Université Paris-Saclay

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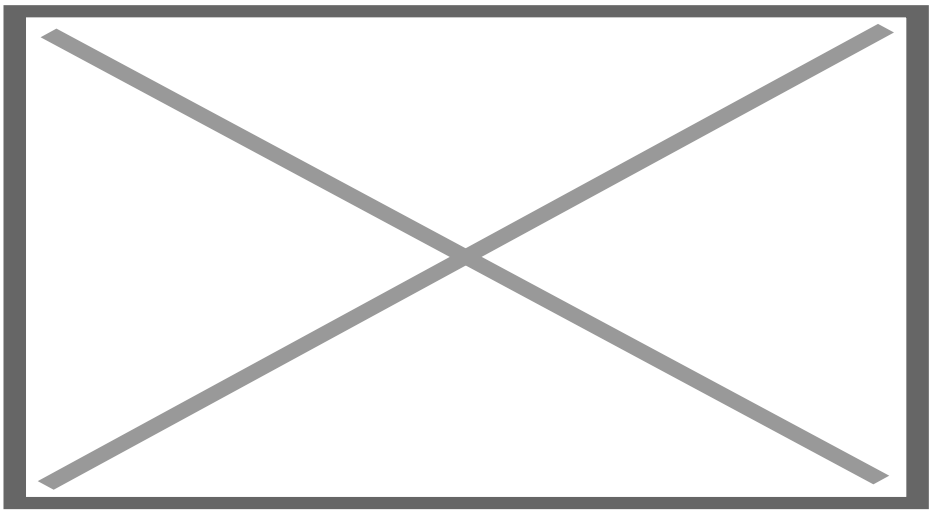
M2 Modelling and Simulation in the Mechanics of Structures and Coupled Systems

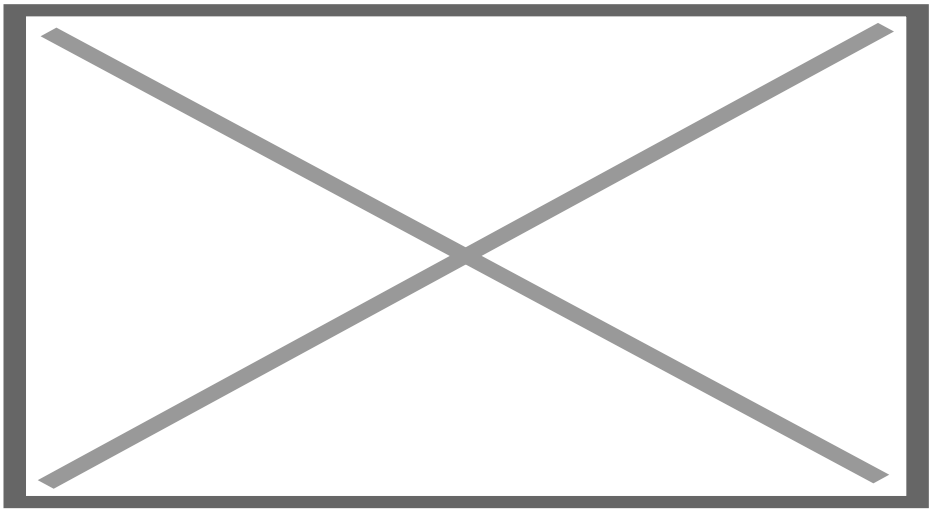
Master's degree
Specialisation Mechanics
Enrolment type
Formation initiale
Language(s) of instruction
English
French

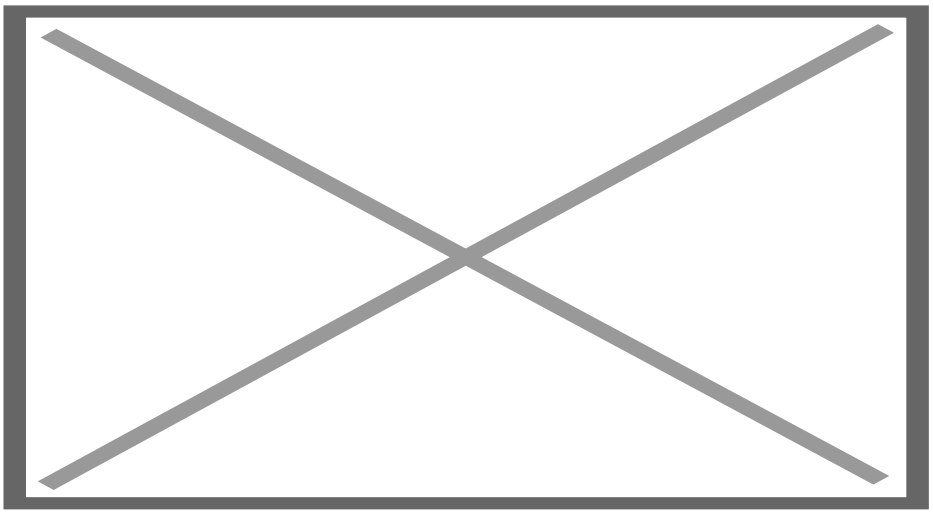
This 2nd year Master's offers a theoretical and practical research curriculum in modelling and simulation of complex mechanical structures and systems. It provides the theoretical, mathematical, numerical and computational foundations necessary for analysis and optimisation. The curriculum combines courses, projects and a research internship, and prepares students for the possibility of pursuing a thesis.

