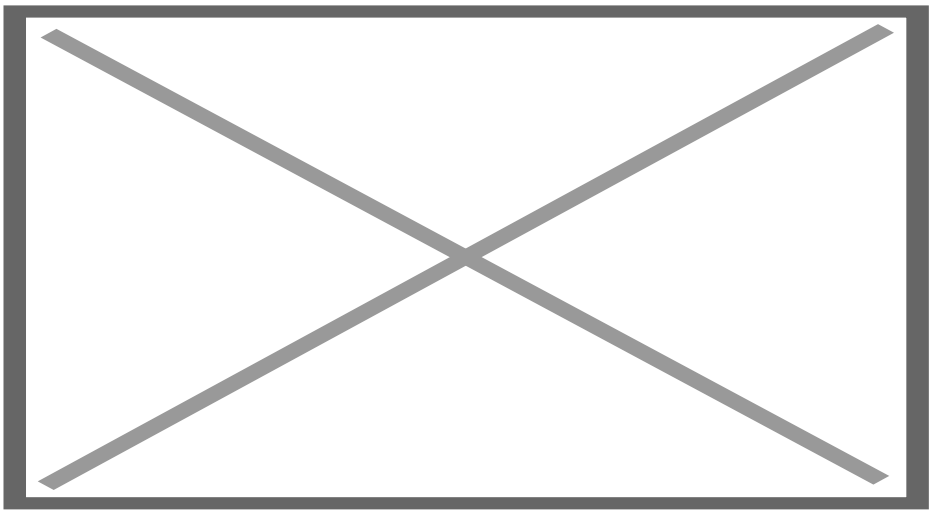
The two M2 programs differ by the mandatory courses of semester S1, and by the research topics of semester S2.

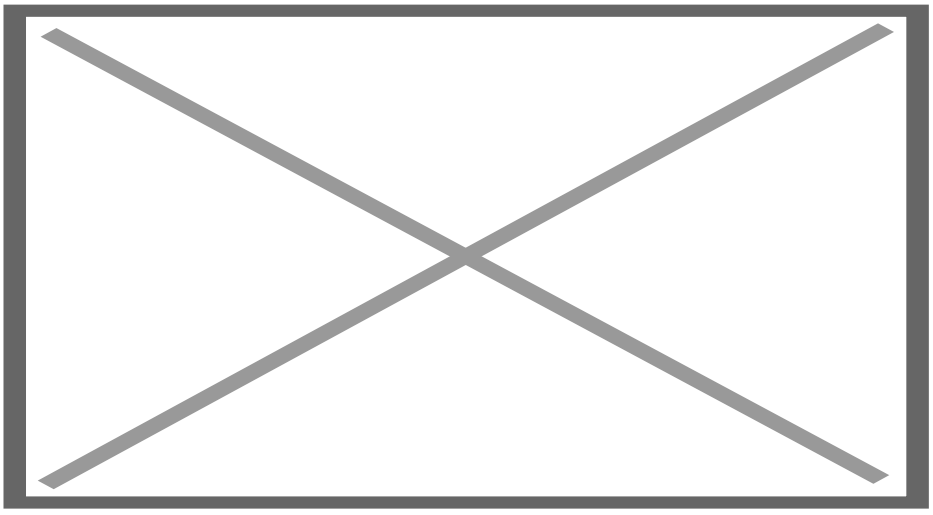
The **Modelling and Computing for Construction Engineering** Master 2 program offers advanced training for future researchers, engineers, and designers in the mechanics of Civil Engineering materials and structures. Particular attention is paid to performance under extreme conditions that exceed standard regulatory requirements. Emphasis is placed on the design and analysis of structures subjected to complex loading, including dynamic, multi-physics, and stochastic (random) effects, as well as damage and failure of both materials and structures.

