

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

- 15 ECTS : Module 1 (Compulsory courses + Optional courses)
- 15 ECTS : Module 2 (First step project)
- 15 ECTS : Module 3 (Compulsory courses + Optional courses)
- 45 ECTS : Personal research project (Master thesis)

**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>					
	Biostatistics <i>Biostatistiques</i>	4	-	-	Schütz F.	
	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>	12	2	-	Opota O.	
	Mouse Models Genetics <i>Modèles génétiques murins</i>	4	2	-	Hummeler E.	
	MB Poster Day				Broillet M.-C.	
	<b>Common courses 2 / Cours communs 2</b>					
	Cancer <i>Cancer</i>	10	2	-	Luther S.	
	Cardiovascular Diseases <i>Maladies cardiovasculaires</i>	10	2	-	Diviani D.	
	Metabolic Diseases <i>Maladies métaboliques</i>	10	2	-	Fajas L.	
	Neuroscience and Brain Diseases <i>Neurosciences et maladies du cerveau</i>	10	2	-	Cardinaux J.-R.	
	Pharmacology <i>Pharmacologie</i>	10	2	-	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.	
<b>Total</b>	<b>104</b>	<b>20</b>	<b>0</b>		<b>15</b>	
MODULE 2	<b>Practical project / Travail pratique</b>					
	First Step Project <i>Travail d'initiation à la recherche</i>	-	-	280	Broillet M.-C.	15

### Abbreviations

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

Due to the sanitary evolution related to COVID-19, the study plans may be adapted during the semester as follows:

- 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).
- adaptation of evaluation modalities, without inducing derogations from the Study Regulations (oral <-> written, examination <-> 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, fieldwork and camps that could not take place or teachings that could no longer take place in the form initially planned.

Students are invited to consult this study plan regularly.

## Spring Semester (semester 2)

One track among the following four / Une filière au choix sur les quatre :

MODULE 3	Courses / Enseignements				Hours per semester		Teaching Staff	ECTS Credits
	C	E/S	PW					
	<b>Immunology and Cancer</b> <b>Immunologie et Cancer</b> Responsible: Luther S. At the end of the course the students will be able to: • Mobilise theoretical and practical knowledge in immunology and oncology. • Systematically analyse fundamental and clinical problems in immunology and oncology, starting with diseases related to the immune system or cell transformation, drug development and treatments. • Apply basic research techniques in immunology and oncology to solve research questions (proteomics, peptide-based assays, flow cytometry, histology and biostatistics).							
	Introduction to Clinical Medicine <i>Introduction à la médecine clinique</i>	20	-	-	Bonny O., Wuerzner G.		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	-	Luther S., Held W., Tacchini-Cottier F., 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	-	Luther S., 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., Riggi N.,			
	Cancer III. Advanced Concepts in Cancer Biology : from Angiogenesis to Tumor Invasion and Mestastasis <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, Transplantations, Allergies <i>Traitements. Traitements et prévention de maladies : Développement de médicaments, vaccins, immunité contre tumeurs, immunothérapie, leucémies, transplantations, allergies</i>	19	5	-	Petrova T., Romero P.,Kandalaft L., Vozenin M.-C., Arber C., Golshayan D., Comte D., Knezevic I.			
	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 : Mass spectrometry, 3D-modeling, immunological assays based on peptides - TP Techniques moléculaires et cellulaires: spectrométrie de masse, modélisation en 3D, tests immunologiques basés sur peptides	16	-	37	Quadroni M., Bassani M., Zoete V., Baumgartner P., Verdeil G., Derre 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	Luther S., Wilson A., Nobile A.			
	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., Debard N., Naveiras O., Perreau M., Descatoire M.			
	Write and Defend Grant Proposal, prepare Journal Club <i>Rédaction et défense d'une demande de subside, préparation d'un journal Club</i>	-	2	-	Luther S.			
	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>								
	LTK1 Module : Training in Animal Experimentation * <i>Module LTK1 : expérimentation animale</i>	20	-	20	Broillet M.-C., Berthonneche C.			
	Clinical Research Module <i>Module de recherche clinique</i>				Bonny O., Wuerzner G., Schneiter P.			
		153	25	102	280			

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

**Neuroscience**
**Responsibles: Cardinaux J.-R.**
**Neurosciences**

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	-	-	Bonny O., Wuerzner G.	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., Do K., Hachaichi M., Klauser P., Kolly S., Magara F., Martin J.-L., Preissmann D., Steullet P.		
Modulation of Synaptic Transmission <i>Modulation de la transmission synaptique</i>	14	2	-	Fasshauer D., Lüthi A., Pralong E., Stoop R., Nikolettou V.		
Neuron-glia Biology <i>Biologie neurones-glie</i>	18	2	-	Volterra A., Finsterwald C., Lengacher S., Paolicelli R., Tenenbaum L.		
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., Widmann C.		
Sensory Functions <i>Fonctions sensorielles</i>	24	2	-	Bagni C., J.R. Cardinaux, Broillet M.-C., Chung P.C.S., Da Costa S., Mamei M., Matusz P., Neukomm L., Murray M.		
Write and Defend Grant Proposal, prepare Journal Club Problem-Based Learning 1 & 2 <i>Rédaction et défense d'une demande de subside, préparation d'un journal Club, apprentissage par problèmes 1 &amp; 2</i>	-	18	-	Cardinaux J.-R.		
Biostatistics <i>Biostatistiques</i>	2	-	13	Schütz F.		
<b>Optional / Optionnel</b>						
LTK1 Module : Training in Animal Experimentation * <i>Module LTK1 : expérimentation animale</i>	20	-	20	Broillet M.-C., Berthonneche C.		
Clinical Research Module <i>Module de recherche clinique</i>				Bonny O., Wuerzner G., Schneiter P.		
	150	30	35		215	

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## Pharmacology and Toxicology Pharmacologie et toxicologie

Responsible: Broillet M.-C.

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.

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	-	-	Bonny O., Wuerzner G.	15	
Case Study in Toxicology <i>Etude de cas en toxicologie</i>	-	8	-	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	-	-	Décosterd L.		
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>	10	2	-	Ocampo Méndes A.		
Regulation and Regulatory Agencies <i>Réglementations et les agences de réglementations</i>	2	-	-	Schild L.		
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.		
Inflammation and Cancer : Role of Reactive Oxygen Species (optional) <i>Inflammation et cancer : rôle des dérivés réactifs de l'oxygène (cours à option)</i>	10	-	-	Felley-Bosco E.		
Some Toxic Plant and Poisonous Mushrooms in Biomedical Research (optional) <i>Plantes toxiques et champignons vénéreux : leurs rôles dans la recherche biomédicale (cours à option)</i>	12	-	-	Giroud C.		
Analytical Techniques in Toxicology and Ecotoxicology (optional) <i>Techniques d'analyses en toxicologie et écotoxicologie (cours à option)</i>	10	-	-	Staedler D.		
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>						
LTK1 Module : Training in Animal Experimentation * <i>Module LTK1 : expérimentation animale</i>	20	-	20	Broillet M.-C., Berthonneche C.		274
Clinical Research Module <i>Module de recherche clinique</i>				Bonny O., Wuerzner G., Schneiter P.		
	180	48	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	Courses / Enseignements		ECTS Credits
	Master Thesis / <i>Travail de Master</i>	Thesis Director	45

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- 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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