

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

Module 1 : 15 ECTS : Compulsory Courses

Module 2 : 15 ECTS : Practical Project

Module 3 : 15 ECTS : Compulsory and Optional Courses

Module 4 : 45 ECTS : Personal Research Project

Training objectives are available in its programme regulations.

Specific training objectives are described at the top of each track in the module 3.

## Autumn Semester (semester 1)

	Courses / Enseignements	Hours per semester				Teaching Staff	ECTS Credits
		C	E	S	PW		
MODULE 1	<b>Common courses 1 / Cours communs 1</b>						
	Cellular Biology <i>Biologie cellulaire</i>	10	-	2	-	Staub O.	
	Immunology <i>Immunologie</i>	10	-	2	-	Luther S.	
	Intracellular Signalling <i>Signalisation intracellulaire</i>	8	-	2	-	Diviani D.	
	Medical Microbiology <i>Microbiologie médicale</i>	10	-	2	-	Opota O.	
	Mouse Models Genetics <i>Modèles génétiques murins</i>	4	-	2	-	Hummeler E.	
	MB Poster Day					Luther S.	
	<b>Common courses 2 / Cours communs 2</b>						
	Cancer <i>Cancer</i>	10	-	3	-	Rufer N.	
	Cardiovascular Diseases <i>Maladies cardiovasculaires</i>	10	-	3	-	Diviani D.	
	Metabolic Diseases <i>Maladies métaboliques</i>	10	-	3	-	Knobloch M.	
	Neuroscience and Brain Diseases <i>Neurosciences et maladies du cerveau</i>	10	-	3	-	Murray M.	
	Pharmacology <i>Pharmacologie</i>	10	-	3	-	Broillet M.-C.	
	<b>Common courses 1 and 2 / Cours communs 1 et 2</b>						
	Scientific Method and Communication <i>Méthode et communication scientifiques</i>	6	-	-	-	Broillet M.-C.	
	Biostatistics <i>Biostatistiques</i>	4	-	-	-	Schütz F.	
<b>Total</b>		<b>102</b>	<b>0</b>	<b>25</b>	<b>0</b>		<b>15</b>
MODULE 2	<b>Practical Project / Travail pratique</b>						
	First Step Research Project <i>Travail d'initiation à la recherche</i>	-	-	-	280	Luther S., Broillet M.-C.	15

### Abbreviations

C = Course

E/S = Exercise/Seminar

PW = Practical Work

The pandemic has shown us that circumstances beyond our control may require us to make the following adjustments / adaptations to study plans during the semester:

- possibility to switch from one mode of teaching to another (face-to-face <-> distance, synchronous <-> asynchronous, switch to co-modal teaching where it was not initially planned).
- change / modification of evaluation modalities, without inducing derogations from the Study Regulations (oral <-> written, exam <-> validation, individual work <-> group work, practical work <-> theoretical work, face-to-face evaluation <-> online evaluation, etc.)
- alternative or time-shifted modalities for teachings, internships, practical work, fieldworks and camps that could not take place or teachings that could no longer take place in the form initially planned.

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## Spring Semester (semester 2)

One track among the below proposals / Une filière au choix parmi les propositions ci-dessous :

