Université Paris-Saclay

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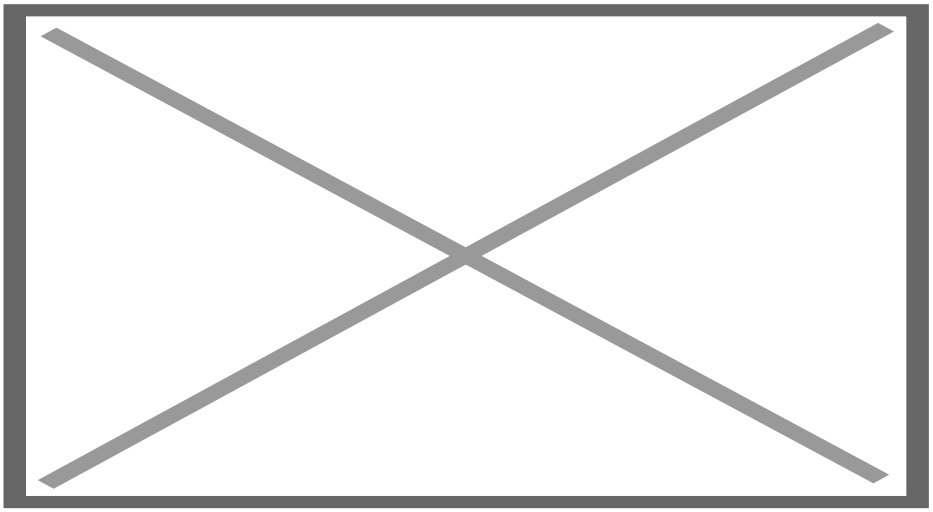
M2 Systems Neuroscience: from cells to brain functions

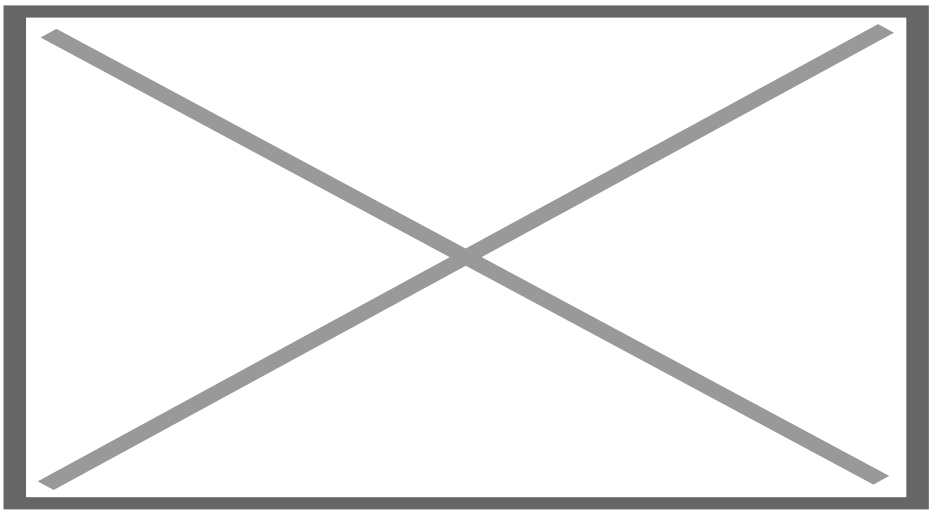
Master
Mention Neurosciences
Régime(s) d'inscription
Formation initiale
Formation continue
Langue(s) d'enseignement
Anglais

