

Share



Email destinataire :

Vous devez renseigner un email valide

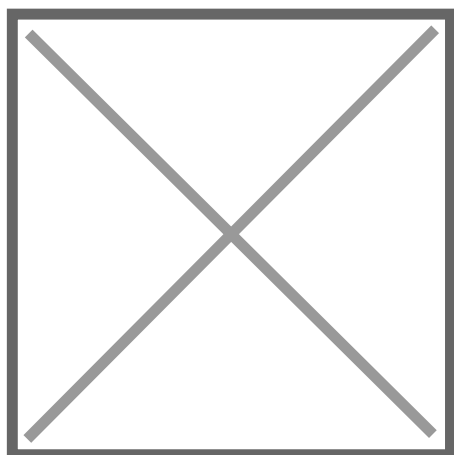
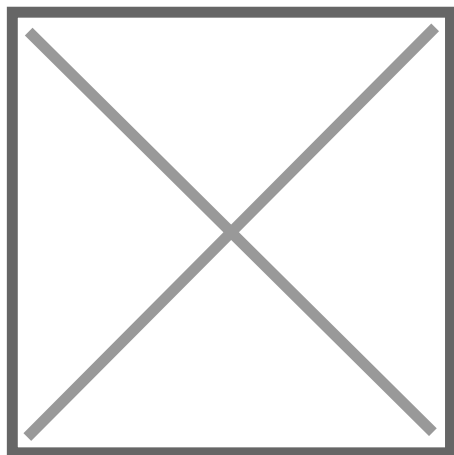
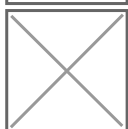
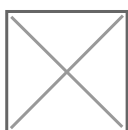
Envoyer

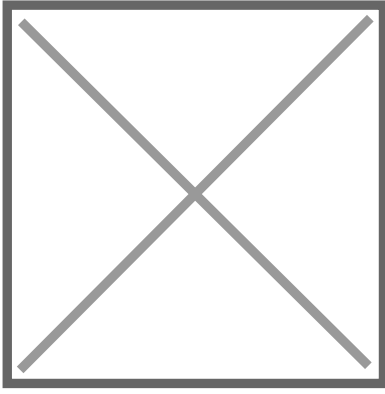
Une erreur est survenue. Merci de réessayer ultérieurement

Le mail de partage a bien été envoyé.

Add to Compare

M2 Human Genomics in Biotherapies, Health and Disease (HuGeInBio)



