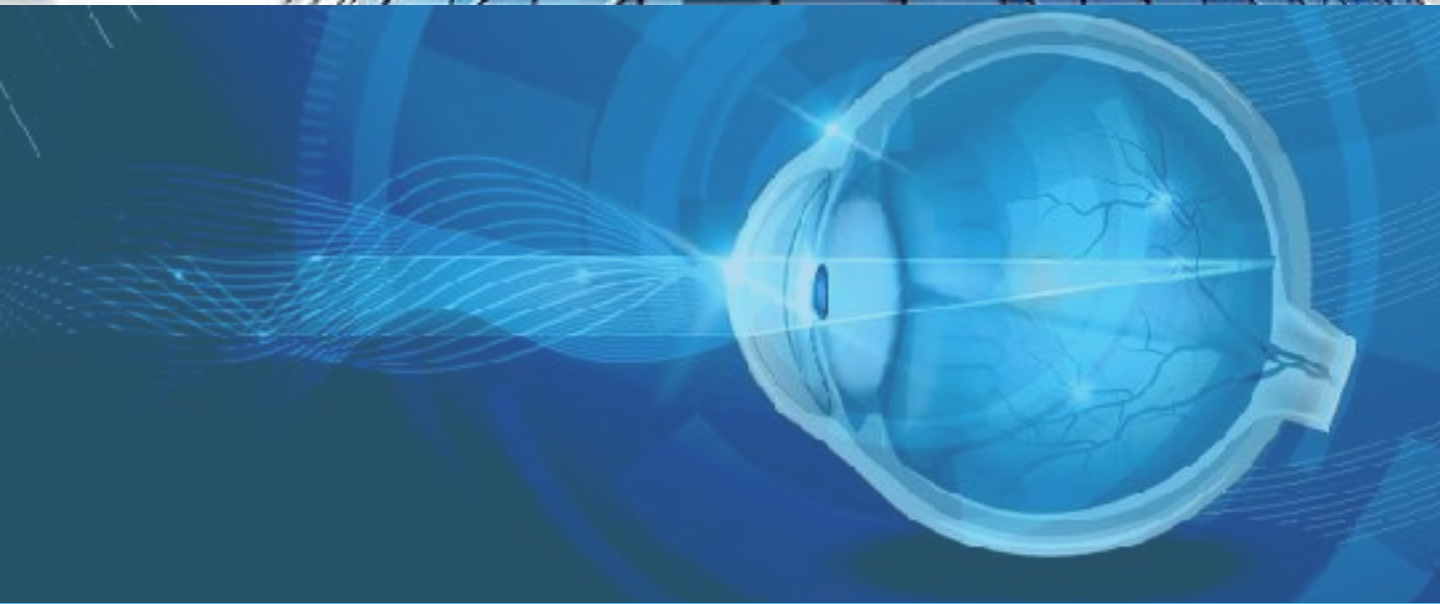




INSTITUT DE
LA VISION
à PARIS



iMOV

International Master Of Vision sciences

PARIS

2020-2021



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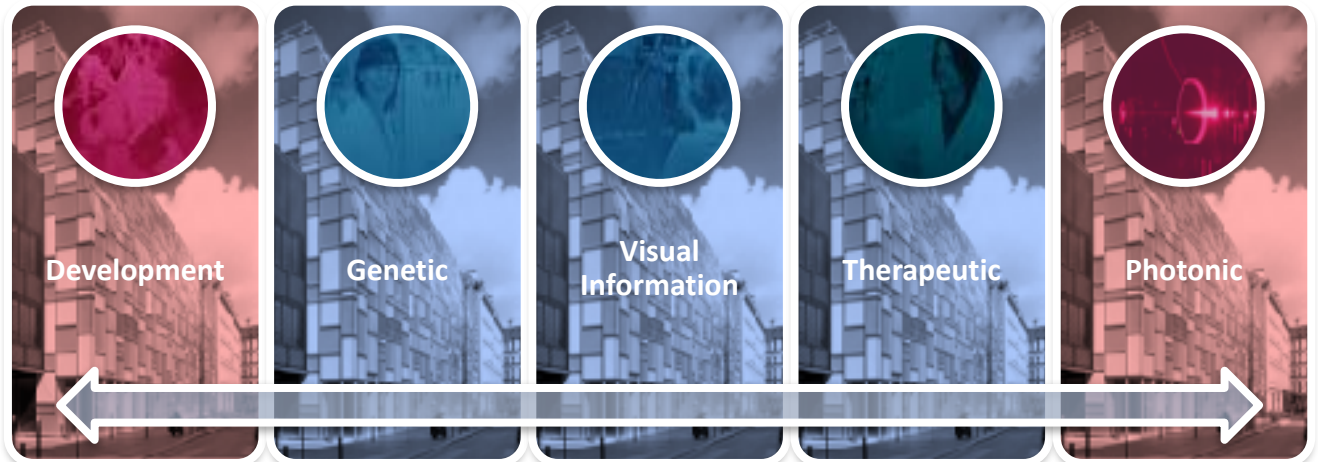
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iMOV mainly function as a specialisation of the **Master BIP - Neuroscience**. Through its selective classes it propose to student in **second year of master** to focus on vision related areas of neurosciences. **iMOV** also function as a **Dual Master** with our partner university UNAM (see p.5), it is then **possible to apply to iMOV in the first or second year of Master (M.Sc)**.

