

The Master program has a normal duration of 3 semesters and comprises 90 ECTS :

- 16 ECTS : Module 1 (Compulsory courses (7 ECTS) + Optional courses (9 ECTS))
- 14 ECTS : Module 2 (First Step Project)
- 15 ECTS : Module 3 (Compulsory courses (6 ECTS) + Optional courses (9 ECTS))
- 45 ECTS : Personal research project (Master Thesis)

Abbreviations
C = Course
E/S = Exercise/Seminar
PW = Practical Work

Training objectives are available in its programme regulations.

Specific training objectives: At the end of the course the students will be able to:

Specialisation in Integrative Biology

- Mobilise multidisciplinary knowledge to design experiments that can involve the various levels of structural and functional organisation of the living.
- Interpret data resulting from multiple phenomena: from the cell to the organism as a whole, in its normal and pathological states.

Specialisation in Bioinformatics

- Design experiments to analyse and understand genetic and genomic data.
- Mobilise in-depth knowledge of statistics and bioinformatics applied to biology.
- Use computer programming techniques.

Specialisation in Microbiology

- Mobilise in-depth knowledge in microbiology, genetics and genomics covering aspects of environmental microbiology, microbial ecology, biotechnology, cell microbiology, virology, microbial pathogenesis, bacteriology, fungal biology, yeast models, epidemiology or synthetic biology.
- Propose research approaches in fundamental, medical or applied microbiology.

Condition to obtain the specialisation / Condition pour obtenir une spécialisation

Specialisation Integrative Biology :

Obtain at least 18 ECTS credits in any field of study in Modules 1 and 3.
Free choice for the First Step Project (Module 2) and the Master Thesis (Module 4).

Specialisation Bioinformatics :

Obtain 9 ECTS credits in the field of Bioinformatics (marked in dark blue) in Module 1 and 9 ECTS credits in any field of study in Module 3
Carry out the First Step Project (Module 2) and the Master Thesis (Module 4) in the field of Bioinformatics.
Produce a significant computer program, in the context of any Module.

Specialisation Microbiology :

Obtain 12 ECTS credits in the field of Microbiology (marked in yellow) and 6 ECTS credits in any field of study in Modules 1 and 3.
Free choice for the First Step Project (Module 2).
Carry out the Master Thesis (Module 4) in the field of Microbiology.

Autumn Semester (semester 1)

	Courses / Enseignements	Hours per semester			Teaching Staff	ECTS Credits	Limited nb of students	
		C	E/S	PW				
MODULE 1	General and common activities - Compulsory / Activités générales et communes - Obligatoires							
		Retreat and BIG Seminars <i>Retraite et séminaires BIG</i>	-	-	-	Fankhauser C., ...		
		Sequence a Genome I <i>Séquençage d'un génome I</i>	14	30	-	van der Meer J., Rivolta C., Engel P., tutors	3	
		Write a Review <i>Rédaction d'une revue</i>	15	-	42	Fankhauser C., Sohrmann M., tutors	4	
		Critical Readings of Scientific Literature <i>Lectures critiques de la littérature scientifique</i>	-	-	56			
		Subtotal	29	30	98		7	
		Optional (at least 9 credits) Optionnel (minimum 9 crédits)						
		Biotechnology <i>Biotechnologie</i>	14	-	-	Poirier Y., Mermod N.	1.5	
		Development of the Nervous System <i>Développement du système nerveux</i>	14	-	-	Braissant O.	1.5	
		Human Molecular Genetics <i>Génétique moléculaire humaine</i>	14	-	-	Rivolta C.	1.5	
		Plant Functional Genetics <i>Génétique fonctionnelle des plantes</i>	14	-	-	Poirier Y.	1.5	
		Protein Homeostasy and Adaptation of Organisms to Stress <i>Adaptation des organismes au stress et homéostasie des protéines</i>	14	-	-	Goloubinoff P.	1.5	
		Scientific Research in all its Forms (for Biology) (Sciences2 - in French only) <i>La recherche dans tous ses états (pour biologie) (Sciences2)</i>	14	-	-	Preissmann D.	1.5	
		LTK1 Module : Training in Animal Experimentation * <i>Module LTK1 : expérimentation animale</i>	20	-	20	Berthonneche C.	1.5	
		Introduction to R (optional support) <i>Introduction à R (mise à niveau optionnelle)</i>	-	-	-	Schütz F.	-	
		Advanced Data Analysis in Biology I-II (compulsory for Bioinformatics specialisation) <i>Analyse de données en biologie I-II : niveau avancé</i>	12	-	12	Schütz F.	4.5	
	Case Studies in Bioinformatics (compulsory for Bioinformatics specialisation) <i>Etudes de cas en bioinformatique</i>	12	24	-	Bergmann S., others	2.5		
	Programming for Bioinformatics (compulsory for Bioinformatics specialisation) <i>Programmation pour bioinformatique</i>	7	14	-	Salamin N.	2		
	Advanced Microbial Genetics <i>Génétique avancée des microbes</i>	14	-	-	Collier J., Pelet S.	1.5		
	Bacterial Genomes and Genome Evolution <i>Génomés bactériens et évolution du génome</i>	14	-	-	van der Meer J.	1.5		
	Fungal Virulence and Pathogenicity <i>Pathogénicité et virulence fongique</i>	14	-	-	Sanglard D.	1.5		
	Immunology with Relevance to Infectious Diseases <i>Immunologie et maladies infectieuses</i>	14	-	-	Nardelli D., Roger T.	1.5		
	Plant Interactions with Microbes and Insects <i>Interactions des plantes avec les microbes et les insectes</i>	14	-	-	Keel C., Reymond P.	1.5		
	Virus-Host Interactions <i>Interactions virus-hôtes</i>	14	-	-	Kunz S., Gouttenoire J.	1.5		
	Total					16		
MODULE 2	Practical Project / Travail pratique							
		First Step Project <i>Travail d'initiation à la recherche</i>	-	-	250	Fankhauser C.	14	

