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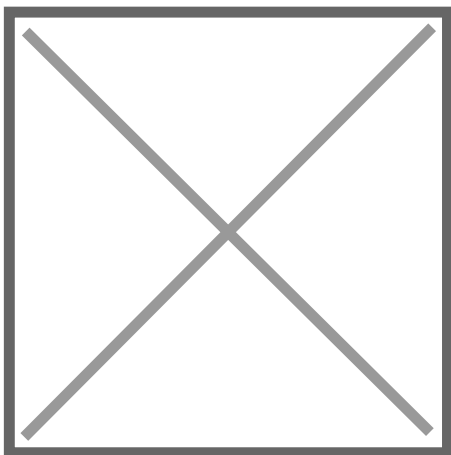
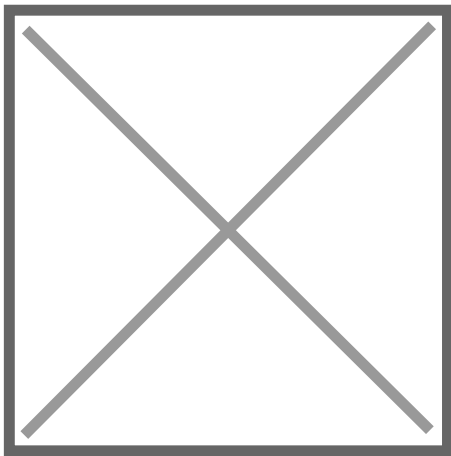
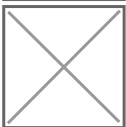
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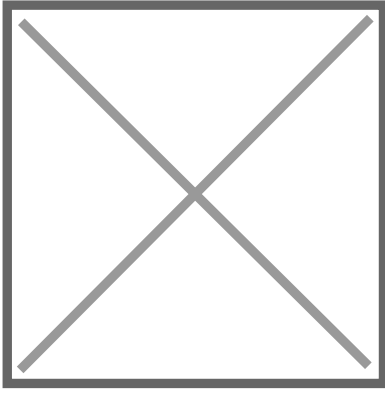
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Le mail de partage a bien été envoyé.

Add to Compare

M2 Genetics, Genomics, Epigenetics and Evolution (GenE2)





Master's degree

Specialisation Biologie moléculaire et cellulaire

Enrolment type

Full-time academic programmes Life-long learning

Language(s) of instruction

English

The international Master 2 GenE2 provides training in cutting-edge technologies in **genetics, genomics, and epigenomics**. Combining theory with hands-on workshops (**ChIP-seq, Big Data**), it develops highly sought-after skills in **high-throughput sequencing data analysis**.

A distinctive feature of this program is its innovative approach, which integrates the latest techniques (**single-cell omics, spatial transcriptomics, ChIP-seq**) with advanced training in data analysis.

The **Master 2 GenE2** is a program entirely taught in English.

It is a **research-based training program** that combines scientific lectures, research projects, hands-on workshops and an internship.

Students develop autonomy through individual or group work under the supervision of specialists.