Developed with the world renown **Vision Institute**, the program offer the full perspective of the multidisciplinary approaches used in vision sciences.



The **Vision Institute** is one of the most important research centers in Europe on eye diseases. Conceived as a place of gathering and exchanges, it brings together in a single building researchers, clinicians and industrial partners (www.incubateur-vision.org/).

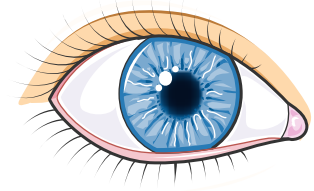
the Institute enables the sharing of ideas and skills, the emergence of new questions and facilitates the delicate process of translating fundamental discoveries into new treatments.

The Institute's goal is to discover, test and develop treatments and technological innovations of tomorrow in order to prevent or limit visual impairment and to improve the autonomy and the quality of life of patients.

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Why should you choose a master in Vision Sciences?



Vision is a healthcare major issue

Vision care is one of the highest in demand sector in the medical industry with more than 50 millions patients in Europe and 700 millions in the world suffering from low vision, a number in constant increase due to ageing and diabetes.

The multiplicity of disease affecting vision is mirrored by the important variety of therapeutical avenues. This master attempt at underlining the multidisciplinary nature of the treatments currently in development at the institute and in the world.



Age-related macular degeneration

(30M patients)



Diabetic Retinopathy

(20M patients)



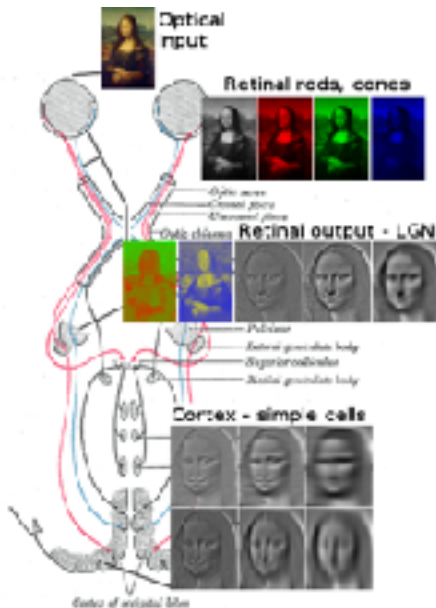
Glaucoma

(6M patients)



Rare retinal diseases

- Retinitis Pigmentosa
 - LHON, Stargardt's, (...)
- (2M patients)



Vision as a prime model for neurosciences

In neurosciences, vision is the most studied sensory modality, by far.

It is the choice modality for many behavioural task developed and yet it remain a very active field where molecular, cellular, network and higher function are explored. Thanks to current advances, those different hierarchical level of organisation are now possibly studied concomitantly in transdisciplinary studies. It is a fascinating time for vision science, join us!

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the **iMOV program is dual master with UNAM**, the largest University in latin America. This specific status means that any student performing two semester in each institution (SU and UNAM) during the two year M.Sc receives **two Master degree**, one of each university.

The choice of semester present in each university is free to the students, at the exception of first semester of second year which is currently not open in UNAM.