* Only students who choose a master project with animal experimentation are allowed to select this course

Spring Semester (semester 2)

	Courses / Enseignements	Hours per semester			Teaching Staff	ECTS Credits	Limited nb of students
		C	E/S	PW			
General and common activities - Compulsory /							
Activités générales et communes - Obligatoire							
	Sequence a Genome II <i>Séquençage d'un génome II</i>	14	28	-	Engel P., Rivolta C., tutors	3	
	Write a Fellowship <i>Rédaction d'une demande de bourse</i>	7	-	-	Fankhauser C., Sohrmann M., tutors	3	
	Subtotal	21	28	-		6	
Optional (choice -> 9 credits) * /							
Optionnel (choix -> 9 crédits)*							
	Genomics, Proteomics and Quantitative Genetics <i>Génomique, protéomique et génétique quantitative</i>	24	-	-	Franken P., Tafti M., Quadroni M., Harshman K., Gambetta M.C.	3	
	Herbivory : Why is the Earth Green <i>Herbivorie : pourquoi la terre est verte</i>	24	-	-	Farmer E.	3	6
	Plant and Animal Domestication : from History to Molecular Mechanisms II <i>Domestication des animaux et des plantes : de l'histoire aux mécanismes moléculaires II</i>	-	12	-	Fankhauser C., Hardtke C.	3	8
	Plant and Animal Domestication : from History to Molecular Mechanisms I (support course) <i>Domestication des animaux et des plantes : de l'histoire aux mécanismes moléculaires I (mise à niveau)</i>	12	-	-	Hardtke C., Fankhauser C.	-	
	Scientific Mediation and Communication - Scientific Hands-on Workshop Module (in French only, MSc BEC) <i>Communication et médiation scientifique - module atelier scientifique (MSc BEC)</i>	8	-	20	Kaufmann A., Reymond P., Ducoulombier D., Trouilloud S.	3	6
	Seminars Biology and Integrative Genetics (BIG) <i>Séminaires Biologie et Génétique Intégratives (BIG)</i>	-	-	-	Martin S.	-	
	Supplement : Sequence a Genome <i>Enseignement complémentaire : Séquençage d'un génome</i>	-	14	10	Engel P., Rivolta C.	1.5	
	Advanced Quantitative Genetics (MSc BEC-CEE) <i>Génétique quantitative avancée (MSc BEC-CEE)</i>	10	7	-	Robinson M.	1.5	
	A Genomic Perspective on Early Human Migrations; an Introduction to Coalescent Theory and its Applications <i>Caractériser les premières migrations humaines à l'ère génomique: une introduction à la théorie de la coalescence et à ses applications</i>	11	3	-	Malaspinas A.-S.	1.5	
	Bioinformatic Algorithms <i>Algorithmes de bioinformatique</i>	15	15	-	Dessimoz C., Gfeller D.	3	
	Computational Cancer Genomics <i>Méthodes computationnelles pour la génomique du cancer</i>	7	-	7	Ciriello G.	1.5	
	Industrial Bioinformatics <i>Bioinformatique industrielle</i>	14	-	-	Xenarios I.	1.5	15
	Phylogeny and Comparative Methods (MSc BEC) <i>Phylogénie et méthodes comparatives (MSc BEC)</i>	7	14	-	Salamin N.	1.5	
	Anti-infective Agents <i>Agents anti-infectieux</i>	14	-	-	Sanglard D., Hauser P., Croxatto A., Ciuffi A.	1.5	
	Bacterial Virulence and Pathogenesis <i>Virulence bactérienne et pathogénèse</i>	14	-	-	Greub G., Hauser P., Jacquier N.	1.5	
	Chromosome Organization and Dynamics <i>Organisation et dynamique des chromosomes</i>	4	10	-	Gruber S.	1.5	
	Epidemiology of Human Pathogens <i>Epidémiologie de pathogènes humains</i>	14	-	-	Blanc D., Hauser P., Zanetti G., Sanglard D.	1.5	
	Microbes as Tools in Experimental Biology <i>Les microbes comme outils de biologie expérimentale</i>	10	4	-	Sanglard D., Ciuffi A.	1.5	
	Microbial Cytoskeleton - A Scientific Writing Class <i>Cytosquelette microbien - écriture scientifique</i>	4	10	-	Martin S., Collier J.	1.5	
	Viral Pathogenesis and Emerging Viruses <i>Pathogénèse virale et virus émergents</i>	14	-	-	Kunz S., Gouttenoire J., Ciuffi A.	1.5	
	Total					15	

Spring Semester (semester 2) and Autumn Semester (semester 3)

	Course / Enseignement	ECTS Credits	Limited nb of students
	Master Thesis Travail de Master	45	
	Thesis Director		

* Students can choose some courses of the Master of Science (MSc) in Behaviour, Evolution and Conservation (max 3 ECTS credits)