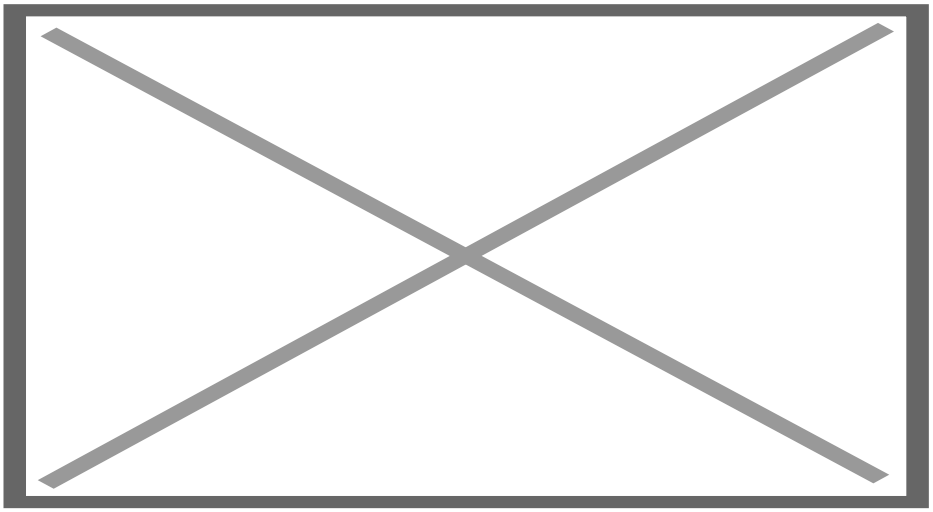
The **Materials for Sustainable Construction and Environment** Master 2 program is designed to train future researchers, engineers, and designers in developing and characterizing advanced materials for environmentally responsible construction. The program combines theoretical foundations, experimental practice, and research experience to address the challenges of sustainability and performance in construction materials and systems.

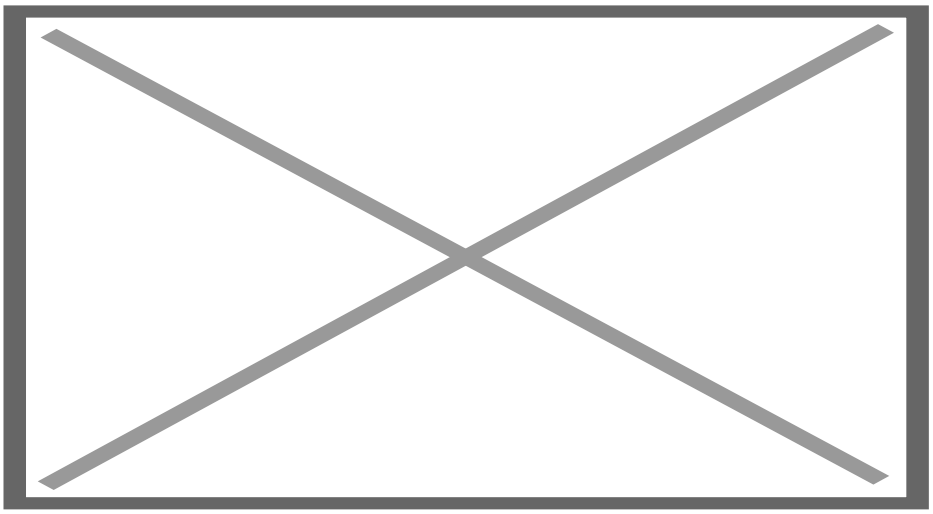
Télécharger la fiche détaillée
Apply Now











Information

- Overview
- Application requirements
- Schedule

Présentation

Skills

For the **Modelling and Computing for Construction Engineering** Master 2 program:

- Advanced experimental investigation for construction engineering (hybrid testing, Digital Image Correlation, etc.).
- Understanding and modeling deformation and degradation mechanisms in materials (durability, porous media, aging, etc.).
- Analysis of damage, rupture, and failure in Civil Engineering materials and structures.
- Mechanics of structures under extreme and non-standard conditions.
- Finite Element computation of non-linear structural responses.

For the **Materials for Sustainable Construction and Environment** Master 2 program:

- Simulate, model, and experiment the behavior (mechanical, thermal, hydric, morphological) of materials and structures in their environment.
- Study advanced materials for sustainable construction and the environment.
- Understand and analyze the degradation and damage mechanisms of these materials, exploring both local and global scales.
- Energy management and sustainable development in construction.
- Propose modern, research-based and high-level courses.