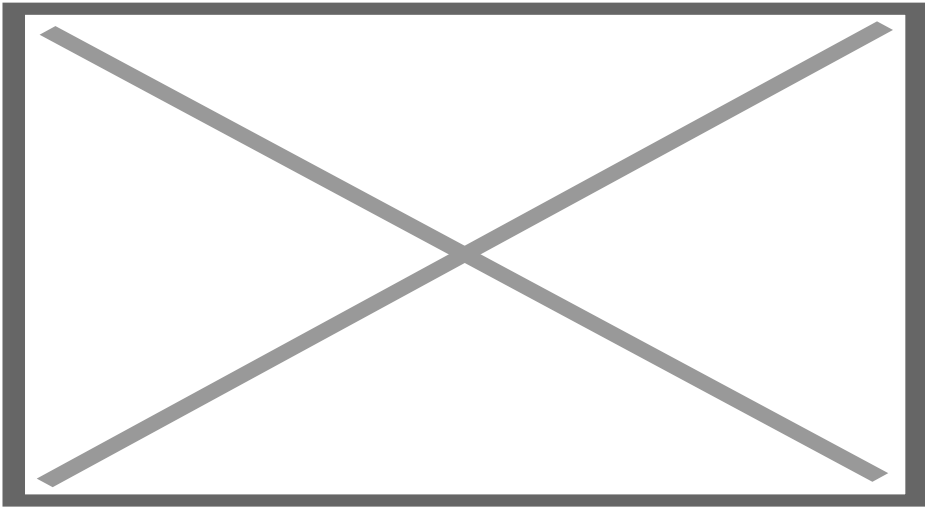
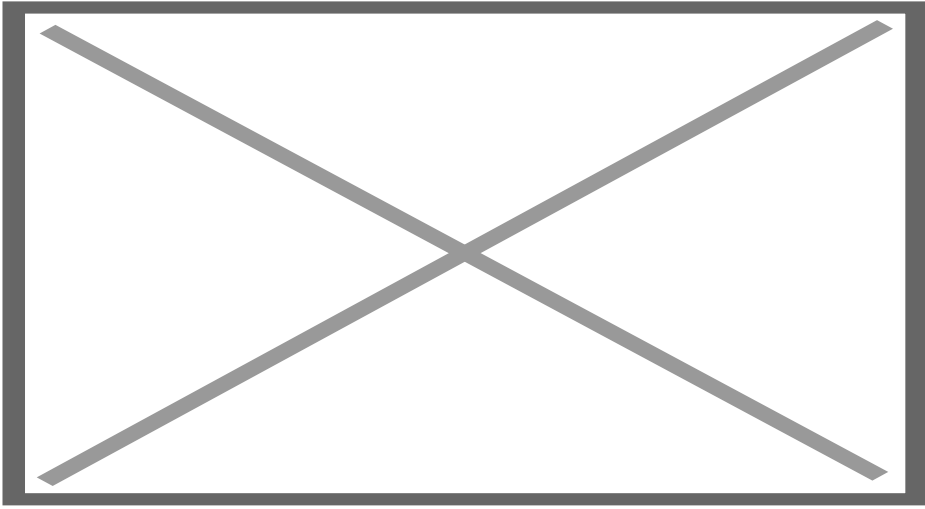
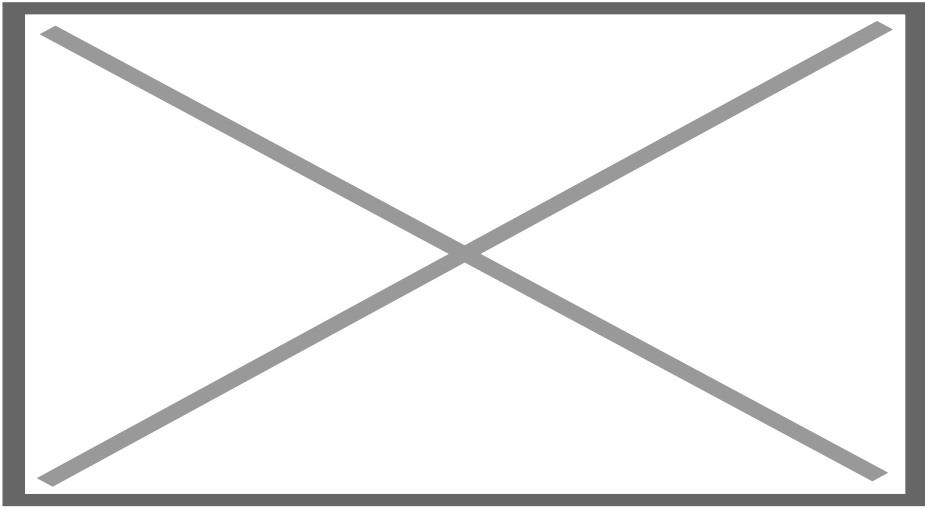
The program is structured around three skill blocks:

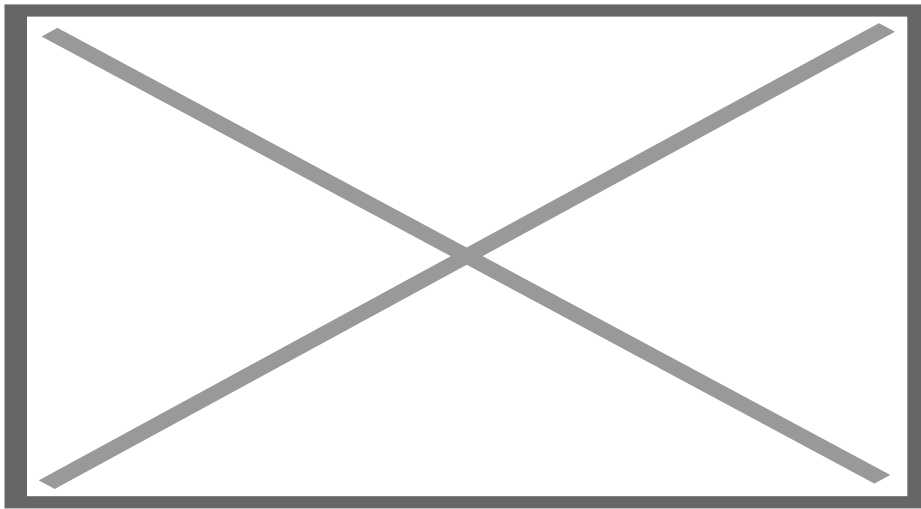
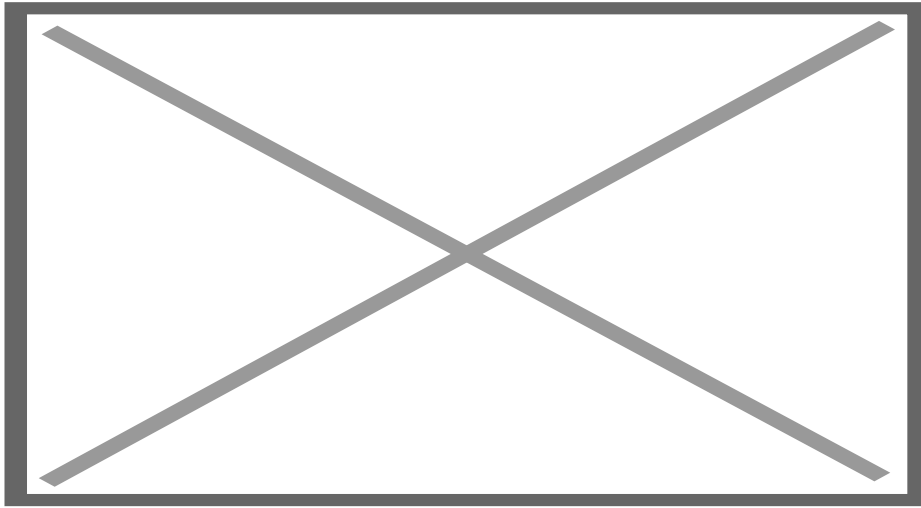
- **Theoretical block (15 ECTS):** organized as scientific lectures.
 - 4 mandatory courses:
 - Functional Genomics
 - ncRNA and Epigenetics
 - Genome Stability and Evolution
 - Genomes, Phenotypes and Populations
 - 1 optional course (choose one):
 - Single-cell omics and spatial transcriptomics
 - Metagenomics
 - Scientific Project
- **Experimental block (15 ECTS):** two innovative practical workshops:
 - ChIP-seq
 - Big Data
- **Research immersion block (30 ECTS):** a six-month laboratory internship in France or abroad.