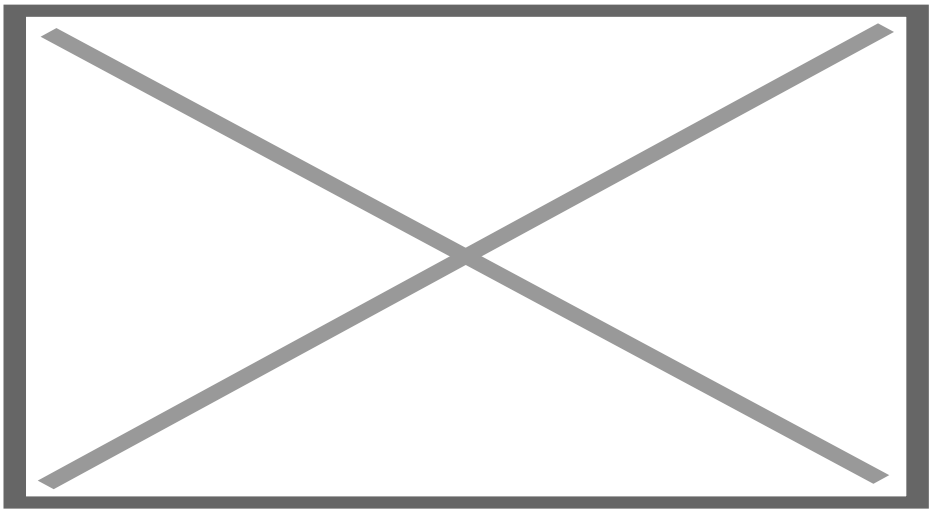
From cells to behavior, explore the major questions of systems neuroscience: how neurons process signals and interact within circuits to give rise to perception, cognition and actions. Develop cutting-edge technical skills through hands-on training, sharpen your critical thinking, and immerse yourself in a 6-month laboratory experience to launch your career in neuroscience research.

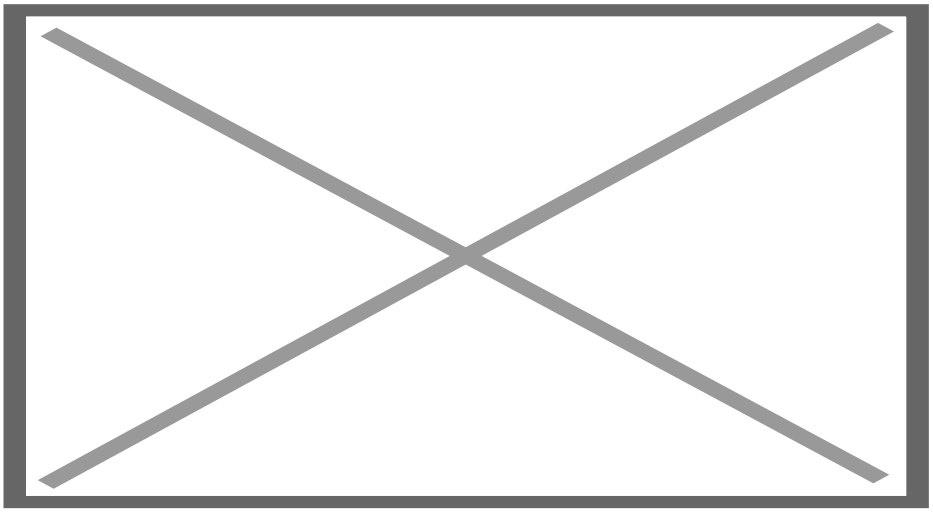
The M2 ***Systems Neuroscience: from Cells to Brain Functions*** explores the neuronal mechanisms underlying animal behavior and the experimental approaches to study them across different levels of organization: from cell neurophysiology to complex, real-world behaviors of neuroethology. This program offers a combination of theoretical foundations and practical experience. During the first semester, students complete a series of core and elective courses. Six core teaching units are required: *Plasticity, Learnings and Memories*, *Sensory Systems and Perception*, *Motor Systems and Actions*, *Neuroethology*, *Glia in Brain Health and Disease,* and *Methods in Systems Neuroscience*. In addition to this, students choose four elective units focusing on specific areas of neuroscience. The second semester is dedicated to a 6-month neuroscience research internship completed by a written report and oral defense to demonstrate the knowledge and skills acquired during the individual research project.