Objectives

For the **Modelling and Computing for Construction Engineering** Master 2 program

- Students develop a solid foundation in scientific methodology, including bibliography analysis, experimental investigation, and the presentation of scientific results. The program develops multidisciplinary skills, combining state-of-the-art experimental tools (e.g., hybrid testing, Digital Image
  Correlation) with theoretical and numerical modeling. Key points are understanding and simulating non-linear, possibly softening, mechanical behavior of Civil Engineering materials and structures.
- *Program Objectives:*
  › Bridge the gap between experiments (observations, mechanical responses) and structural modeling for supporting sustainable construction,
  › Prepare students for research and engineering careers involving high-performance simulation and design under complex mechanical and environmental conditions,
  › Offer hands-on research experience through a supervised Scientific Training Period in a research lab,
  › Propose modern, research-based and high-level courses.

For the **Materials for Sustainable Construction and Environment** Master 2 program:

- Students gain a multidisciplinary understanding of material behavior under environmental constraints, exploring mechanical, thermal, hydric, and morphological phenomena. Special focus is placed on the degradation mechanisms, damage, durability, and environmental impact of materials, from microstructural processes to structural performance.
- *Program Objectives:*
  › Provide a solid theoretical and practical foundation for research-oriented careers in sustainable construction materials.
  › Cultivate critical thinking and scientific reasoning through applied and investigative learning.
  › Offer hands-on research experience through a supervised internship in a research lab.

Débouchés

Career prospects

After a Master's + PhD: researcher or lecturer
Research and Innovation Manager

Further Study Opportunities

PhD
Postgraduate specialised degree

Calendar

Start of programme (indicative date)
01/09/2026
End of programme (indicative date)
30/09/2027

Description of the Master program

Admission

Capacity

Available Places

30

Target Audience and Entry Requirements

To enroll in this research-oriented Master 2 program, applicants must have completed at least the first year (M1) of a master degree, with theoretical training in civil engineering.

Engineers seeking to acquire research skills related to the **« Materials, Structures and Energy for Sustainable Construction »** program.

Période(s) de candidature

Inception Platform

From 05/03/2026 to 15/05/2026

Supporting documents

Compulsory supporting documents

Course selection sheet.

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 (compulsory for non-English speakers).

Curriculum Vitae.

Additional supporting documents

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

Inception - Selection Form

Programme

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
Digital Image Correlation and Identification (Part I)	1.5	Semester 1						
Charger le détail								
Non-Linear Finite Element Method	3	Semester 1						
Charger le détail								
Thermodynamics of Solid Materials (Part I)	1.5	Semester 1						
Charger le détail								
Coupled Energy and Mass Transfers in Porous Media	3	Semester 1						
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
Control of Active and Reactive Systems (Part I)	1.5	Semester 1						
Charger le détail								
Delayed Behavior of Construction Materials	3	Semester 1	24					
Charger le détail								
Thermodynamics of Solid Materials (Part II - Porous Media)	1.5	Semester 1						
Charger le détail								
Digital Image Correlation and Identification (Part II)	1.5	Semester 1						
Charger le détail								
Structures Subjected to Transient Loads	3	Semester 1						
Charger le détail								
Reduced and Surrogate Modelling for Construction Engineering	3	Semester 1						
Charger le détail								
Continuum Damage Mechanics for Quasi-brittle Materials	3	Semester 1						
Charger le détail								
Advanced Structural Modeling	3	Semester 1						
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
Advanced Formulations of Rational Mechanics & of its Coupling	3	Semester 1						
Charger le détail								
Scientific Machine Learning - Application to Construction Engineering	3	Semester 1						
Charger le détail								
Experimental Methods	1.5	Semester 1	6		16			
Charger le détail								
Low Environmental Impact Materials	3	Semester 1						
Charger le détail								
Durability of Construction Materials	3	Semester 1	24					
Charger le détail								
Thermo-Hygro-Morphic Behavior of Materials	3	Semester 1						
Charger le détail								
Energy in Construction	3	Semester 1						
Charger le détail								
Control of Active and Reactive Systems (Part II)	1.5	Semester 1						
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
From Experiments to Modeling and Simulation for Sustainable Construction	3	Semester 1	12					
Charger le détail								
Reduced Models for Transient Thermal Problems	3	Semester 1						
Charger le détail								
Energies éoliennes et marines	1.5	Semestre 1	6	6	4			
Charger le détail								
Calcul haute performance	1.5	Semestre 1	9	6				
Charger le détail								
Volumes Finis	3	Semestre 1	10	10	10			
Charger le détail								
Adaptive Modeling and Data-Driven Methods	3	Semester 1	24		6			
Charger le détail								
Multi-Scale Computational Strategies and Domain Decomposition Methods	3	Semester 1	24		6			
Charger le détail								
Scientific Machine Learning and applications to Mechanics	3	Semester 1	20		10			
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
High Performance Computing in Solid Mechanics	3	Semester 1	24	6				
Charger le détail								
Autonomous Learning	3	Semester 1						
Charger le détail								