MODULE 3	Immunology and Cancer					Responsible: Esser-von Bieren J.	
	<i>Immunologie et Cancer</i>						
	At the end of the course the students will be able to:						
	<ul style="list-style-type: none"> <li>• Mobilise theoretical and practical knowledge in immunology and cancer biology.</li> <li>• Systematically analyse fundamental and clinical problems in immunology and cancer biology, starting with diseases related to the immune system or cell transformation, drug development and treatments.</li> <li>• Apply basic research techniques in immunology and cancer biology to solve research questions (proteomics, peptide-based assays, flow cytometry, histology and biostatistics).</li> </ul>						
	Courses / Enseignements	Hours per semester				Teaching Staff	ECTS Credits
		C	E/S	S	PW		
	Introduction to Clinical Medicine <i>Introduction à la médecine clinique</i>	20	-	-	-	Wuerzner G., Gonzalez Rodriguez E.	15
	Immunology II. Advanced Concepts in Immunology : from Antigen Recognition and Signalling to Leukocyte Responses <i>Immunologie II. Concepts avancés en immunologie : de la présentation et reconnaissance d'antigène à la signalisation et aux réponses des leucocytes</i>	24	-	5	-	Esser-von Bieren J., Luther S., Held W., Rebsman M., Thome M., Ho P.-C., Monticelli S.	
	Immunology III. Immunity and Disease : Microbiome, Infections and Autoimmunity <i>Immunologie III. Immunité et maladie : Microbiome, Infections et Autoimmunité</i>	21	-	4	-	Esser-von Bieren J., Broz P., Velin D., Perreau M., Roger T., Pot C., Verdeil G., Ubags N.	
	Cancer II. Advanced Concepts in Cancer Biology : from Genetics and Epigenetics to Metabolism <i>Cancer II. Concepts avancés en biologie du cancer : De la génétique et épigénétique au métabolisme</i>	8	-	1	-	Petrova T., Missiaglia E., Hanahan D., Ciriello G.	
	Cancer III. Advanced Concepts in Cancer Biology : from Angiogenesis to Tumor Invasion and Metastasis <i>Cancer III. Concepts avancés en biologie du cancer : de l'angiogenèse à l'invasion tumorale et au métastases</i>	12	-	2	-	Petrova T., Joyce J., Gfeller D.	
	Treatments. Treatments and Prevention of Disease : Drug Development, Vaccines, Anti-Tumor Immunity, Immunotherapy, Leukemia, Transplantation, Allergy <i>Traitements. Traitements et prévention de maladies : Développement de médicaments, vaccins, immunité contre tumeurs, immunothérapie, leucémie, transplantation, allergie</i>	17	-	5	-	Petrova T., Harari A. Kandalaf L., Vozenin M.-C., Arber C., Perez L., Golshayan D., Comte D.	
	Molecular and Cellular Techniques. Applications to the Study of Lymphocytes and Tumor Cells. Techniques moléculaires et cellulaires. Applications à l'étude des lymphocytes et cellules tumorales. - Lectures on protein analysis (proteomics) - Cours ex-cathédra sur l'analyse des protéines (protéomique) - PW Molecular and cellular techniques : proteomics, antigen discovery, 3D-modeling, immunological assays based on peptides - TP Techniques moléculaires et cellulaires: protéomique, découverte d'antigènes, modélisation en 3D, tests immunologiques basés sur peptides	14	-	-	35	Quadroni M., Bassani M., Zoete V., Baumgartner P., Verdeil G., Derré L.	
	PW Ex Vivo and In Situ Techniques TP techniques ex vivo et in situ - Histological Analysis of Lymph Nodes or Cancer Tissues - Analyse histologique des ganglions et tissus cancéreux - Multicolor Flow Cytometric Analysis of Lymphoid Organs - Cytométrie de flux en multiples couleurs pour analyser des tissus lymphoïdes - Discussion and Feedback Session - Discussion et session 'feedback'	8	-	4	28	Bénéchet A., Mayol J.-F., Nobile A., Arber C., Bernier-Latmani J.	
	E-Learning Exercises. Article- and Case-based Learning in Proteomics / Immunology / Cancer <i>Exercices de type 'e-learning'. Apprentissage par article ou problème en protéomiques / immunologie / cancer</i>	1	-	2	-	Luther S., Esser-von Bieren J., Naveiras O., Perreau M., Perez L.	
	Write and Defend Grant Proposal, prepare Journal Club <i>Rédaction et défense d'une demande de subsides, préparation d'un journal Club</i>	-	2	-	-	Petrova T.	
	Bioinformatics: lecture and PW <i>Bioinformatique: cours et TP</i>	2	-	-	4	Gfeller D.	
	Biostatistics <i>Biostatistiques</i>	2	-	-	13	Schütz F.	
	<b>Optional / Optionnel</b>						
	Training in Animal Experimentation (RESAL Module 1) * <i>Expérimentation animale (RESAL module 1)</i>	20	-	-	20	Broillet M.-C., Cadilhac C.	
	Clinical Research Module <i>Module de recherche clinique</i>					Wuerzner G.	
		149		25	103		277