First year of M.Sc in S.U. is the Master BIP first year

(see here: <http://master.bip.sorbonne-universite.fr/fr/planning-des-cours.html>)

M.Sc first year, first semester, at UNAM :

Bases of cellular and systemic communications in the nervous system

Modulation of the transmission mediated by the immune system

Molecular mechanisms of cell signalling

Experimental perspectives for visual sciences

Techniques of molecular biology, pharmacology and genetics

Biostatistics

August

December

M.Sc first year, second semester, at UNAM :

Expression and regulation of genes and proteins

Functional plasticity in the nervous system

Nervous system functions and alterations in pathological processes

Internship

January

May

Students can elicit to organise their formation to best suit their professional plan :
 4 semester in SU
 or 3 semester in SU and 1 at UNAM (see internship p.12)
 or 2 semester in each university (dual master)

Prerequisites: B.SC in biology or equivalent

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Msc second year, first semester :

Vision from retina to primary visual cortex (6ECTS)

Neurophysiology of perception (6ECTS)

Physiopathology of sensory diseases and translational research (6ECTS)

Specialization coursework (6ECTS)

exams 1st semester



Developing a research project (6ECTS)

November

December

January

- Program entirely taught in **English**
- **Research**-oriented (medical, scientific, R&D...)
- **Flexibility** allowed regarding course choices
- (access to Neurosciences master BIP modules)
- specialisation coursework details here: http://master.bip.sorbonne-universite.fr/fr/planning-des-cours/coursm2s3/m2s3_neurosciences.html

Msc second year, second semester :

Master's thesis (30ECTS)

Thesis evaluation



February

July

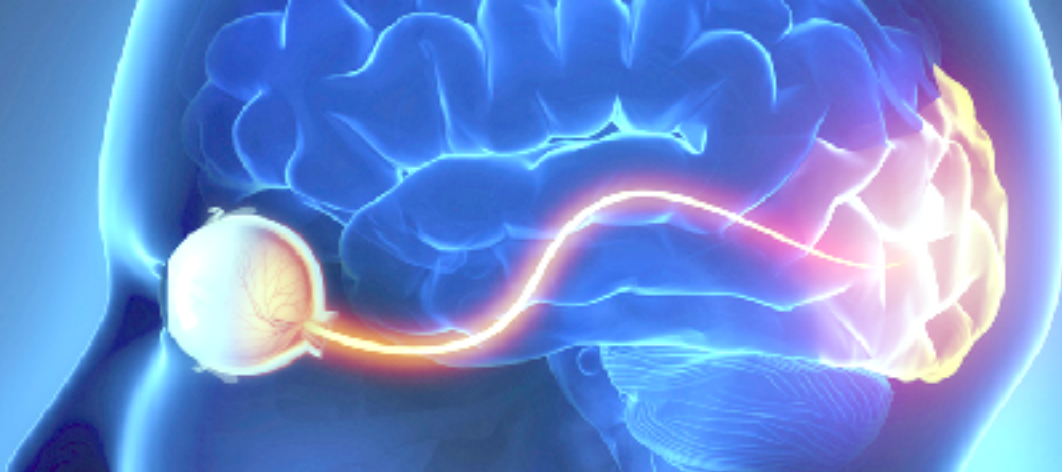
- Partnership with the **University Nacional Autonoma de Mexico**, multiple internship opportunities.
- **Funding** provided for transportation and living expenses abroad.
- **Referent researcher** assigned to each student going abroad.
- Subject of the internship **has to be vision related**.



The program put an emphasis on current fundamental and clinical advances in the multiple field of visual sciences and introduce students to the cutting edge technologies behind the discoveries.

Prerequisites: first year of Msc (M1) level in neurosciences, biology or equivalent

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Vision from retina to primary visual cortex (6 ECTS)

The purpose of this course is to introduce the different approaches used to study the early visual system, with a focus on **development**, **physiology** and **modelling** from the retina to the primary visual cortex.

Themes:

- Physics of the eye and of the phototransduction.
- Development of the early visual system from the retina to the cortical maps.
- Physiology and computational modelling of information processing.
- Tools to study neural circuits
- Psychophysics.

Students will learn about different experimental techniques, as well as computational tools, and how they can be used and combined to study how the visual system process and extract the information contained in the visual scene.

The course will allow getting the essential knowledge about the early visual system. It will also emphasise the diversity of tools, concepts and technologies used for its study. Most of these tools are also relevant to study other neural circuits. As such, the contents presented during this course will also be useful for students interested in other parts of the brain.