Website: <http://www.gene2.fr/>

[Télécharger la fiche détaillée](#)

[Apply Now](#)





■ ■

Information

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

Présentation

Skills

1. Scientific and Technical Skills

- Mastery of fundamental concepts and methods in **genetics, genomics, epigenetics, and evolution**.
- Design, execution, and analysis of **genomics and epigenomics experiments**.
- Use and interpretation of **high-throughput sequencing data**.
- Mastery of **modern sequencing techniques** (ChIP-seq, single-cell omics, spatial transcriptomics...).
- Application of **bioinformatics and biostatistics tools** to analyze complex datasets.
- Creation, management, and **visualization of large biological datasets**.

2. Analytical and Methodological Skills

- Synthesis and integration of scientific knowledge and results.
- Development of a **scientific critical mind**, with the ability to identify the limits of an analysis.
- Design and planning of **innovative scientific projects**.

3. Professional and Organizational Skills

- Work **independently and collaboratively** in a research environment.
- Adherence to **scientific rigor**, protocols, and laboratory safety rules.
- Project management and organization in an **international and multidisciplinary context**.

4. Communication and Scientific Dissemination Skills

- Writing and oral presentation of scientific results.
- Ability to communicate results to diverse audiences, including for **scientific publication**.

Objectives

By following this program, students will be able to:

- **Master** the fundamental concepts and methods in **genetics, genomics, epigenetics, and evolution**.
- **Define and carry out** all steps of an experimental approach in **genomics**.
- **Apply** basic concepts of **high-throughput data analysis**.
- **Design and analyze** experiments using **modern sequencing technologies**.
- **Identify, select, and apply** existing tools in **bioinformatics and biostatistics** to analyze high-throughput sequencing data.
- **Acquire skills** in creating, managing, manipulating, and **visualizing complex data**.
- **Apply knowledge** to **biomedical, applied, or fundamental research problems**.
- **Synthesize and integrate** knowledge and results to present them **in writing and orally**, developing a **scientific critical mind** to understand the limits of high-throughput genomic analyses.
- **Develop the ability** to **design and plan innovative scientific projects**.
- **Master laboratory practices**: teamwork, scientific rigor, autonomy, communication, and laboratory safety.
- **Develop the ability** to work in an **international and multidisciplinary environment**.
- **Strengthen skills** in **scientific publishing and communication** to diverse audiences.

Débouchés

Career prospects

After a Master's or Master's + PhD: engineer (R&D, control, production, etc.)

After a Master's or Master's + PhD: researcher or lecturer
After a Master's or Master's + PhD: engineer (research and development, control, production, etc.) in the fields of health, pharmaceuticals, agri-food, biotechnologies, instruments and reagents, cosmetics, pollution control and the environment.
Sectors of activity: fundamental or applied research in Biology, Health or Ecology in academia or the private sector
Fields: health, pharmaceuticals, agri-food, biotechnologies, instruments and reagents, cosmetics, pollution control and the environment.
After a Master's + PhD: researcher or lecturer
After a Master's or Master's + PhD: engineer (Research & Development, control, production, etc.)
Environment / Biodiversity Officer
Data Scientist
Bioinformatics Engineer (Research and Development)
After a Master's degree: Data scientist
After a Master's degree: Research analyst
Ingenieur R&D
Quality assurance manager
R&D Project Manager
Chef de projet
Consulting
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
Secondary school teacher
Cultural outreach professions

Laboratory Manager
Research or Design Engineer

Further Study Opportunities

Biology-Agrosciences

Biodiversity, Ecology and Evolution

Master of Bioinformatics

Master of Biology-Agrosciences

Master of Molecular and Cellular Biology

Master of Microbiology

Master of Education and Teaching Professions

PhD in Ecology / Evolution / Ecosystem Functioning

PhD in Ecology, Evolution

PhD in Chemistry / Biology

Doctorat en Bioinformatique

PhD

Engineering school

PhD thesis

Graduates can be recruited under private or public sector employment contracts, but can also take part in public sector competitive exams and professional examinations.