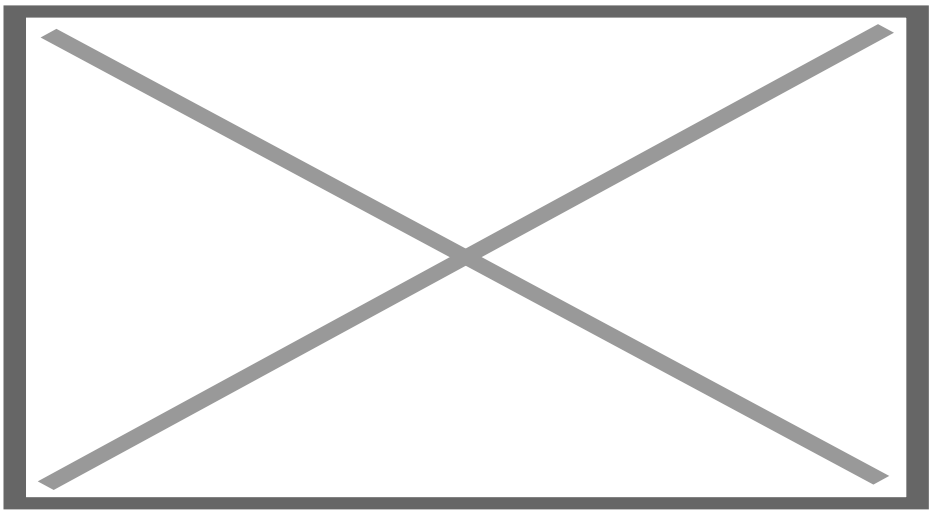
Télécharger la fiche détaillée
Je candidate











Informations

- Présentation
- Admission
- Programme

Présentation

Compétences

At the end of this program, the students will be able to:

- Explain the core principles of neural plasticity, memory, sensory processing, motor control, and glial function.
- Explain how structures and functions are linked within the central nervous system.
- Compare normal and pathological processes in the central nervous system across multiple scales.
- Describe and apply state-of-the-art experimental techniques to record and manipulate neural activity in animal models.
- Assess the strengths and limitations of different methodological approaches in systems neuroscience.
- Adopt a multidisciplinary perspective of the neuroscience research.

- Design and implement experimental protocols in neuroscience.
- Conduct an independent long-term research project, integrating theory and practice.
- Analyze, interpret, and critically evaluate neuroscientific data, using appropriate statistical tools
- Critically read scientific literature and contextualize new findings.
- Communicate scientific results effectively in written, oral, and visual formats.

Objectifs pédagogiques de la formation

This M2 program offers comprehensive training in neuroscience, covering levels of analysis from cellular mechanisms to neural circuits and behavior.

The theoretical part of the program highlights how the cellular components of the central nervous system interact to form functional networks that govern behavior and mediate interactions with the environment. Students gain an in-depth understanding of normal and pathological processes, which involve plasticity, sensory processing, motor control, neuroethology, and glial functions. They also acquire a solid knowledge in methodological approaches for recording and manipulating neural activity. Moreover, the program is flexible and can be tailored to individual student interests: In addition to the core courses, students can choose four elective units from M2 *Cognition, Behavior and Mental Disorders*, M2 *Computational Neuroscience and Neuroengineering*, or from open units focused on neurodevelopment and neurodegenerative diseases.

The practical part of the program provides students with a full immersion into research. During their 6-month internship, they will manage their own scientific project under the guidance of an expert researcher. This involves situating their project within a scientific context through critical reading and discussion, producing experimental data, analyzing and interpreting results, and communicating their findings to peers and experts in their field.

In addition to scientific and methodological expertise, students will develop essential research competences: critical thinking, the ability to evaluate hypotheses and experimental data, scientific communication skills through oral presentations, written reports and discussions, teamwork, autonomy in project management, and awareness of good practices in animal research and data integrity.
Upon completion of this M2, students will be equipped with the theoretical and methodological tools to embark on a career in neuroscience research.

Débouchés

Poursuite d’études

Thèse de doctorat
Les étudiants titulaires d’un M2 ont la possibilité de poursuivre dans la recherche en doctorat
Ingénierie études, recherche et développement
Formation d'attaché.e ou assistant.e de Recherche Clinique

Agenda

Début de la formation (date indicative)
07/09/2026
Fin de la formation (date indicative)
30/09/2027
Admission

Voie d’accès

Sciences de la vie

Capacité d’accueil

Places

15

Public visé et prérequis

The access in M2 Systems Neuroscience is open to:

- Master Students who have obtained the M1 in Neurosciences, or related fields with at least 2-3 units teaching in Neurosciences (basic knowledge in brain anatomy and functioning, at different scales)
- Medical, pharmacy or engineer students (with a specific knowledge in Neuroscience)

English level should be sufficient to follow courses taught in English, active participation is expected.

Période(s) de candidature

Plateforme Inception

Du 02/02/2026 au 04/04/2026

Du 04/05/2026 au 21/06/2026

Pièces justificatives

Obligatoires

Lettre de motivation.