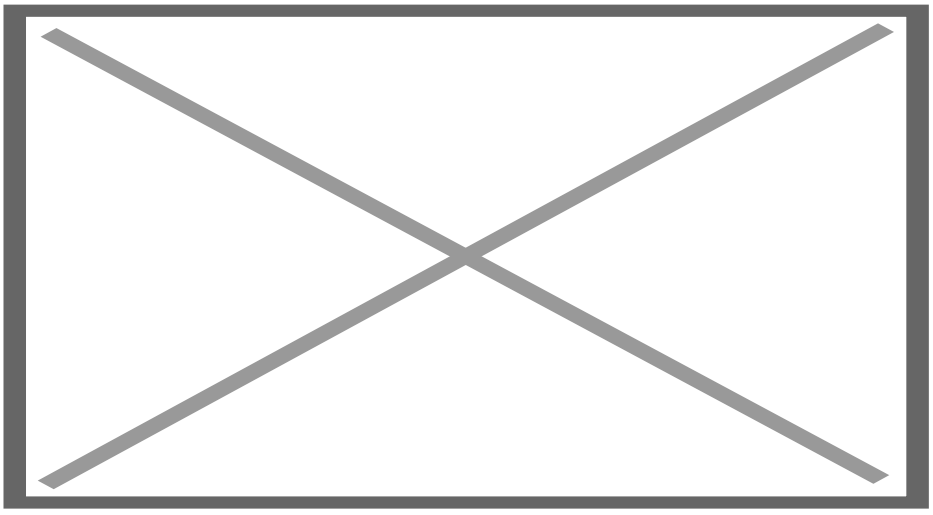
The year is divided into two semesters. The first comprises 10 courses chosen from a wide range of electives. The second is devoted to a research project, consisting of a literature review on a scientific topic, and a research internship lasting at least 4 months.

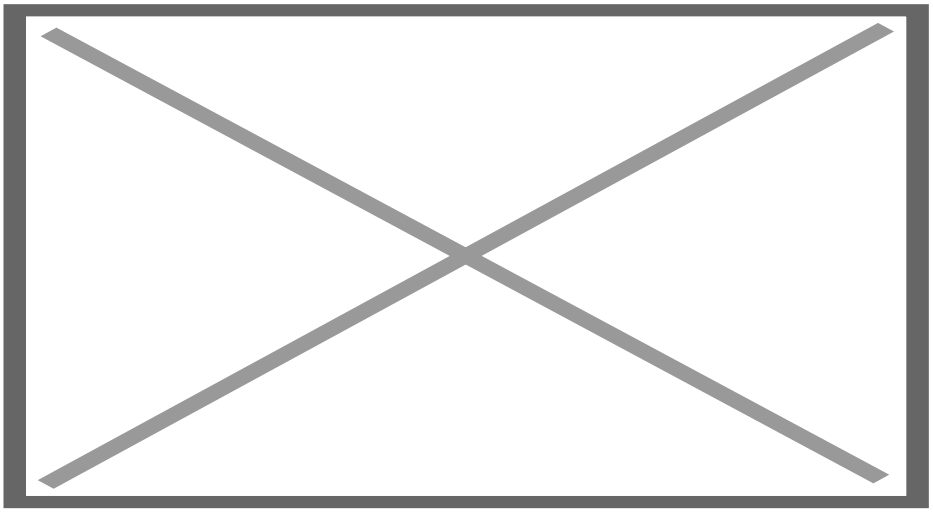
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Information

- Overview
- Application requirements
- Schedule

Présentation

Skills

Independently, and without ambiguity, formulate a mechanical problem to meet a given objective, from modelling the study system to modelling the stresses and boundary conditions, by proposing a relevant strategy to resolve them.