Students in this track can turn to research at the end of the 2nd year Master's.

Specialised Master's programmes (MBA in Project Management, Business, and Innovation Management in the Bio-industries)

Master of Teaching Professions

Engineering, research and development

Engineering in agriculture and the natural environment

Master of BioMedical Engineering

Master of Innovation Management

train international specialists, producing competitive work within reputable teams from public scientific and technological institutions (EPST), in particular the French National Institute of Health and Medical Research (Inserm) and French National Centre

Multidisciplinary Engineering School

Ecole d'ingénieur généraliste par apprentissage

fields of statistical learning, artificial intelligence and advanced data analysis

the curriculum also enables students to enter the corporate world directly after their graduation, in positions such as Data Scientist, Data Analyst or Machine Learning Engineer.

Data Scientist, Data Analyst, Ingénieur·e en Machine Learning dans des secteurs innovants (tech, finance, santé, énergie, etc.) ;

R&D researcher or data modelling and analysis expert in leading-edge companies or laboratories.

Admission

Capacity

Available Places

20

Target Audience and Entry Requirements

- Students in **Biology** (Master degree or 4-year BSc), **Medicine**, **Pharmacy**, **Veterinary Sciences**, **Biotechnology** or **Agri-food**, or any other **relevant scientific background**.
- Professionals who wish to acquire skills in the **manipulation, processing, and statistical analysis of high-throughput sequencing data**.
- Researchers, engineers, or technicians in **biology, biotechnology, genomics, epigenomics, or biomedical research laboratories**, wishing to specialize in **sequencing data processing and analysis**.
- Hospital staff or clinicians in **continuing education** interested in **medical genomics** and **patient data analysis** for translational or clinical research.

Période(s) de candidature

Inception Platform

From 09/02/2026 to 04/05/2026

From 15/05/2026 to 29/06/2026

Supporting documents

Compulsory supporting documents

Copy diplomas.

Copy of passport.

Motivation letter.

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

Curriculum Vitae.

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

Additional supporting documents

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

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

Advanced Genomics

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	practical class	directed study/practical class
Functional Genomics	3	Semestre 1	20	5				

Functional Genomics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 20

Directed study: 5

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

M1 level in genomics, genetics and molecular biology

Overall organisation

This teaching unit explores the latest advances and innovative concepts in functional genomics. Led by leading experts in the field, the course will cover cutting-edge scientific developments in comparative genomics, metagenomics, transcriptomics, proteomics, and their applications.

Key objectives:

- Bridge the gap between scientific questions and the most effective methodologies to address them.
- Foster critical discussions on how global approaches in genomics are reshaping our understanding of gene function and the genome 'dark matter'.

Interactive learning:

- Roundtable discussions between students and researchers to explore the impact of emerging concepts in genomics.
- A one-day mini-symposium where students present their own reviews on self-selected themes, encouraging active participation and deeper engagement with the material

Type of assessment

Evaluation Continue non Intégrale

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Structure and Evolution of Genomes	3	Semestre 1	25					
■								

Structure and Evolution of Genomes

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 25

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Basic concepts in Genetics, Genomics and Evolution.

Basic knowledge about gene structure and genome organisation in prokaryotes and eukaryotes.

Overall organisation

This course explores key aspects of genome evolution across the tree of life — from bacteria to humans. Topics include mutational processes, complex chromosomal rearrangements, the dynamics of meiosis, and the impact of transposable elements on genome architecture.

Lectures are delivered by researchers actively working in these fields and will address the molecular mechanisms underlying genome dynamics, such as meiotic recombination, mutation, hybridization, transposition, and resistance to extreme DNA damage. These processes will be examined not only at the individual level, but also in the context of their evolutionary consequences for populations. Illustrative examples will be drawn from a wide range of organisms to show how these mechanisms have shaped genome structure and diversity throughout evolution.

