

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>					
	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	-	Hummler 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.	
Biostatistics <i>Biostatistiques</i>	4	-	-	Schütz F.		
<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

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- 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, 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		Hours per semester			Teaching Staff	ECTS Credits
	<i>Immunologie et Cancer</i>		C	E/S	PW		
	Introduction to Clinical Medicine <i>Introduction à la médecine clinique</i>		20	-	-	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., Ciriello G.	
	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, 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., Pittet M., Kandalaft 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	-	38	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	Luther S., Mayol J.-F., Nobile A., Arber C., Bénédet 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., Arber C., Bénédet A.	
	Write and Defend Grant Proposal, prepare Journal Club <i>Rédaction et défense d'une demande de subside, 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>						
	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>					Wuerzner G.	
			149	25	103		277

\* 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	-	-	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., Dwir D., 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.	215
Clinical Research Module <i>Module de recherche clinique</i>				Wuerzner G.	
	150	30	35		

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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	-	-	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	-	-	Vaslin Chessex A.		
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.		
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	-	-	Thomas A.		
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.		
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.		262
Clinical Research Module <i>Module de recherche clinique</i>				Wuerzner G.		
	168	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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