Université Paris-Saclay
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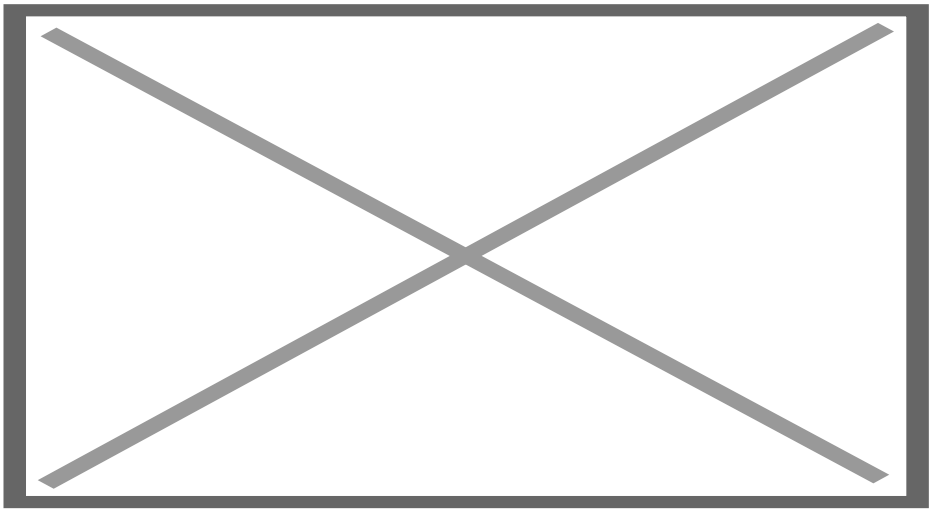
M2 Systems Neuroscience: from cells to brain functions

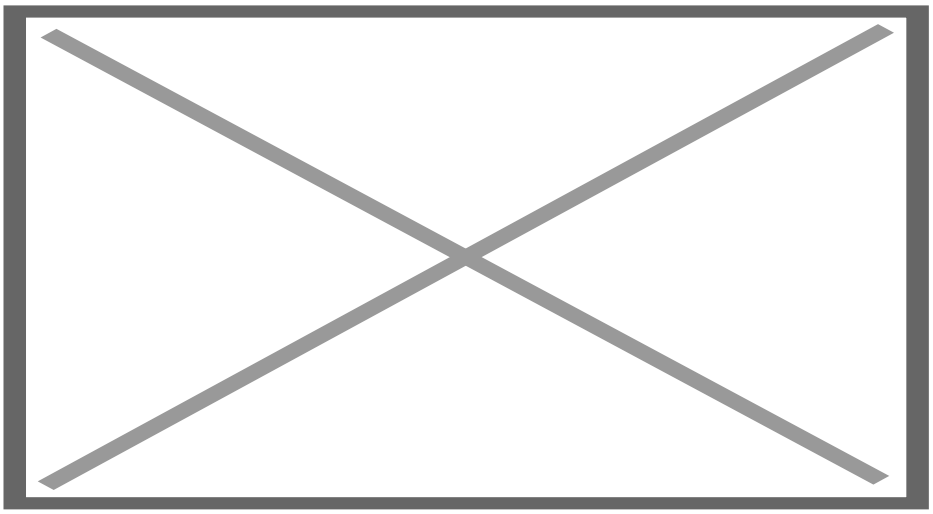
Master's degree
Specialisation Neurosciences
Enrolment type
Formation initiale
Formation continue
Language(s) of instruction
English

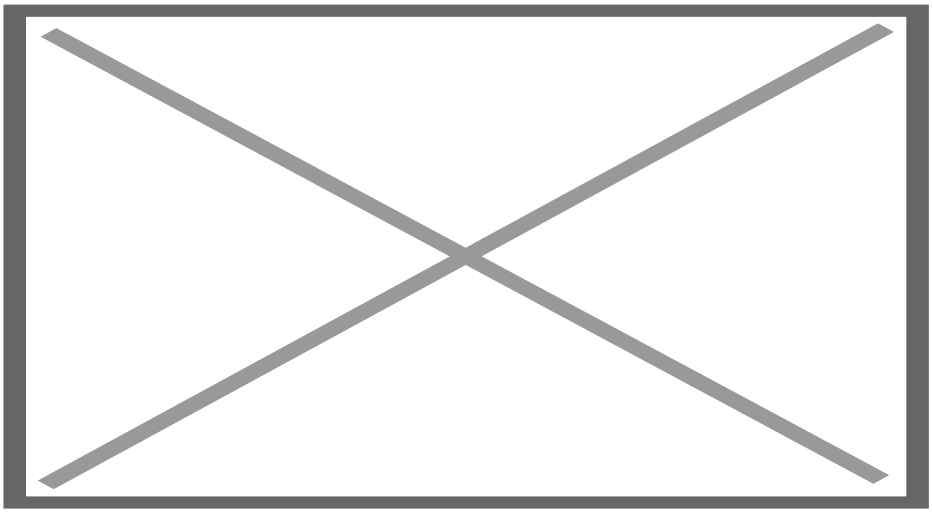
From cells to behavior, explore the major questions of systems neuroscience: how neurons process signals and interact within circuits to give rise to perception, cognition and actions. Develop cutting-edge technical skills through hands-on training, sharpen your critical thinking, and immerse yourself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