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**Metabolism and Human Health**
**Responsible: Opota O. and Mansuy-Aubert V.**
**Métabolisme et santé humaine**

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

- Mobilise knowledge from a physiological point of view on metabolism, endocrinology, nutrition and health.
- Acquire a current vision of the issues of medical microbiology, host-microbe interactions in health and metabolic diseases, microbiota and health.
- Critically analyse and present case studies on metabolic diseases and the influence of the microbiome on human health.
- Interact with scientists and professionals from different backgrounds to learn and practice the various steps involved in the research, diagnostics and treatments of metabolic diseases.

Courses / Enseignements	Hours per semester				Teaching Staff	ECTS Credits	
	C	E	S	PW			
Introduction to Clinical Medicine <i>Introduction à la médecine clinique</i>	20	-	-	-	Wuerzner G., Gonzalez Rodriguez E.	15	
Human Nutrition and Metabolism <i>Nutrition humaine et métabolisme</i>	10	-	-	-	Mansuy-Aubert V., Puder J., Vonaesch P.		
Metabolic Syndrome and its Consequences (Diabetes, Obesity, Cancer, Cardiac Diseases) <i>Syndrôme métabolique et ses conséquences (diabète, obésité, cancer, maladies cardiaques)</i>	8	-	2	-	Rosenblatt N., Puder J.		
Interaction Gut-Nervous System <i>Interaction intestin-système nerveux</i>	4	-	-	-	Langlet F., Mansuy-Aubert V.		
Developmental Origin of Health and Diseases (Maternal-Fetal-Child Interactions) <i>Origine développementale de la santé et des maladies (interactions mère-fœtus-enfant)</i>	8	-	2	-	Crozier S., Fischer-Fumeaux C., Vonaesch P., Zydorczyk C.		
Genetics of Metabolic Diseases <i>Génétiq ue des maladies métaboliques</i>	2	-	-	-	Messina A.		
Cellular Metabolism, Stem Cells <i>Métabolisme cellulaire, cellules souches</i>	8	-	-	-	Paolicelli R., Knobloch M., Jourdain A.		
Case Study on Metabolic Diseases <i>Etude de cas sur les maladies métaboliques</i>	-	10	-	-	Mansuy-Aubert V., Langlet F., Messina A.		
Exercise and Metabolism <i>Exercice et métabolisme</i>	6	-	2	-	Amati F.		
Sport, Metabolism, Health and Performance <i>Sport, métabolisme, santé et performance</i>	6	-	-	-	Place N., Zanou N.		
Energy Metabolism and Rheumatic Diseases <i>Métabolisme énergétique et maladies rhumatismales</i>	6	-	-	-	Geurts J.		
Human-Microbes Interactions <i>Interactions entre l'homme et les microbes</i>	10	-	2	-	Opota O., Bertelli-Lombardo C., Jacot D., Niculita Hirzel H., Mazza-Stalder J.		
Human Microbiota in Metabolic Health and Diseases <i>Microbiote humain dans la santé métabolique et les maladies</i>	12	-	2	-	Bertelli-Lombardo C., Ubags N., Guery B., Stojanov M., Vonaesch P.		
Diet, Lifestyle, Microbiota and Brain Diseases <i>Alimentation, mode de vie, microbiote et maladies neurobiologiques</i>	6	-	2	-	Mansuy-Aubert V., Boutrel B., Pot C.		