Type of assessment

Evaluation Continue non Intégrale

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Genomes, Phenotypes and Populations	3	Semestre 1	22					
■								

Genomes, Phenotypes and Populations

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 22

Tutored project 3

Language(s) of instruction

Français

Remote teaching

non

Prerequisites

Genomes, Phenotypes, Populations is intended for students wishing to deepen their knowledge of evolutionary genomics and gain first-hand experience in creating an original research project in this field. Prior training in population genetics and evolutionary biology will be appreciated but non-mandatory.

Type of assessment

Evaluation Continue non Intégrale

[Non-coding RNAs and epigenetics](#)

3 Semestre 1 25

Non-coding RNAs and epigenetics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 25

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

M1 levels in genetics, genomics and molecular biology. In addition, notions of high-throughput sequencing methods and epigenetic mechanisms developed in the Master 1 core course and/or several Master 1 teaching units (Epigenetics, Controle of gene expression, ‘génomique fonctionnelle’, ‘analyse et valorisation de données « omiques »’,...) should be understood and comprehended.

Type of assessment

Evaluation Continue non Intégrale

[Single-cell](#)

[omics and](#)

[spatial](#)

[transcriptomics](#)

3

Semestre
1

25

Single-cell omics and spatial transcriptomics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 25

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

- **Molecular biology:** understanding of the concepts of gene, DNA/RNA, transcription, translation, PCR, sequencing, etc.
- **Genetics and genomics:** knowledge of genome structure, genetic variations, annotation, and principles of high-throughput sequencing (NGS).
- **General bioinformatics:** understanding of the principles of analysis pipelines, biological databases, etc. Ability to understand and interpret data generated by high-throughput sequencing.
- **Basic knowledge of statistics applied to biology :** tests, data representation, normalization.

Learning objectives

- Understand the fundamental principles of single-cell omics approaches and their advantages compared to bulk population analyses.
- Describe the key experimental steps involved in single-cell transcriptomics, including cell isolation, RNA capture, UMI, reverse transcription, amplification, and library preparation.
- Identify the main technologies and platforms used in single-cell RNA-seq (primarily 10x Genomics) and understand their respective advantages and limitations.
- Acquire the foundations of bioinformatics analysis of single-cell data: quality control, normalization, dimensionality reduction, clustering, and cell-type annotation.
- Interpret biological results obtained from single-cell data to explore cellular heterogeneity, differentiation trajectories,

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	0
Introduction to Metagenomics	3	Semestre 1	10	10					



Introduction to Metagenomics

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 10

Directed study: 10

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Basic knowledge in microbiology with high interest in the biology of bacteria, phages, and plasmids interacting in communities and in interactions with pluricellular hosts. Strong interest in genomics, big data analysis, and bioinformatics. A mobile, personal computer is required for this course (as it cannot be provided).

Learning objectives

This course provides a basic and comprehensive introduction to the dynamic field of metagenomics, which is essential for understanding microbiome-host (holobiont) interactions. Participants will explore diverse topics such as the human gut microbiome, plant-microbe interactions, and the roles of viruses (the ‘virome’) within microbiomes. Metagenomics is key in advancing our understanding of microbial diversity, ecosystem dynamics, and their implications for health, agriculture, and the environment.

Overall organisation

Lectures will be given by experts in the field, and participants will analyze real-world datasets by gaining hands-on experience with R (RStudio), computing clusters, and command-line tools. The approaches will include data pre-processing, community analysis, taxonomic profiling, functional annotation, and data visualization.

By the end of the course, participants will have the confidence to approach metagenomic datasets and understand their relevance to scientific challenges in microbiology, ecology, and beyond. The grade will be based on a course grade (65%) from weekly tasks and exercises and a final report (35%) due one week after the course (at the latest). S2·

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	Other
Introduction to Metagenomics	3	Semestre 1							

Introduction to Metagenomics

ECTS : 3

Semester: Semestre 1

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Basic knowledge in microbiology with high interest in the biology of bacteria, phages, and plasmids interacting in communities and in interactions with pluricellular hosts. Strong interest in genomics, big data analysis, and bioinformatics. A mobile, personal computer is required for this course (as it cannot be provided).