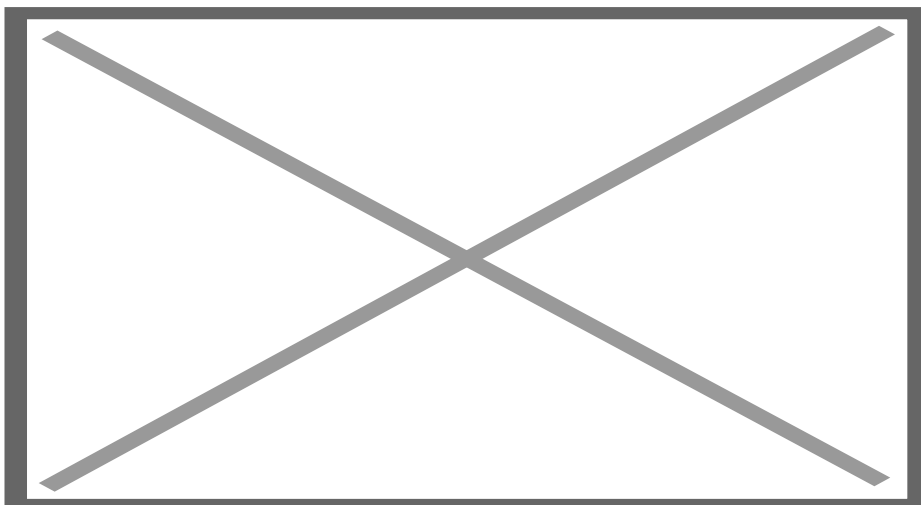


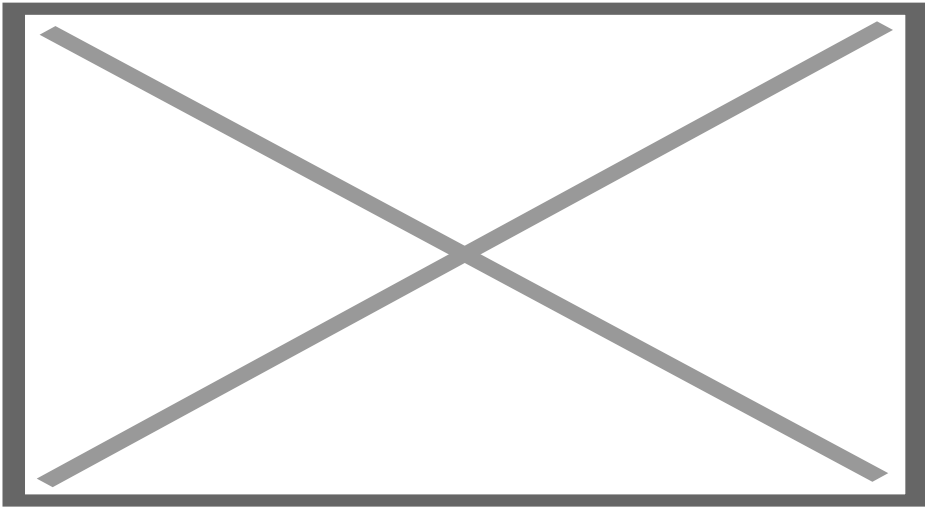
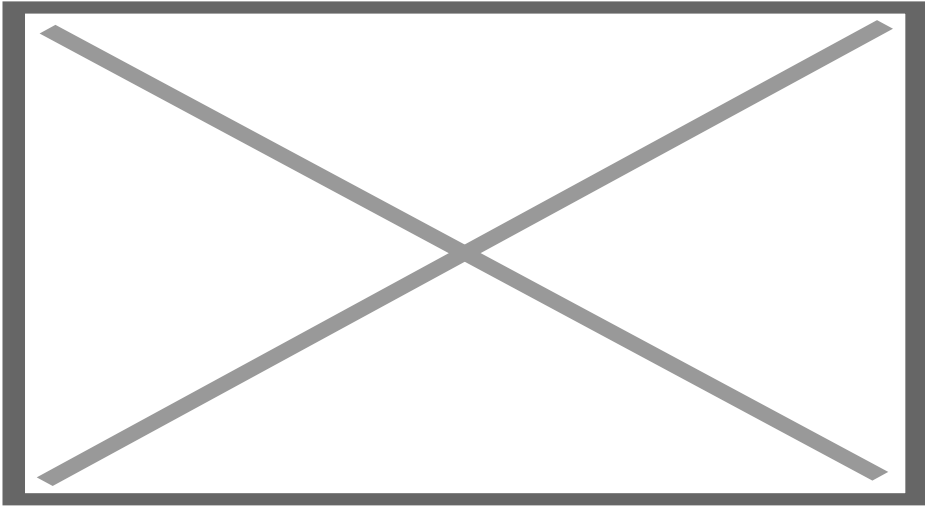
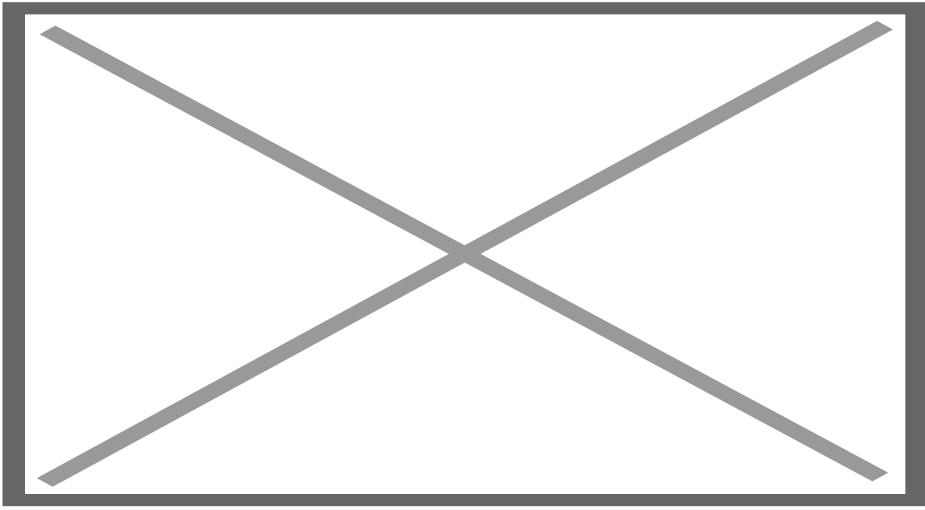
Master's degree
Specialisation Biologie moléculaire et cellulaire
Enrolment type
Full-time academic programmes
Language(s) of instruction
English