Preventive and Therapeutic Interventions on Microbiota <i>Interventions préventives et thérapeutiques sur le microbiote</i>	4	-	-	-	Galperine T., Vonaesch P.		
Human Microbiome and Interactions with Chemotherapies <i>Microbiome humain et interactions avec les chimiothérapies</i>	2	-	-	-	Homicsko K.		
Case Study on the Microbiome and Human Health <i>Etude de cas sur le microbiome et la santé humaine</i>	-	10	-	-	Opota O.		
Laboratory Approaches in Clinical Chemistry (Metabolomics, Proteomics) <i>Approches en chimie clinique (métabolomique, protéomique)</i>	8	-	-	4	Braissant O., Binz P.-A., Choong E., Gallart-Ayala H., Ivanisevic J.		
Laboratory Approaches in Medical Microbiology <i>Approches en microbiologie médicale</i>	8	-	-	4	Opota O., Bertelli-Lombardo C., Jacot D., Niculita Hirzel H.		
Monitoring Physiological Functions <i>Méthodes analytiques des fonctions physiologiques</i>	-	-	-	8	Puder J., Amati F., Mansuy-Aubert V.		
Therapies of Gut-Brain Communication (from By-Pass Surgery to Endopharmacology) <i>Axe intestin cerveau, approches thérapeutiques (de la chirurgie de dérivation à l'endopharmacologie)</i>	2	-	-	-	Favre L.		
Fundamental Principles : Pharmacokinetics / Pharmacogenomics <i>Principes fondamentaux de pharmacocinétique et pharmacogénomique</i>	10	-	2	-	Firsov D.		
Principles of Chemotherapy : Infectious Diseases <i>Principes de la chimiothérapie : les maladies infectieuses</i>	6	-	2	-	Staub O.		
Visit of Nestlé SA, Vers-chez-les-Blanc <i>Visite de Nestlé SA, Vers-chez-les-Blanc</i>	-	-	-	4	Opota O.		
Visit FIND Geneva or WHO Geneva <i>Visite de FIND Genève ou WHO Genève</i>	-	-	-	4	Opota O.		
Recent Advances in Metabolic Health/Career Development <i>Avances récentes en santé métabolique / Evolution de carrières</i>	-	-	12	-	Opota O., Mansuy-Aubert V.		
Write and Defend Grant Proposal, prepare Journal Club <i>Rédaction et défense d'une demande de subside, préparation d'un journal Club</i>	-	2	-	-	Opota O.		
Biostatistics <i>Biostatistiques</i>	2	-	-	13	Schütz F.		
<b>Optional / Optionnel</b>							
Training in Animal Experimentation (RESAL Module 1) * <i>Expérimentation animale (RESAL module 1)</i>	20	-	-	20	Broillet M.-C., Cadilhac C.		275
Clinical Research Module <i>Module de recherche clinique</i>					Wuerzner G.		
	168	22	28	57			

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**Neuroscience**  
**Neurosciences**

**Responsibles: Murray M. and Knobloch M.**

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

- Mobilise theoretical knowledge about the physiological, pathological and medical aspects of selected domains of neuroscience such as nervous system development, sensory functions, neuron-gland interactions, synaptic functions, neuronal death and tissue repair, psychiatric neuroscience.
- Use advanced research techniques to study the physiological function of the nervous system or neuropsychiatric diseases in animal models or in humans.
- Systematically analyse fundamental and clinical problems and experimental approaches in neuroscience.