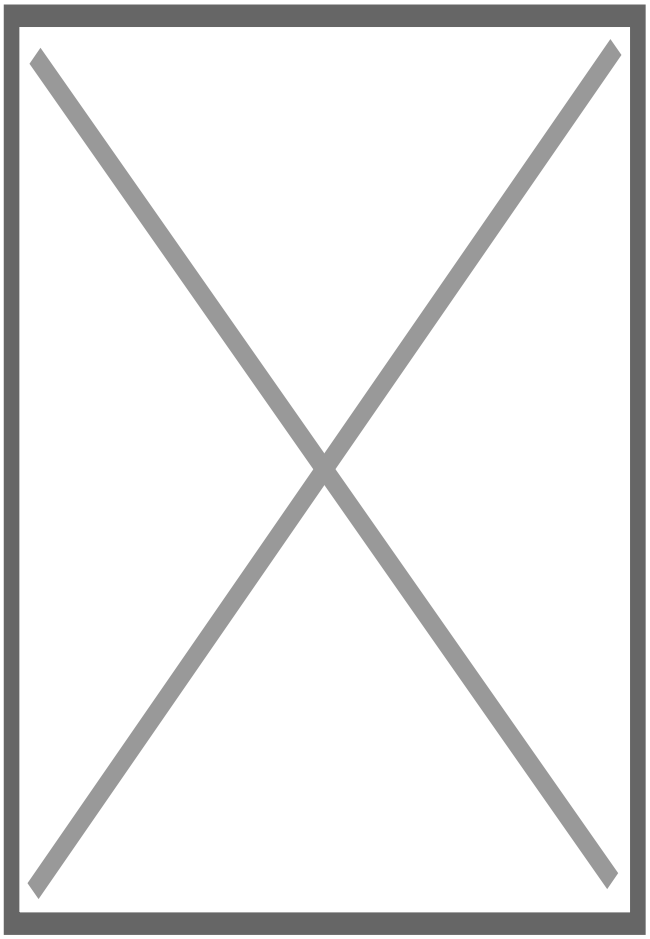
Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	dista lear cou
State-of-the-Art Report	7	Semester 2							
Charger le détail									
Research for All	2	Annualized							
Charger le détail									
Scientific Training Period	21	Semester 2							
Charger le détail									
Opening Course	2	Annualized							
Charger le détail									
Second Opening Course	2	Annualized							
Charger le détail									

Teaching Location(s)

GIF SUR YVETTE

Training campus

Javascript est requis pour visualiser cette carte.



Saclay Moulon

Saclay / Gif-sur-Yvette / Orsay
Bus 4606 / 4609 / 4611 / 5154
RER B Le guichet
Voir
Student restaurant (CROUS)
Library
Sports facilities
Student residence

Contact

- **Kamilia ABAHRI**
- **Farid BENBOUDJEMA**
- **FAU Amélie**
- **Rodrigue DESMORAT**

- **Rachid BENNACER**
- **Léa COCO**

http://www.universite-paris-saclay.fr/formation/master/energie/m2-advanced-materials-structure-and-energy-sustainable-construction