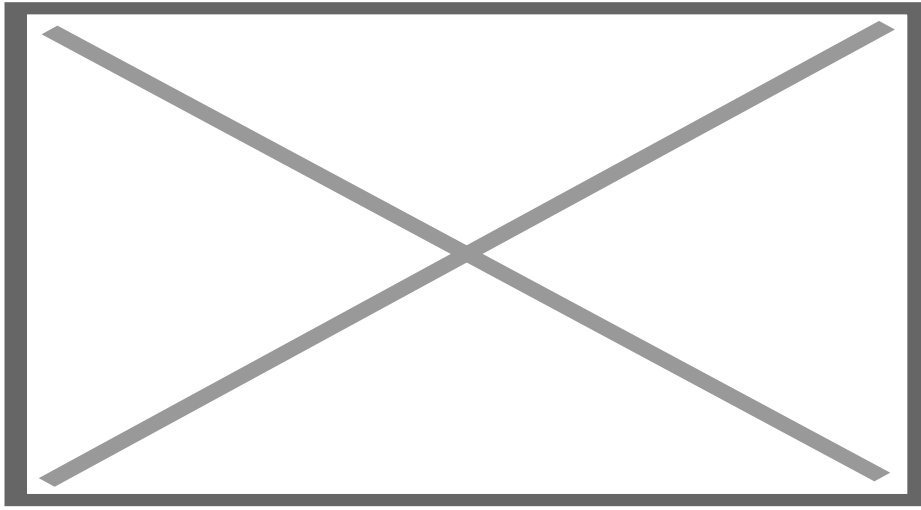
The Master **HuGeInBIO** provides cutting-edge knowledge in **cancer, disease modeling and biotherapies**, with a focus on **genomics** and its **impact on health** and precision medicine. It also covers key areas, as genome editing and large-scale genetic screening for drug development, and fosters awareness of bioethics and entrepreneurship at the crossroads of science, innovation and business. The curriculum blends theory with practice through case studies and real-world scenarios with field professionals.

The training program is structured into four blocks. The **Core block** (12 ECTS) provides principal methods in functional genomics, overview in biotherapies and highly specialized methods to characterize heterogeneity of samples and basics in mathematics and computational sciences in biology. The **Research block** (12 ECTS) includes an interdisciplinary project with a M2 in Bioinformatics, focusing on digital tools for data processing and interpretation in biology. It also features practical training in NGS data analysis and a seminar unit on diverse research topics. The **Optional block** (6 ECTS) offers a choice between units on innovation and bioethics or other biology specialties. The **Internship block** (30 ECTS) is dedicated to a research placement in industry or academia.