MODULE 3

Courses / Enseignements	Hours per semester				Teaching Staff	ECTS Credits
	C	E	S	PW		
Introduction to Clinical Medicine <i>Introduction à la médecine clinique</i>	20	-	-	-	Wuerzner G., Gonzalez Rodriguez E.	15
Brain Development <i>Développement du cerveau</i>	16	-	2	2	Bagni C., Cardinaux J.-R., Achsel T., Puyal J., Restivo L.	
Introduction to Psychiatric Neuroscience <i>Introduction aux neurosciences psychiatriques</i>	20	-	2	-	Cardinaux J.-R., Dwir D., Klauser P., Kolly S., Magara F., Preissmann D., Steullet P., Marquet P.	
Modulation of Synaptic Transmission <i>Modulation de la transmission synaptique</i>	14	-	2	-	Nikoletopoulou V., Fasshauer D., Lüthi A., Stoop R., Croizier S.	
Neuron-glia Biology <i>Biologie neurones-glie</i>	18	-	2	-	Bezzi P., Nikoletopoulou V., Finsterwald C., Lengacher S., Paolicelli R., Tenenbaum L., Richetin K., Volterra A.	
Neuronal Death and Repair in the Central Nervous System <i>Mort neuronale et réparation dans le système nerveux central</i>	16	-	2	-	Toni N., Brunet J.-F., Courtine G., Déglon N., Hirt L., Puyal J., Truttmann A.	
Sensory Functions <i>Fonctions sensorielles</i>	24	-	2	-	Murray M., Broillet M.-C., Chung P.C.S., Mameli M., Neukomm L., Collignon O., Pascucci D., Crottaz-Herbette S.	
Write and Defend Grant Proposal, prepare Journal Club <i>Rédaction et défense d'une demande de subside, préparation d'un journal Club</i>	-	18	-	-	Murray M.	
Biostatistics <i>Biostatistiques</i>	2	-	-	13	Schütz F.	
<b>Optional / Optionnel</b>						
Training in Animal Experimentation (RESAL Module 1)* <i>Expérimentation animale (RESAL module 1)</i>	20	-	-	20	Broillet M.-C., Cadilhac C.	
Clinical Research Module <i>Module de recherche clinique</i>					Wuerzner G.	
	150	18	12	35		215

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**Pharmacology and Toxicology**
**Responsible: Broillet M.-C.**
**Pharmacologie et toxicologie**

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

- Mobilise knowledge from a physiological point of view on the functioning of five major classes of drugs (anti-infection, anti-cancer, neurological, cardiovascular and hormonal)
- Acquire a current vision of the issues of pharmacogenetics, personalised medicine and pharmacovigilance.
- Critically analyse and present the practical steps of drug development, pharmaceutical industry and the drug-market policy.
- Interact with scientists and professionals from different backgrounds to learn and practice the various steps involved in the identification of a toxic substance, from the discovery of its mechanism of action to the press release and risk management.