- | |
|--|
| ✓ Critical thinking is encourage through the continued evaluation of student participation and through presentation of articles that are analysed and critiqued by the students. |
|--|



Neurophysiology of perception (6 ECTS)

The Aim of this course is to present the latest results and current issues related to how sensory cortices process information, and how this gives rise to perception.

The emphasis will be on vision, although other modalities will also be discussed. The variety of approaches used to tackle these issues will be presented, ranging from the study of cortical circuits using state of the art tools, to the more integrated level of human psychophysics and animal behaviours.

Themes:

- Neurophysiology and imaging of the visual cortex.
- Interaction between visual cortex and other cognitive areas.
- Object and face perception.
- Visual psychophysics.
- Link between cortical activity and perception.
- Neuropsychological correlates of perception.
- Cross modal interaction between different modalities

✓ This unit includes debate between the main scientific hypothesis on neurophysiological correlates of perception. This unique format stimulates critical thinking and encourages participation of students



Physiopathology of sensory diseases and translational research (6 ECTS)

This course aims at giving an overview of the different pathological contexts leading to sensory defects. The physiological conditions of the diseases will be explored with an emphasis on how research advances can lead to therapeutic progress.

→ Neuropathology of diseases affecting vision:

- age-related macular degeneration,
- retinitis pigmentosa,
- dystrophies and other retinal diseases,
- glaucoma,
- corneal diseases,
- usher syndrome,
- aging.

→ New therapeutic avenues will be considered:

- cell therapy,
- gene therapy,
- implants,
- medical device.

→ handicap evaluation and rehabilitation techniques

✓ Thanks to the involvement of contributors from academic research, clinical medicine and the industry, participants will gain an understanding in the translational process underlining transition from fundamental research to the development of therapeutic advances.



Developing a research project (6 ECTS)

Acquire the tools to **describe and present a research project**

Students will introduce the scientific question that they will study during their **Master's thesis**

With the help of their host laboratory, students will **develop their experimental approach** with detailed protocols and feasibility considerations.

Opportunity to acquire the pre-requisites skills necessary to complete the Master's thesis, with literature analysis and discussion with the host team during the first semester.

- **Writing a letter of intention** (scientific background, question raised, experimental strategy)
- **Oral presentation** and discussion with a researcher

- | | |
|---|--|
| ✓ | Present in a synthetic manner |
| ✓ | Conduct a literature review and critical analysis |
| ✓ | Describe a research project and experimental protocols |
| ✓ | Acquire theoretical skills necessary to apprehend useful concepts for experimental practice in biology |
| ✓ | Assess feasibility and limits associated with planned experiments |

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Finding an internship in Vision sciences at UNAM

Many laboratories work in vision related sciences at UNAM, here are the different proposition currently open :



**Neurobiology Institute
UNAM campus at Juriquilla**

Dr Stéphanie Thébault

«Impact of physical exercise on spontaneous electroretinogram oscillations in obese animals»

Dr Carmen Clapp

«Analysis of the protective effect of prolactin / vasoinhibin axis in experimental diabetic retinopathy»



APEC-UNAM - Coyocoban

Dr Lenin Ochoa-de la Paz

«In vitro characterization of the VEGF₂ in Muller cells under physiological and pathological conditions»



**Institute of ophthalmology
«Conde de Valenciana Foundation»**

Dr Yonathan Garfias

«Study of nucleolin in a retinal developin model and oxygen induced retinopathy»



**Department of cellular physiology
/ genetics and molecular Biology**

Dr Cecilia Montanez

«Identification of dystrophin Dp71 and Dp40 isoforms expressed during the development of the mouse retina»

Dr Irene Lee Rivera

«Thrombin as an inducer of proliferative pathologies in the retina»

Dr Rocío Salceda

«The role of Nr2f2 in retinal homeostasis»

Finding an internship in Vision sciences elsewhere :

We are currently developing new partnership with these universities and internship are already possible there :



We are able to provide Funding for transportation and living expenses abroad for students engage in the program.

We also have a wide array of internship proposal available at the Vision Institute.

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Contacts

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Director of iMOV:

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Applications: mid May 2020 to early July 2020

Should you have any questions, please contact: **Grégory Gauvain**

<https://sciences.sorbonne-universite.fr/masters/master-biologie-integrative-et-physiologie-bip/m2-parcours-neurosciences>

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