Université Paris-Saclay

Partager

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Envoyer

Une erreur est survenue. Merci de réessayer ultérieurement

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Ajouter au comparateur

M2 Advanced Materials, Structure and Energy for sustainable construction

Master
Mentions Energie | Génie Civil
Régime(s) d'inscription
Formation initiale
Langue(s) d'enseignement
Anglais

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:

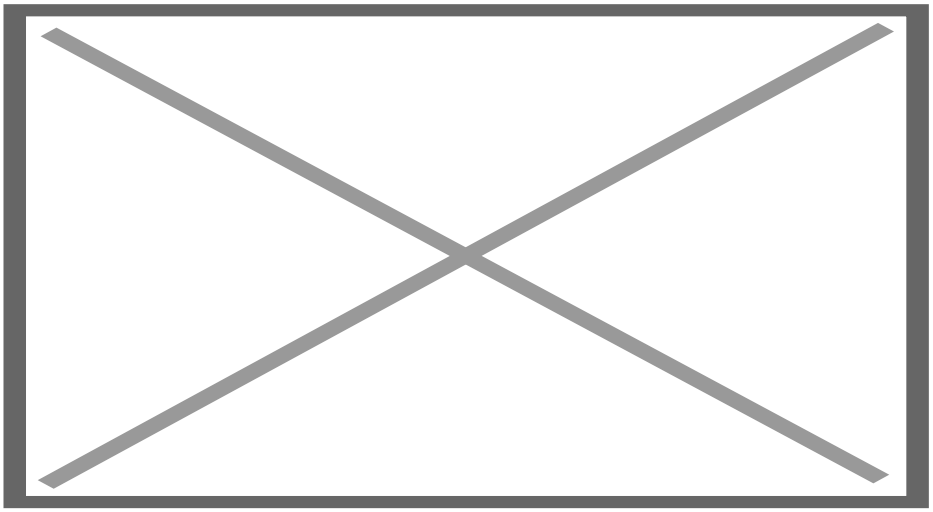
- Program **Modeling and Computing for Construction Engineering**,
- Program **Materials for Sustainable Construction and Environment**.

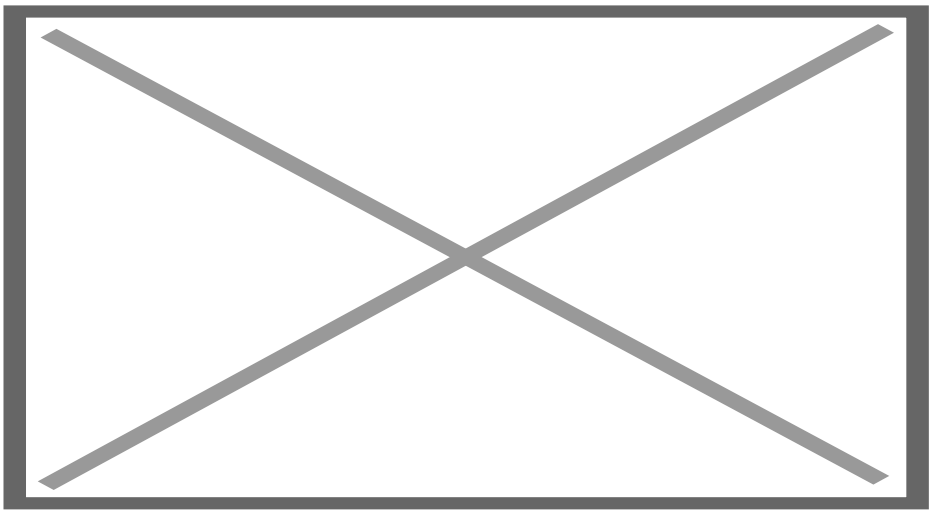
The two M2 programs differ by the mandatory courses of semester S1, and by the research topics of semester S2.

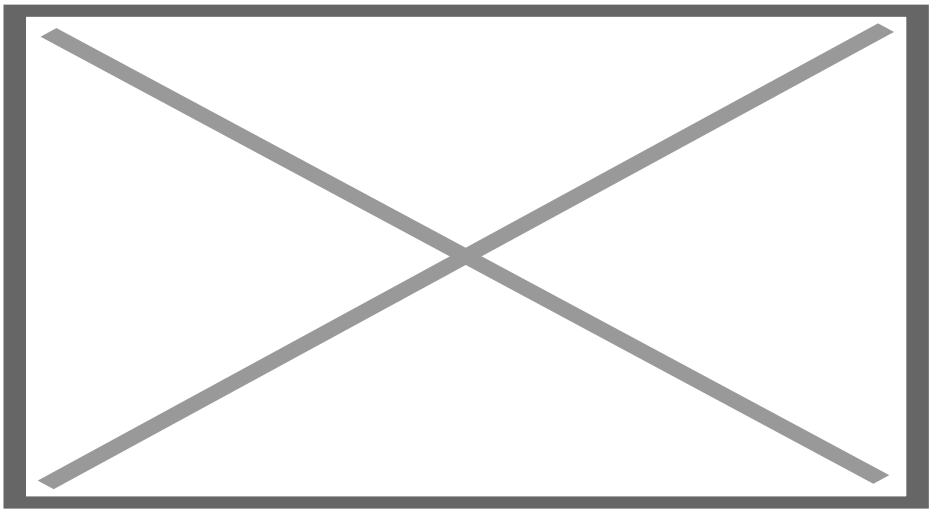
The **Modelling and Computing for Construction Engineering** Master 2 program offers advanced training for future researchers, engineers, and designers in the mechanics of Civil Engineering materials and structures. Particular attention is paid to performance under extreme conditions that exceed standard 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.