Lettre de recommandation d'un maÎtre de stage.

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

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.

Programme

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet	Tutorat
Advanced Systems Neuroscience											
Sensory systems and perception	3	Semester 1	25								
Charger le détail											
Neuroethology	3	Semester 1	16	4							
Charger le détail											
Methods in systems neuroscience	3	Semester 1	5		15						
Charger le détail											
Motor systems and actions	3	Semester 1	13.5	6.5							
Charger le détail											
Glia in brain health and disease	3	Semester 1	15	5							
Charger le détail											
Fundaments in Neuroscience											
Brain plasticity, learnings and memories	3	Semester 1	20								
Charger le détail											

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet	Tutorat
Elective courses											
Neural stem cells and neurogenesis	3	Semestre 1	15	5							
Charger le détail											

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet Tutorat
Closed loop neuroscience Charger le détail	3	Semester 1	25							
Models and ethics in neuroscience Charger le détail	3	Semester 1	14	6						
Neurodegenerative diseases Charger le détail	3	Semester 1	16	4						
Functional neuroanatomy, development and evolution Charger le détail	3	Semester 1								
In-depth exploration of Cognition, Behavior and Mental Disorders										
social cognition in normal and physiopathological conditions Charger le détail	3	Semester 1	14	0	6					
Methods in cognition Charger le détail	3	Semester 1	2	9	9					
Psychiatric disorders: translational approaches and treatments Charger le détail	3	Semester 1	5	15						
Human developmental cognitive neurosciences Charger le détail	3	Semester 1	16	4						
Microbiota-gut-axis in the control of eating behaviors and emotions Charger le détail	3	Semester 1	20							

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet Tutorat
Scientific project SNCBF Charger le détail	3	Semester 2								
Internship SNCBF	27	Semester 2								

Matières	ECTS	Semestre	Cours	TD	TP	Cours-TD	Cours-TP	TD-TP	A distance	Projet	Tutorat

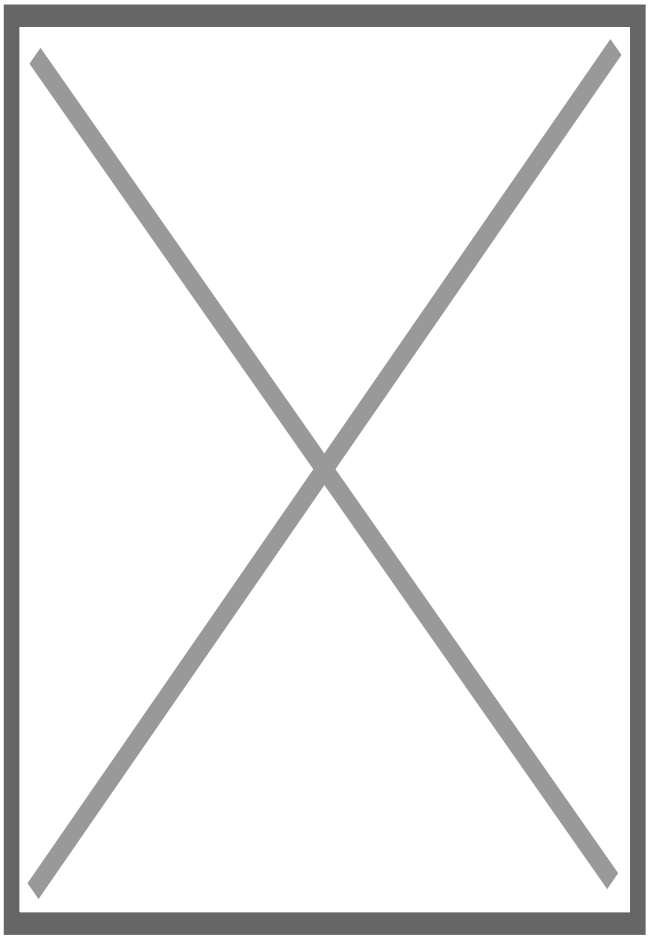
Charger le détail

Lieu(x) d'enseignement

SACLAY

Campus de la formation

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Résidence étudiante

Contact(s)

- **Julie CARCAUD**
- **Claire ESCHBACH**

http://www.universite-paris-saclay.fr/formation/master/neurosciences/m2-systems-neuroscience-cells-brain-functions