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Ajouter au comparateur

M2 Advanced Materials, Structure and Energy for sustainable construction

Master

Mentions Energie | Génie Civil

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.

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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

[illegible]

[illegible]

[illegible]

Matières	ECTS	Semestre	Cours	TD	TP	Cours- TD	Cours- TP	TD- TP	A distance	Projet	Tutorat
Stratégies de calcul multi-échelle et méthodes de décomposition de domaine	3	Semester 1	24		6						
■											
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	Semestre 1									
■											
Charger le détail											
Research Training											

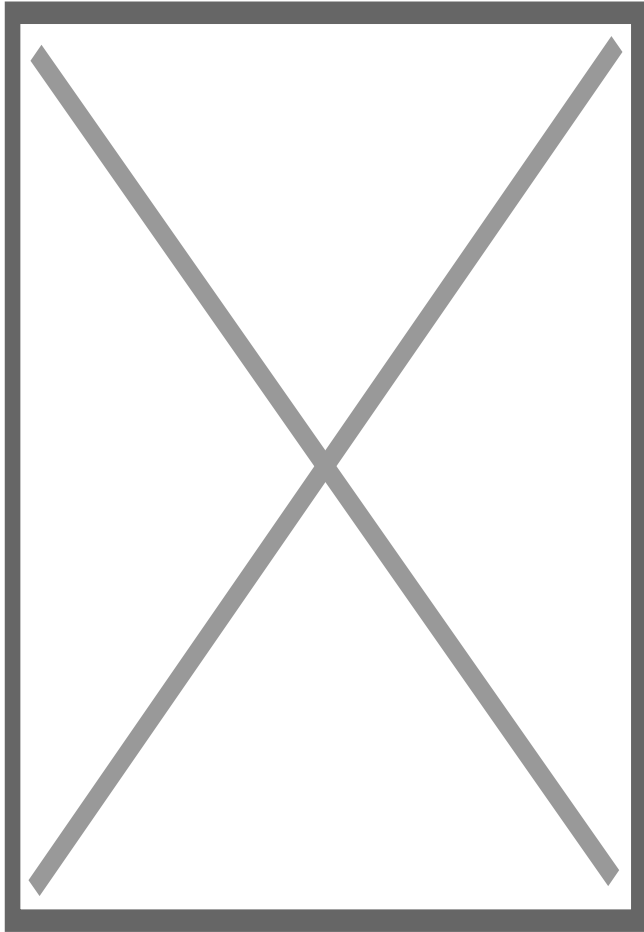
Matières	ECTS	Semestre	Cours	TD	TP	Cours- TD	Cours- TP	TD- TP	A distance	Projet	Tutorat
State-of-the-Art Report	7	Semester 2								200	
■											
Charger le détail Research for All	2	Annualized									
■											
Charger le détail Scientific Training Period	21	Semester 2								630	
■								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

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Bibliothèque

Equipements sportifs

Résidence étudiante

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