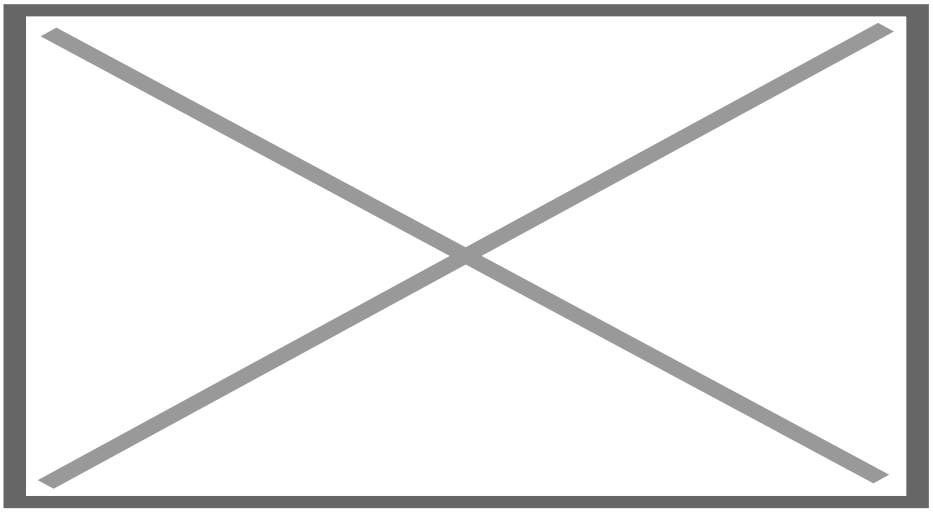
The **Materials for Sustainable Construction and Environment** Master 2 program is designed to train future researchers, engineers, and designers in developing and characterizing advanced materials for environmentally responsible construction. The program combines theoretical foundations, experimental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

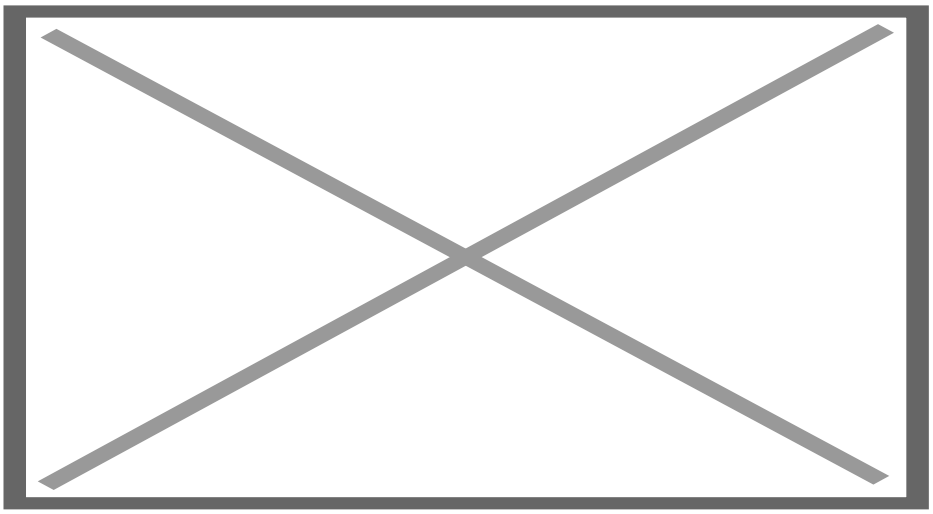
Télécharger la fiche détaillée
Je candidate











Informations

- Présentation
- Admission
- Programme

Présentation

Compétences

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.

Objectifs pédagogiques de la formation

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

Professionnels

Après Master + Doctorat : chercheur ou enseignant-chercheur
Chargé.e de recherche et innovation

Poursuite d’études

PhD
Postgraduate specialized degree

Agenda

Début de la formation (date indicative)
01/09/2026
Fin de la formation (date indicative)
30/09/2027

Description of the Master program

Admission

Capacité d’accueil

Places

30

Public visé et prérequis

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

Plateforme Inception

Du 05/03/2026 au 15/05/2026

Pièces justificatives

Obligatoires

Choix de parcours.