Objectives

The 2nd year Master's is a research-based curriculum that combines practical and theoretical training in advanced techniques for modelling and simulating structures and complex mechanical systems. The Master's aims to provide, within this broad field, the fundamentals of theoretical, mathematical, numerical, computational, and software modelling necessary to understand and optimise the solution of practical problems related to the dimensioning and virtual design of complex mechanical systems. Through a research internship in an academic laboratory or industrial research centre, as well as course-related projects, the curriculum aims to impart a scientific work methodology for students that will enable them to see the bigger picture and work autonomously, and to test their ability and interest in pursuing a thesis in the field. The variety of curricula taught by academic and industrial partners allows students to follow a truly personalised path in the fields covered by the Master's programme: modelling, simulation, structural calculation, applied mathematics, coupled problems and interactions, multi-scale and multi-physics parallel strategies, wave dynamics and propagation, vibration study and control, model reduction, big data, test-calculation interaction, model control, verification and validation, inverse problems, optimisation, non-linear problems, damage and fracture, composite materials, hazards and probabilistic modelling, etc.

Admission

Capacity

Available Places

25

Target Audience and Entry Requirements

For the standard course, 1st year Master's IT or MMS of the track (gateways possible from 1st year Master's MIP, MFL, MMM). Not on the track: 1st year Master's in mechanics, physics (with a focus on mechanics) or mathematics.

Période(s) de candidature

Inception Platform

From 01/02/2026 to 30/06/2026

Supporting documents

Compulsory supporting documents

Motivation letter.

Letter of recommendation or internship evaluation.

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

Curriculum Vitae.

Detailed description and hourly volume of courses taken since the beginning of the university program.

Recommendation letters.

Additional supporting documents

Certificate of English level.

This is compulsory only if french is not your mother-tongue

Certificate of French (compulsory for non-French speakers).

This is compulsory only if french is not your mother-tongue and you cannot produce an English certificate

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

Document indicating the list of local M2 choices available here : https://urlz.fr/i3Lo.

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

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distan learni cour
Stage de recherche	21	Semestre 2							
Charger le détail									

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distan learni cour
Projet de recherche	9	Semestre 2							
Charger le détail									

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
Elastic Wave Propagation in Solids	3	Semester 1	21	9				
Charger le détail								
Matrix Methods for High-Performance Computing	3	Semester 1	21		9			
Charger le détail								
Fluid–Structure Interaction (FSI)	3	Semester 1	12	12				
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
Modélisation des incertitudes et apprentissage statistique pour le calcul des matériaux et des structures (MIFO)	3	Semestre 1	27	6				
Charger le détail								
UE d'ouverture 2	3	Semestre 1						
Charger le détail								
UE d'ouverture 1	3	Semestre 1						
Charger le détail								
Nonlinear Constitutive Modeling: Thermodynamics and Numerical Integration	3	Semester 1	22		8			
Charger le détail								
Particle methods and XFEM	3	Semester 1	30					
Charger le détail								
Multi-Scale Computational Strategies and Domain Decomposition Methods	3	Semestre 1	24		6			
Charger le détail								
Model and Data Reduction	3	Semester 1	22		8			
Charger le détail								
Inverse problems and identification	3	Semester 1	12	4.5	7.5			
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practica class
Frequency-Domain Methods for Structural Vibrations and Acoustics	3	Semester 1	15					
Charger le détail								
Numerical Solid Mechanics: Finite Element Method – Theory and Applications	3	Semester 1	26	4				
Charger le détail								
to failure Modeling and Analysis of Composite Structures up to Failure	3	Semester 1	22		8			
Charger le détail								
Adaptive Modeling and Data-Driven Methods	3	Semester 1	24		6			
Charger le détail								
Structural Assemblies: Modeling and Analysis of Frictional Contact	3	Semestre 1	18		12			
Charger le détail								
Modal Analysis	3	Semester 1	18		12			
Charger le détail								
Introduction to computational fluid dynamics	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
Scientific Machine Learning and applications to Mechanics	3	Semester 1	20		10			

Charger le détail

Teaching Location(s)

GIF SUR YVETTE

Contact

- **Andrea BARBARULO**

  MCF

- **CentraleSupélec SUPPORT SCOLARITE**

  Support scolarité

http://www.universite-paris-saclay.fr/formation/master/mecanique/m2-modelisation-et-simulation-en-mecanique-des-structures-et-systemes-couples