Learning objectives

This course provides a basic and comprehensive introduction to the dynamic field of metagenomics, which is essential for understanding microbiome-host (holobiont) interactions. Participants will explore diverse topics such as the human gut microbiome, plant-microbe interactions, and the roles of viruses (the ‘virome’) within microbiomes. Metagenomics is key in advancing our understanding of microbial diversity, ecosystem dynamics, and their implications for health, agriculture, and the environment.

Overall organisation

Lectures will be given by experts in the field, and participants will analyze real-world datasets by gaining hands-on experience with R (RStudio), computing clusters, and command-line tools. The approaches will include data pre-processing, community analysis, taxonomic profiling, functional annotation, and data visualization.

By the end of the course, participants will have the confidence to approach metagenomic datasets and understand their relevance to scientific challenges in microbiology, ecology, and beyond. The grade will be based on a course grade (65%) from weekly tasks and exercises and a final report (35%) due one week after the course (at the latest). S2: 100% oral exam for participants who did not pass S1. It will cover the lectures and key metagenomic concepts from the course

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
UE libre	3	Semestre 1		25					
■									

UE libre

ECTS : 3

Semester: Semestre 1

Detail

Directed study: 25

Language(s) of instruction

Français

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

BigData and ChIP-seq

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
Big Data Workshop	9	Semestre 1	30		45				

Big Data Workshop

ECTS : 9

Semester: Semestre 1

Detail

Lecture: 30

Practical study : 45

Independent learning: 45

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

- To be able to calculate descriptive statistics parameters

- To understand the principles of RNA-seq data generation experiments

- To know the principle and different steps of a statistical test

No prior computer or statistical training is required.

Learning objectives

The BigData workshop is intended for students in biology, medicine, pharmacy or any other scientific background, incling PhD Students who wish to acquire skills in the design, manipulation, processing and analysis of high-throughput sequencing data (genomics, transcriptomics, epigenomics, genotyping, ...).

- To master the different variants of the linear model (anova, regressions...)

- Be able to model RNA-seq data using a statistical approach and perform differential analysis

- Be able to implement statistical analyses and graphical representations with R software

- To master different methods of multivariate analysis for large and heteorgeneous datasets and interpret the resulting outcomes

- Choose and apply the right test to identify over- and under-represented functional

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
ChIP-seq Workop	6	Semestre 1	10		36				
■									

ChIP-seq Workop

ECTS : 6

Semester: Semestre 1

Detail

Lecture: 10

Practical study : 36

Language(s) of instruction

Anglais

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

UE libre	3	Semestre 1	25
■			

UE libre

ECTS : 3

Semester: Semestre 1

Detail

Directed study: 25

Language(s) of instruction

Français

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

Research Immersion

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
GenE2 Scientific Project	3	Semestre 2			30				

GenE2 Scientific Project

ECTS : 3

Semester: Semestre 2

Detail

Directed study: 30

Language(s) of instruction

Anglais

Remote teaching

non

Learning objectives

The Scientific Project unit consists of a guided bibliographical study carried out in close collaboration with the internship supervisor(s). Its primary objective is to enable students to define and contextualize the research project that will be developed during their internship. Through an in-depth analysis of the relevant scientific literature, students are expected to produce a structured document that includes a general introduction to the research field, a clear presentation of the biological context, and a critical overview of current knowledge related to the host team's research theme.

This work also aims to help students formulate the specific objectives of their internship project, identify the key biological questions to be addressed, and understand their significance within the broader scientific context. Particular attention is given to the description and justification of the experimental and/or computational methodologies that will be employed to tackle these questions. Students are encouraged to critically assess the advantages and limitations of these approaches, as well as to consider possible alternative strategies.