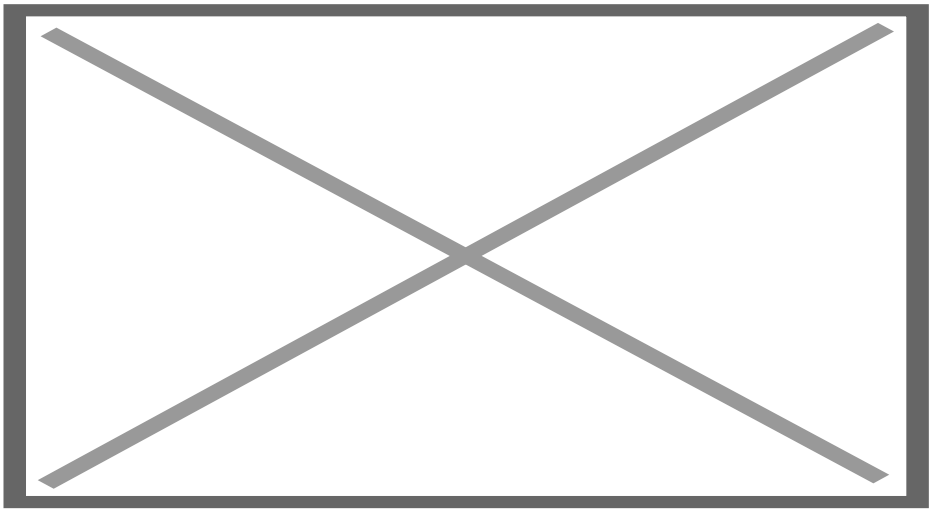
The M2 ***Systems Neuroscience: from Cells to Brain Functions*** explores the neuronal mechanisms underlying animal behavior and the experimental approaches to study them across different levels of organization: from cell neurophysiology to complex, real-world behaviors of neuroethology. This program 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.

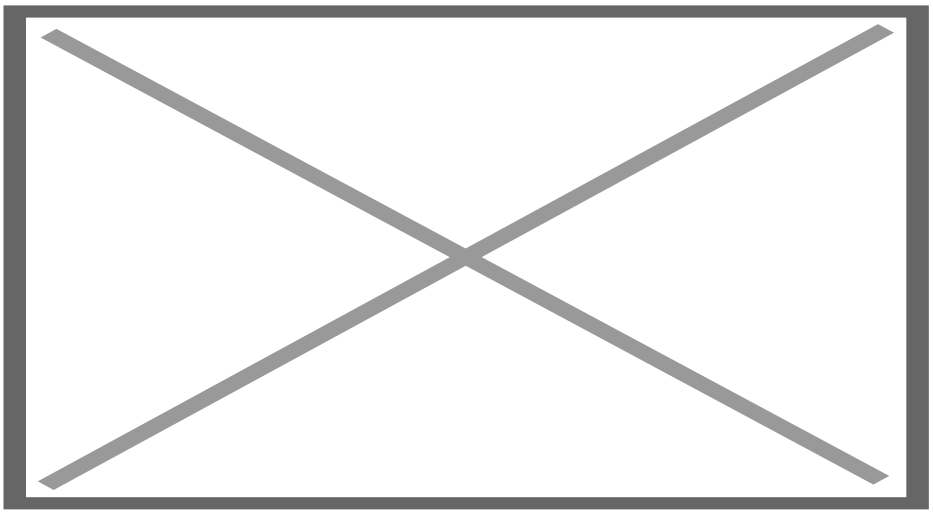
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Information

- Overview
- Application requirements
- Schedule

Présentation

Skills

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.