[Télécharger la fiche détaillée](#)
[Apply Now](#)







Information

- [Overview](#)
- [Application requirements](#)
- [Schedule](#)

Présentation

Skills

Students will learn to **formulate hypotheses**, **design** and **carry out** experimental projects, and generate validated scientific data. They will also develop the ability to **monitor scientific advances** and independently synthesize the state of the art on a given research topic.

Students will be trained to use new **technological tools**, **communicate** scientific data and concepts to both experts and non-specialists, justify methodological choices and interpretations, and critically **analyze scientific information** from articles or conferences in English.

Students will develop **autonomy**, **teamwork**, and time management skills to meet deadlines. They will also learn to **collaborate** with external partners—scientific or non-scientific, national or international—across various professional contexts.

Objectives

This training will provide you with a strong foundation in modern genomics and its applications in research and healthcare. You will develop:

1. **Expertise in structural and functional genomics techniques**, with a focus on single-cell analysis and the study of spatial and temporal cellular heterogeneity in complex biological samples—essential for choosing the right approach to specific scientific questions.

2. **Hands-on skills in implementing multi-omics strategies** from an experimental point of view, enabling you to work confidently in a laboratory setting.
3. **A clear understanding of how genomic data impacts patient diagnosis, care, and treatment**, including the use of large-scale screening tools (such as CRISPR/shRNA or compound libraries) for therapeutic discovery.
4. **The ability to collaborate effectively with bioinformaticians**, guiding data processing workflows and independently performing downstream functional analysis to extract and apply relevant findings to your research projects.
5. **Awareness of the ethical and legal challenges** surrounding precision genomics and the responsible use of genomic data.
6. **An introduction to entrepreneurship in human genomics**, helping you explore the intersection between science, innovation, and business development.
7. **Insight into the broader research ecosystem**, both nationally and internationally, through seminars and courses offered in collaboration with public and private partners—including those from the EUGLOH European University Alliance.

Throughout the program, students will benefit from a cutting-edge research environment in genomics and post-genomics. This Master's program is developed in synergy with Genopole and the GenoTher biocluster, and in collaboration with the Paris Saclay Cancer Cluster.

Débouchés

Career prospects

Design/research engineer in an R&D department in the ophthalmic industry

Ingenieur R&D

R&D Project Manager

R and D Project Manager

Project Manager

Design engineer in the industrial sector

Design engineer in the research / scientific sector

Design engineer industry / public research

Academic staff

Design Engineer

Research & Development Engineer

Research and Innovation Manager

Project Manager

Project manager in biotechnologies, biotherapies or healthcare innovation

Research & Development Engineer

Research or Design Engineer

Lecturer (after a PhD)

Design Engineer

Research Engineer

Healthcare project engineer

Design engineer

Head of development

Research officer

Further Study Opportunities

PhD

PhD in Chemistry / Biology

PhD

PhD thesis

Admission

Admission Route

Life Sciences

Capacity

Available Places

20

Target Audience and Entry Requirements

Recruitment is open to students who hold a **Master 1 degree in Molecular and Cellular Biology** from Paris-Saclay University, particularly those who have completed the following courses: *Biologie des Génomés*, *Biothérapies* and *Cellules Souches et Biologie des Cancers*, or those enrolled in the Master 1 *International Track in France – parcours Évry-Paris-Saclay*, or the Master 1 *International Track Sino-French Program*.

Recruitment is also open to students holding a **French degree equivalent to the first year of a Master's in Biology**, with certified English language proficiency.

Additionally, students with a **Bachelor's degree in Science** in relevant fields such as molecular biology, biotechnology, genetics, genomics, or bioengineering are eligible to apply.

Période(s) de candidature

Inception Platform

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

Supporting documents

Compulsory supporting documents

Motivation letter.

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

Certificate of English level.

Curriculum Vitae.

Additional supporting documents

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

Programme

CORE

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	practical class	directed study/practical class	discovery
Introduction to Mathematics and Computer Science for Biology	3	Semestre 1	15	7.5					

Introduction to Mathematics and Computer Science for Biology

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 15

Directed study: 7.5

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

The prerequisites for the course are a basic knowledge of discrete mathematics and an eagerness to engage in computational analysis. Students are assumed to have a solid background in biology.

