

Course directory 2015.2016

school of biology (FBM-BIO)  
master

\* your selection

> Biology > Master of Science in Medical Biology



## SUMMARY

---

Notice	iv
Legend	v
List of courses	1

## NOTICE

---

This course catalogue was produced using data from the *SylviaAcad* information system of the University of Lausanne. Its database contains all information about courses proposed by the different faculties and their times. This data can also be consulted online at the address :

**<https://applicationspub.unil.ch/interpub/noauth/php/Ud/index.php>.**

Web site of the faculty : **<http://www.unil.ch/ecoledibiologie/>**

Generated on : 24.05.2016

## LEGEND

---

### NAME OF THE COURSE

Teacher

Type of course	Status	Hours per week	Teaching language	Hours per year
Semester	Credits			

N: Levels

P: Programme requirements

O: Objective

C: Content

B: Bibliography

I: Additional information

DISCIPLINE

## ABBREVIATIONS

### TYPE OF COURSE

Attest.	Attestation
C	Course
C/S	Course - seminar
Cp	Camp
E	Exercises
Exc	Excursion
Lg	Guided lecture
S	Seminar
T	Fieldwork
TP	Practical work

### STATUS

Fac	Facultative
Obl	Compulsory
Opt	Optional
Fac/Comp/Opt	Facultative, compulsory or optional (according to the study programme)

### SEMESTER

Sp	Spring
A	Autumn

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)

**Autumn Semester (semester 1)**

	Courses / Enseignements	Hours per semester			Teaching Staff	ECTS Credits
		C	E/S	PW		
<b>MODULE 1</b>	<b>Compulsory / Obligatoire</b>					
	Cardiovascular Diseases <i>Maladies cardiovasculaires</i>	20	4	-	Diviani D.	2
	Cellular Biology <i>Biologie cellulaire</i>	12	4	-	Staub O.	1.5
	From Memory to Memory Loss : Alzheimer's Disease <i>De la mémoire à la perte de mémoire : la maladie d'Alzheimer</i>	18	4	-	Cardinaux J.-D.	1.5
	Immunology and Cancer <i>Immunologie et cancer</i>	20	12	-	Luther S.	2
	Intracellular Signalling <i>Signalisation intracellulaire</i>	12	3	-	Diviani D.	1
	Metabolic Diseases <i>Maladies métaboliques</i>	16	4	-	Widmann C.	1.5
	Microbiology <i>Microbiologie</i>	18	4	-	Kunz S.	2
	Scientific Writing - How to Increase the Impact of your Research <i>L'écriture scientifique - Comment augmenter l'impact de votre recherche</i>	8	2	-	Broillet M.-C., Kohler S.	0.5
	MB Poster Day				Staub O.	
	<b>Subtotal</b>	<b>124</b>	<b>37</b>	<b>-</b>		<b>12</b>
	<b>Optional (choice -&gt; 3 credits) / Optionnel (choix -&gt; 3 crédits)</b>					
LTK1 Module : Training in Animal Experimentation <i>Module LTK1 : expérimentation animale</i>	20	-	20	Berthonneche C.	3	
Introduction to Clinical Research Module (EH) <i>Module d'introduction à la recherche clinique (EH)</i>				Tappy L.		
<b>Total</b>					<b>15</b>	

<b>MODULE 2</b>	<b>Practical project / Travail pratique</b>					
	First Step Project <i>Travail d'initiation à la recherche</i>	-	-	282	Staub O.	<b>15</b>

**Abbreviations**

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

Spring Semester (semester 2)