MODULE 3

Courses / Enseignements	Hours per semester				Teaching Staff	ECTS Credits	
	C	E	S	PW			
Introduction to Clinical Medicine <i>Introduction à la médecine clinique</i>	20	-	-	-	Wuerzner G., Gonzalez Rodriguez E.	15	
Case Study in Toxicology <i>Etude de cas en toxicologie</i>	-	12	-	-	Broillet M.-C.		
Development of Drugs : Practical Aspects <i>Développement de médicaments : aspects pratiques</i>	4	-	-	-	Dumont J.-M.		
Development of Therapeutics <i>Développement d'agents thérapeutiques</i>	10	-	-	-	Broillet M.-C.		
Drug Design <i>Conception de médicaments</i>	4	-	-	-	Scapozza L.		
Fundamental Principles : Pharmacokinetics / Pharmacogenomics <i>Principes fondamentaux de pharmacocinétique et pharmacogénomique</i>	10	-	2	-	Firsov D.		
Optimization of Drug Treatment <i>Optimisation des traitements médicamenteux</i>	6	-	-	-	Choong E.		
Pharmaceuticals as Doping Drugs <i>Les médicaments comme produits dopants</i>	4	-	-	-	Leuenberger N.		
Principles of Chemotherapy : Infectious Diseases <i>Principes de la chimiothérapie : les maladies infectieuses</i>	6	-	2	-	Staub O.		
Principles of Chemotherapy : Cancer <i>Principes de la chimiothérapie : le cancer</i>	6	-	2	-	Ocampo Méndes A.		
Radiation Protection and Radiological Risk: Quantitative and Public Health Aspects <i>Protection contre les radiations, risque radiologique : aspects quantitatifs et de santé publique</i>	2	-	-	-	Staedler D.		
Regulation and Regulatory Agencies <i>Réglementations et les agences de réglementations</i>	2	-	-	-	Girardin F.		
Seminars on Drug Discovery & Development <i>Séminaires sur la découverte et le développement de médicaments</i>	-	-	12	-	Kellenberger S., Staub O.		
System Pharmacology : Cardiovascular Pharmacology <i>Pharmacologie des systèmes : pharmacologie cardiovasculaire</i>	8	-	2	-	Kellenberger S., Diviani D.		
System Pharmacology : Neuropharmacology <i>Pharmacologie des systèmes : neuropharmacologie</i>	18	-	4	-	Kellenberger S., Eap C., Hummler E., Steullet P.		
System Pharmacology : Endocrine Pharmacology <i>Pharmacologie des systèmes : pharmacologie endocrinienne</i>	8	-	2	-	Hummler E.		
Toxicology <i>Toxicologie</i>	16	-	4	-	Broillet M.-C., Hopf N., Chèvre N.		
Toxicology : e-Learning <i>Toxicologie : formation en ligne</i>	-	8	-	-	Broillet M.-C.		
Visit of an Industrial Pharmaceutical Research Center <i>Visite d'un centre de recherche d'une industrie pharmaceutique</i>	-	-	-	8	Staub O., Broillet M.-C.		
Visit of a Waste or Water Recycling Plant <i>Visite d'une station d'épuration des eaux ou d'une usine de recyclage</i>	-	-	-	5	Broillet M.-C.		
Analytical Techniques in Toxicology and Ecotoxicology (optional) <i>Techniques d'analyses en toxicologie et écotoxicologie (cours à option)</i>	10	-	-	-	Staedler D.		
Synthetic Drugs : an Emerging Toxicology and Social Health Problem (optional) <i>Drogues de synthèse : un problème d'actualité en matière de toxicologie et de santé publique (cours à option)</i>	10	-	-	-	Gilardi F.		
Pharmaceutical Drugs : Pregnancy and Breastfeeding (optional) <i>Médicaments : grossesse et allaitement (cours à option)</i>	10	-	-	-	Winterfeld U.		
Write and Defend Grant Proposal, prepare Journal Club <i>Rédaction et défense d'une demande de subside, préparation d'un journal Club</i>	-	2	-	-	Broillet M.-C.		
Biostatistics <i>Biostatistiques</i>	2	-	-	13	Schütz F.		
<b>Optional / Optionnel</b>							
Training in Animal Experimentation (RESAL Module 1) * <i>Expérimentation animale (RESAL module 1)</i>	20	-	-	20	Broillet M.-C., Cadilhac C.		260
Clinical Research Module <i>Module de recherche clinique</i>					Wuerzner G.		
	162	22	30	46			
<b>Total per study path / Total par filière</b>						<b>15</b>	

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

MODULE 4	<b>Personal Research Project / Projet de recherche personnel</b>		<b>ECTS Credits</b>
	Master Research Project / <i>Travail de Master</i>	<b>Thesis Director</b>	<b>45</b>

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- change / modification of evaluation modalities, without inducing derogations from the Study Regulations (oral <-> written, exam <-> validation, individual work <-> group work, practical work <-> theoretical work, face-to-face evaluation <-> online evaluation, etc.)
- alternative or time-shifted modalities for teachings, internships, practical work, fieldworks and camps that could not take place or teachings that could no longer take place in the form initially planned.

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