Overall, the Scientific Project serves as a preparatory step for the research internship, fostering autonomy, critical thinking, and the ability to integrate and synthesize complex scientific information, while ensuring a coherent alignment between the proposed project, its objectives, and the methods implemented.

Overall organisation

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distanc learn cour
Lab internship	27	Semestre 2		30					



Lab internship

ECTS : 27

Semester: Semestre 2

Detail

Directed study: 30

Tutored project 0

Language(s) of instruction

Français

Remote teaching

non

Learning objectives

The research internship of the Master 2 GenE2 at Université Paris-Saclay is a six-month immersion within an academic or industrial laboratory, in France or abroad. It enables students to apply and deepen their skills in genetics, genomics, epigenetics, bioinformatics, and data analysis through an original research project addressing current scientific questions. Supervised by experienced researchers, students develop autonomy, critical thinking, and the ability to design, implement, and interpret experimental and/or computational approaches. The pedagogical framework is based on research-driven learning, with personalized mentoring, regular interactions with supervisors, and full integration into the host laboratory environment. This internship is a key step in professional development, providing strong preparation for PhD studies or careers in research and biotechnology sectors.

Overall organisation

The research internship is preceded by the “Scientific Project” unit, during which students prepare their project through a supervised bibliographical study in collaboration with their future supervisor(s). A mid-term follow-up is organized in March, either in person or remotely, to assess progress and provide guidance. The internship is validated by the submission of a written report and an oral defense.

Type of assessment

Evaluation Continue non Intégrale

Teaching Location(s)

ORSAY

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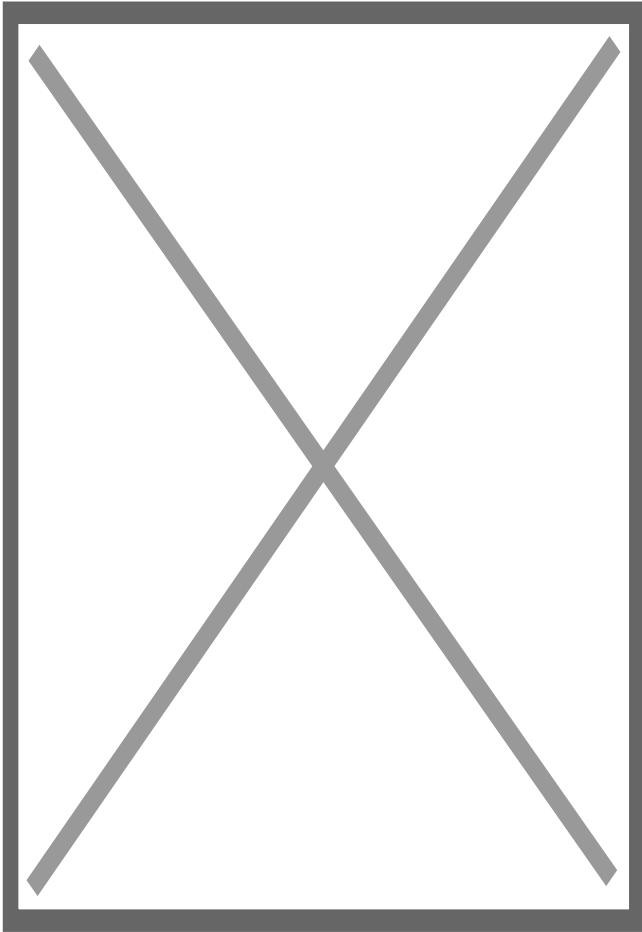
PARIS 05

PARIS 15

EVRY

Training campus

Javascript est requis pour visualiser cette carte.



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

- **Sébastien BLOYER**

PR

<http://www.universite-paris-saclay.fr/formation/master/biologie-moleculaire-et-cellulaire/m2-genetics-genomics-epigenetics-and-evolution-gene2>