Programme/contents

Syllabus:

- Probability-Statistics: Descriptive statistics, Probability, Random variables, Distributions, Central Limit Theorem, Hypothesis testing, Linear regression, Probabilistic modeling, Tests

- Data Analysis & Simulation: Introduction to R language, Introduction to Linux

Learning objectives

The course will present basic computational and mathematical concepts needed for genomic and data analysis.

At the end of the course, the student should be able to:

- perform basic statistical analysis on datasets
- understand formal concepts used for describing biological problems
- use R for basic data analysis
- be autonomous in a Unix/Linux environment

Overall organisation

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	dis lea c
UE Biotherapies, in vitro (2D 3D organoids) and animal modeling	3	Semestre 1	15	7.5					

UE Biotherapies, in vitro (2D 3D organoids) and animal modeling

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 15

Directed study: 7.5

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

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

- Identify and explain the main innovative biotherapy strategies.
- Analyze the limitations and challenges associated with these strategies.
- Describe and explain the commonly used *in vitro* and *in vivo* models, highlighting their applications across diverse fields of biology.
- Evaluate the advantages and constraints of these experimental models.
- Propose appropriate innovative biotherapy strategies and select suitable models to address a specific pathology.

Learning objectives

This course introduces the fundamental concepts underlying innovative biotherapies and presents the main therapeutic strategies developed in this field. It addresses their clinical applications while highlighting the scientific and practical challenges associated with their implementation. It also highlights emerging trends and prospects for the evolution of biotherapies. In addition, the course also provides an overview to the different *in vitro* and *in vivo* models commonly used in biology.

Overall organisation

This course is organized as follows:

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	dis lea c
UE Single cell and spatial multi-omics, high-throughput screening	3	Semestre 1	15	7.5					

UE Single cell and spatial multi-omics, high-throughput screening

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 15

Directed study: 7.5

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

This teaching unit will provide an overview of the breaking edge technologies allowing to :

- Study the complexity and heterogeneous nature of the samples at both genomic, epigenomic and transcriptional level, i.e. single-cell omic approaches, spatial transcriptomic, single-cell DNA barcoding, metagenomic, single-cell DNA barcoding approaches for lineage tracing, metagenomic.

It will provide knowledge on advantage and limitations of the main single cell approaches, spatial-transcriptomic technologies

- Identify and develop new therapeutic targets (genome-wide RNAi, CrispR/Cas9 knockout screens, drug screening)

Learning objectives

This course will provide an overview of genomic tools and strategy dedicated to address questions related to the description the cellular composition of complex tissue, definition of the cellular hierarchy of differentiation in both physiological and pathological condition, exploration of immunity dysregulation in disease context, identification of the cell of origin of the disease, study of disease cells interaction with their microenvironment, microbiome composition and variations in health and disease, finding disease cell vulnerabilities.

It will help student to identify current challenges in the genomic field and opportunity to undress

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	dis lea c
Advanced Functional Genomics	3	Semestre 1	15	7.5					

Advanced Functional Genomics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 15

Directed study: 7.5

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

At the end of this course, the students will be able to

- Enumerate and differentiate large-scale sequencing technology driven-approaches, i.e. RNA-seq, ChIP-seq, Methyl-seq, WGBS, ATAC-seq, Hi-C

- Specify the distinct steps of the analysis workflows from raw data to pathway analysis (read mapping strategies, transcript assembly, data normalization, isoform-specific or differential gene expression analysis) for both quantitative and qualitative analysis of transcriptomic data

- Understand the limits of bulk RNAseq in regard to Single-cell approach

- Describe the principle of data production and analysis of ChIP-seq from peak calling to data visualization

- Explain the methods of data exploration: common tools of genes &/or samples classification and functional annotation

- Determine which technology to use among a broad spectrum of functional genomics methods to address specific biological questions

- Interpret results of the high-throughput data in a scientifically stringent manner

- Enumerate applications of these sequencing data in health and precision medicine

Learning objectives

RESEARCH APPLICATION

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	dis
Research Seminars	3	Semestre 1	15	5					

Research Seminars

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 15

Directed study: 5

Language(s) of instruction

Anglais

Remote teaching

oui

Programme/contents

The conferences will cover various topics related to Human Genomic, Gene Cell Tissue biotherapies, Cancer and other disease understanding that were not presented in the teaching units of the block Core.