Objectives

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

Further Study Opportunities

PhD thesis
Students with a 2nd year Master's degree have the possibility to pursue doctoral research.
Engineering, research and development
Clinical Research associate or assistant course

Calendar

Start of programme (indicative date)
07/09/2026
End of programme (indicative date)
30/09/2027
Admission

Admission Route

Life Sciences

Capacity

Available Places

15

Target Audience and Entry Requirements

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

Inception Platform

From 02/02/2026 to 04/04/2026

From 04/05/2026 to 21/06/2026

Supporting documents

Compulsory supporting documents

Motivation letter.

Letter of recommendation from a trainee.

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

Curriculum Vitae.

Additional supporting documents

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

Programme

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	d
Advanced Systems Neuroscience									
Sensory systems and perception Charger le détail	3	Semester 1	25						
Neuroethology Charger le détail	3	Semester 1	16	4					
Methods in systems neuroscience Charger le détail	3	Semester 1	5		15				
Motor systems and actions Charger le détail	3	Semester 1	13.5	6.5					
Glia in brain health and disease Charger le détail	3	Semester 1	15	5					
Fundaments in Neuroscience									
Brain plasticity, learnings and memories Charger le détail	3	Semester 1	20						

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practic class
Elective courses								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practic class
Neural stem cells and neurogenesis	3	Semestre 1	15	5				
Charger le détail								
Closed loop neuroscience	3	Semester 1	25					
Charger le détail								
Models and ethics in neuroscience	3	Semester 1	14	6				
Charger le détail								
Neurodegenerative diseases	3	Semester 1	16	4				
Charger le détail								
Functional neuroanatomy, development and evolution	3	Semester 1						
Charger le détail								
In-depth exploration of Cognition, Behavior and Mental Disorders								
social cognition in normal and physiopathological conditions	3	Semester 1	14	0	6			
Charger le détail								
Methods in cognition	3	Semester 1	2	9	9			
Charger le détail								
Psychiatric disorders: translational approaches and treatments	3	Semester 1	5	15				
Charger le détail								
Human developmental cognitive neurosciences	3	Semester 1	16	4				
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practic class
Microbiota-gut-axis in the control of eating behaviors and emotions	3	Semester 1	20					

Charger le détail

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distan learn cour
Scientific project SNCBF	3	Semester 2							

Charger le détail

Internship SNCBF	27	Semester 2							

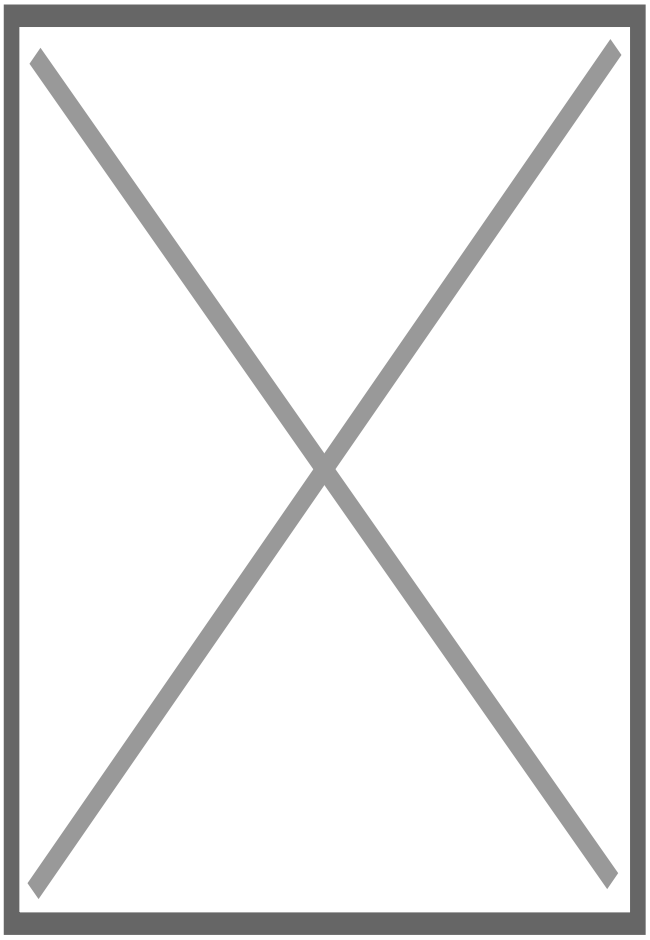
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Teaching Location(s)

SACLAY

Training campus

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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

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

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