Classement Année Précedente et taille promotion.

Lettre de motivation.

Tous les relevés de notes des années/semestres validés depuis le BAC à la date de la candidature.

Attestation de niveau d'anglais (obligatoire pour les non anglophones).

Curriculum Vitae.

Facultatives

Dossier VAPP (obligatoire pour toutes les personnes demandant une validation des acquis pour accéder à la formation) https://www.universite-paris-saclay.fr/formation/formation-continue/validation-des-acquis-de-lexperience.

Inception - selection form

Programme

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet	Tutorat
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											
Control of Active and Reactive Systems (Part I)	1.5	Semester 1									
Charger le détail											
Delayed Behavior of Construction Materials	3	Semester 1	24								

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet	Tutorat
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 Advanced Formulations of Rational Mechanics and 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											

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet Tutorat
Durability of Construction Materials Charger le détail	3	Semester 1	24							
Thermo-Hygro-Morphic Behavior of Materials Charger le détail	3	Semester 1								
Energy in Construction Charger le détail	3	Semester 1								
Control of Active and Reactive Systems (Part II) Charger le détail	1.5	Semester 1								
From Experiments to Modeling and Simulation for Sustainable Construction Charger le détail	3	Semester 1	12							
Reduced Models for Transient Thermal Problems Charger le détail	3	Semester 1								
Energies éoliennes et marines Charger le détail	1.5	Semestre 1	6	6	4					
Calcul haute performance Charger le détail	1.5	Semestre 1	9	6						
Volumes Finis Charger le détail	3	Semestre 1	10	10	10					
Modèles adaptatifs et approches pilotées par les données Charger le détail	3	Semester 1	24		6					
Stratégies de calcul multi-échelle et méthodes de décomposition de domaine Charger le détail	3	Semester 1	24		6					

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet	Tutorat
Charger le détail Scientific Machine Learning and applications to Mechanics	3	Semester 1	20		10						
Charger le détail High Performance Computing in Solid Mechanics	3	Semester 1	24	6							
Charger le détail Autonomous Learning	3	Semester 1									
Charger le détail											

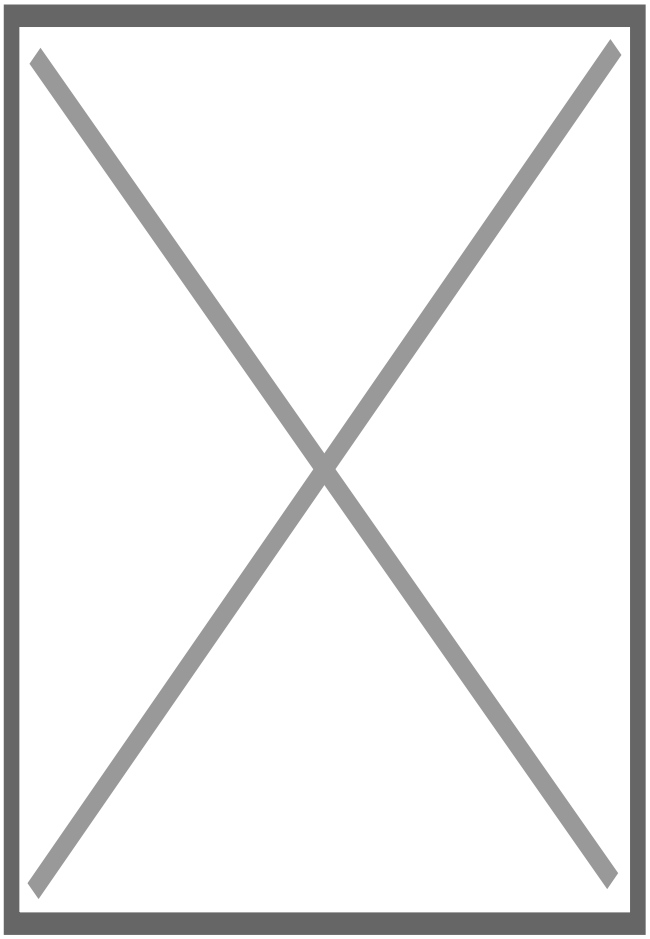
Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet	Tutorat
State-of-the-Art Report	7	Semester 2								200	
Charger le détail Research for All	2	Annualized									
Charger le détail Scientific Training Period	21	Semester 2								630	
Charger le détail Opening Course	2	Annualized									
Charger le détail Second Opening Course	2	Annualized									
Charger le détail											

Lieu(x) d'enseignement

GIF SUR YVETTE

Campus de la formation

Javascript est requis pour visualiser cette carte.



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- **Rachid BENNACER**
- **Léa COCO**

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