Researchers involved particularly in academic research units in Human genomics (Gustave Roussy, Curie Institute) and Biotherapies (Istem, Genethon, Integrare, ART-TG, CNRGH, Genoscope, Sysfate, LBEPS, SABNP) as well as private companies on the Genopole campus will be involved. Few seminars will be held by colleagues from the European alliance EUGLOH.

Learning objectives

This teaching unit will develop their analytic and communication skills.

Overall organisation

This teaching unit proposes cycles of conferences delivered by research experts, one conference a week during 8 to 10 weeks during the first semester either in a face-to-face or online

Students will be evaluated (1) through chairman activities during the conferences (including introduction of the invited speaker, provide a general introduction of the research area that will be presented by the invited speaker, animate the discussion between the invited speaker and the audience (2) by an oral presentation at the end of the cycle of conferences by presenting us the links between their own internship project and one or several of the seminars.

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	dis lea c
UE Practical course in digital genomics	6	Semestre 1	1	16.5					

UE Practical course in digital genomics

ECTS : 6

Semester: Semestre 1

Detail

Lecture: 1

Directed study: 16.5

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

The course outline for the available data assigned :

- identify the type of data / consider biological questions / choice of the right software to answer biological questions and/or necessary developments (if development is required, criteria for validating the method (quality controls) and estimation of the time needed for development)
- Descriptive statistics of the available data
- Analysis strategies / description of tasks to be performed
- Validation criteria / results / giving biological meaning to the results obtained / discussion (limitations, additional analyses with planned protocol, etc.)
- Reporting (strategies, scripts, available/processed data, results obtained/quality of analysis and reflection)

Learning objectives

An interdisciplinary project shared with another M2 in Bioinformatics (M2 Geniomhe) will allow them to understand the place of digital technology in the processing and interpretation of the data generated to address biological problems.

Overall organisation

It aims to train students with specific specialty who will work in direct interaction and, in the

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	dis lea c
NGS data processing methodology	3	Semestre 1		22.5					

NGS data processing methodology

ECTS : 3

Semester: Semestre 1

Detail

Directed study: 22.5

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

The course outline:

- Perform all bioinformatics steps of sequence data processing (alignment, local realignment, variant identification, variant visualization with IGV)
- Define and apply adequate quality control filters at each step of data processing
- Perform and interpret descriptive statistics at each step of data processing
- Choose and apply filters for the identified variants according to the problem considered (frequency, predicted effect, ...)
- Use the appropriate statistical tools to search for genetic variants associated with a complex disease.
- Interpret the statistical results obtained
- Synthesize the results obtained during the different stages (bioinformatics and statistics).

Learning objectives

The objective of this practical teaching is to manipulate Next Generation Sequencing DNA sequence data in order to identify genetic variants (SNV, indels) associated with a complex disease.

Overall organisation

This teaching unit is organized in the form of practical work in the computer room. 2/3 will focus on the bioinformatics processing of data,

OPTIONAL

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Neural stem cells and neurogenesis	3	Semestre 1	15	5				

Neural stem cells and neurogenesis

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 15

Directed study: 5

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Basic knowledge in development and stem cell biology will be useful, but it is not required.

Programme/contents

Through conferences given by experts working on diverse model organisms, you will explore how neural stem cells (NSCs) build, remodel and potentially repair the nervous system throughout life.

You will learn how their microenvironment, the neurogenic niche, regulates their maintenance and behavior. You will explore the mechanisms that control the proliferation, fate and differentiation of their progeny. You will also discover how these processes go awry in neurological disorders, and how they can be studied or harnessed for therapeutical purposes.

Methodological sessions consisting in guided case studies in group, will allow you to strengthen your analytic skills, your ability to evaluate experimental designs, and your critical thinking.

Learning objectives

At the end of the course the students should be able to:

- Formulate current challenges and problematics in the field of neural stem cells and neurogenesis.
- Explain the principle of technics and tools presented by speakers in the attended conferences.
- Describe, analyze, interpret and question scientific data linked to the conference themes, in writing and in a scientific article-style format.

Overall organisation

The course takes place in the Paris-Saclay Institute of Neuroscience (INSP)

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Bioimaging - Biological Digital Image Processing and Analysis	3	Semestre 1	10		15			

Bioimaging - Biological Digital Image Processing and Analysis

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 15

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

No specific prerequisites, other than a broad scientific background.

Programme/contents

Knowledge:

- Fundamentals of optics and microscopy.
- Theoretical foundations necessary for interpreting digital images: digital image concepts, image formats, sampling, periodic and non-periodic signals, noises, filters, linear convolution, correlation function, segmentation and information quantification.
- Theoretical bases of 3D reconstruction algorithms: image combination, back-projection methods, iterative methods, and visualization of reconstructions.

Know-how:

Using ImageJ (Fiji): installation, modification of image properties, evaluation of image quality (histogram...), automatic segmentation, granulometry analysis, quantifications (signal intensity, shape descriptors, densitometry, particle tracking - trajectory, speed, etc.), RGB images, channel separation and merge, co-localization analysis (object-based and statistical approaches), noise detection, filters, creation of homemade filters based on linear convolution, image correlation, periodic signal extraction (Fourier analysis), projection simulation, 3D reconstruction from projected data, macro programming, volume visualization.

Soft skills:

How to construct an argument (evidence vs opinions: reasoning, facts, examples).

Learning objectives

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
<u>Innovation and entrepreneurship in biotechnology (IEB)</u>	3	Semestre 1	22.5					

Innovation and entrepreneurship in biotechnology (IEB)

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 22.5

Tutored project 0

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

1/Interactive session about entrepreneurship

Thoughts and discussions about entrepreneurship and its scope, leading to the identification of modules needed for business start-up

2/ Presentation of support organizations

Global presentation and Focus on Genopole: its ecosystem, Biotechnology entrepreneurship specificity and the early-stage support program Shaker.

3/ Testimonials of actors

Entrepreneurs / Incubator / Funders - Presentation and meeting with the Paris Saclay Cancer Cluster stakeholders, followed by an on-site visit.

4/ Student's case study : Preparation of a pitch for a biotech start-up project

session of projects presentations and guidelines of this pitch exercise

personal and team students work

restitution with an oral presentation

Learning objectives

Give an overview of steps and procedures for entrepreneurship, with a focus on biotechnologies

Overall organisation

20 hours of face-to-face teaching spread over 2 weeks Supervised project to be prepared Oral presentation

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Ethical issues in biotherapies and precision medicine	3	Annualisé	10	10				

Ethical issues in biotherapies and precision medicine

ECTS : 3

Semester: Annualisé

Detail

Lecture: 10

Directed study: 10

Language(s) of instruction

Français

Remote teaching

non

Programme/contents

1/Une journée de **séminaire introductif** ‘Enjeux de la Santé numérique

2/ Accès à toute ou partie d'UE

- Droit du vivant animal et végétal
- Droit des outils numériques en santé, e-santé
- Ethique de l’IA appliquée à la santé

3/ **Projet** en groupe bi-disciplinaire Biologie/Droit

Sujet de recherche appliqué pour lequel les problématiques d’éthiques seront identifiées et mises en regard des règles de bioéthiques appropriées. Regard croisé de biologistes et juristes sur un projet de recherche

Learning objectives

Donner les principes éthiques applicables aux thématiques de recherches en biologie, et plus particulièrement pour les approches appliquées en biothérapies et médecine de précision.

Overall organisation

Cours présentiels ou distanciels synchrones ou asynchrones

Projet tutoré

Skills

C'est l'ensemble des compétences nécessaires à la communication scientifique qui sera plus particulièrement travaillée, avec notamment

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Ecological Transition - M2	3	Semestre 1		20				
■								

Ecological Transition - M2

ECTS : 3

Semester: Semestre 1

Detail

Directed study: 20

Language(s) of instruction

Anglais

Remote teaching

oui

Learning objectives

Give a comprehensive understanding of how modern occupational health and safety (OHS) practices contribute to global economic growth, social inclusion, and sustainability

Overall organisation

Online workshop/seminars with attendance certificate

Skills

All competencies developed for scientific communications, ie ‘Structure and present scientific data and concepts to specialists or novices’

'Interpersonal skills in the workplace' will also be included, with the specific competencies “Working independently” and “Interacting with non-scientific partners”.

Type of assessment

Evaluation Continue non Intégrale

[EUGLOH events](#)

3

Annualisé

22.5



EUGLOH events

ECTS : 3

Semester: Annualisé

Detail

Directed study: 22.5

Language(s) of instruction

Anglais

Remote teaching

oui

Programme/contents

The EUGLOH alliance brings together **9 key European universities of research**: [Ludwig-Maximilians-Universität München](#) (Germany), [Lund University](#) (Sweden), the [University of Porto](#) (Portugal), the [University of Szeged](#) (Hungary), [University of Alcala?](#) (Spain), [The Arctic University of Norway](#) (Norway), [University of Novi Sad](#) (Serbia), [University of Hamburg](#) (Germany) and Université Paris-Saclay. Embracing the **values of the European Union**, they pool their expertise in order to answer the **challenges of today's society** and offer **education of excellence** with a blend of high-quality teaching and research, and cutting-edge facilities.

Overall organisation

Thanks to the EUGLOH European University, students from all five universities have access to courses offered by the different member universities, to workshops, thematic schools, webinars, and conferences

Type of assessment

Evaluation Continue non Intégrale

[UE libre](#)

[Catalogue S1](#)

2.5

Semestre

1

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
----------	------	----------	---------	----------------	-----------------	------------------------	-------------------------	--------------------------------



UE libre Catalogue S1

ECTS : 2.5
Semester: Semestre 1
Language(s) of instruction
Français
Remote teaching
non
Type of assessment
Evaluation Terminale

INTERNSHIP

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
----------	------	----------	---------	----------------	-----------------	------------------------	-------------------------	--------------------------------	-------------------

[Internship](#) 30
Semestre 2

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
----------	------	----------	---------	----------------	-----------------	------------------------	-------------------------	--------------------------------	-------------------

■

Internship

ECTS : 30

Semester: Semestre 2

Language(s) of instruction

Anglais

Remote teaching

non

Learning objectives

Research Internship in an academic or private laboratory

Overall organisation

full-time in laboratory based on internship agreement

Skills

C1.1 : Formuler des problématiques et des hypothèses de travail permettant la conception et la réalisation d'un projet dans son domaine d'expertise et /ou à l'interface de plusieurs domaines en biologie.

C1.4 : Produire, valider et analyser des données scientifiques.

C4.1 : Travailler en autonomie et collaborer avec les membres d'une équipe afin d'atteindre des objectifs communs.

C4.3 : Organiser et planifier son temps de travail de façon à respecter des deadlines.

Type of assessment

Evaluation Continue non Intégrale

Contact

- **Contact formation**

Support - contact

-

Marie-Anne DEBILY

Enseignante

<http://www.universite-paris-saclay.fr/formation/master/biologie-moleculaire-et-cellulaire/m2-human-genomics-biotherapies-health-and-disease-hugeinbio>