	Courses / Enseignements	Hours per semester			Teaching Staff	ECTS Credits
		C	E/S	PW		
	<b>Compulsory / Obligatoire</b>					
	Introduction to Clinical Medicine <i>Introduction à la médecine clinique</i>	22	-	8	Bonny O.	
	<b>One study path among the following four / Une filière au choix sur les quatre :</b>					
	<b>Immunology and Cancer</b> <i>Immunologie et Cancer</i>				Responsible: Luther S.	
MODULE 3	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>	22	4	-	Luther S., Held W., Tacchini F., Guarda G., Thome M., Ho P.-C.	
	Immunology III. Immunity and Disease : Autoimmunity, Allergy and Infections <i>Immunologie III. Immunité et maladie : Autoimmunité, allergie et infections</i>	14	4	-	Acha-Orbea H., Velin D., Perreau M., Marsland B.	
	Cancer II. Advanced Concepts in Cancer Biology : from Oncogenes to Angiogenesis <i>Cancer II. Concepts avancés en biologie du cancer : Des oncogènes à l'angiogenèse</i>	15	3	-	Fasel N., Petrova T., Fajas L., Gfeller D., Hanahan D.	
	Cancer III. Examples of Tumor Types : Brain and Genital Tumors, Leukemia <i>Cancer III. Exemples de types de tumeurs : tumeurs cérébrales, génitales, leucémies</i>	11	3	-	Nardelli D., Hantschel O., Missiaglia E., Wolfer A., Dotto P.	
	Treatments. Treatments and Prevention of Disease : Drug Development, Vaccines, Anti-Tumor Immunity, Immunotherapy <i>Traitements. Traitements et prévention de maladies : Développement de médicaments, vaccins, immunité contre tumeurs, immunothérapie</i>	10	2	-	Romero P., Collin N., Raymond E.	
	Proteomics and 3D Modeling. Applications to the Study of Lymphocytes and Tumor Cells. <i>Protéomiques et modélisation en 3D. Applications à l'étude des lymphocytes et cellules tumorales.</i>				Quadroni M. Servis C. Zoete V.	
	- Lectures on Proteomics - Cours ex-cathédra sur la protéomique					
	- PW Proteomics : Peptide Synthesis, Peptide-based Assays and Mass Spectrometry - TP Protéomiques : Synthèse de peptides, tests basés sur peptides, spectrométrie de masse	16	-	36		15
	- PW 3D-Modeling - TP modélisation en 3D					
	- Report Writing - Rédaction du rapport	-	-	8		
PW Immunology/Cancer : TP Immunologie/Cancer :				Wilson A., Ronet C. Luther S., Debard N., Kraehenbuel J.-P., Nobile A.		
- Multicolor Flow Cytometric Analysis of Lymphoid Organs - Cytométrie de flux en multiples couleurs pour analyser des tissus lymphoïdes						
- Histological Analysis of Lymph Nodes or Cancer Tissues - Analyse histologique des ganglions et tissus cancéreux	8	3	28			
- Metabolic Switch in Cancer Cells - Métabolisme altéré dans les cellules cancéreuses						
- Discussion and Feedback Session - Discussion et session 'feedback'						
- Report Writing - Rédaction du rapport	-	-	34			
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	9	-	Luther S., Debard N., Kraehenbuel J.-P., Quadroni M., Servis C.		
- Preparation of Exercises - Préparation des exercices	-	-	26			
Biostatistics and Bioinformatics <i>Biostatistiques et Bioinformatique</i>	-	4	-	Diviani D.		

<b>Metabolism</b>					<b>Responsible: Widmann C.</b>	
<b>Métabolisme</b>						
Bioinformatics Tools for the Study of Metabolism <i>Outils bioinformatiques pour l'étude du métabolisme</i>	2	-	-	Xenarios I.		
Brain Metabolism <i>Métabolisme cérébral</i>	4	2	-	Pellerin L.		
Circadian Rhythm and Metabolism <i>Rythme circadien et métabolisme</i>	2	2	-	Gatfield D.		
Critical Reading and Effective Presentation in Science <i>Lecture critique et présentation efficace en sciences</i>	2	8	-	Widmann C.		
Experimental Techniques : Transgenesis and Gene Knockout <i>Techniques expérimentales : transgénèse et invalidation de gène</i>	4	2	-	Hummler E.		
G-couple Receptors and Autonomic Nervous System <i>Récepteurs couplés aux protéines G et système nerveux autonome</i>	4	2	-	Diviani D.		
Glucose as Signal in Metabolism Regulation <i>Le glucose comme signal de régulation métabolique</i>	6	2	-	Thorens B.		
Hypothalamus and the Interaction between Metabolism and Reproduction <i>Hypothalamus et l'interaction entre le métabolisme et la reproduction</i>	4	2	-	Pralong F.		
Metabolic Adaptation to Fasting : Role of Metabolic Sensors <i>Adaptation métabolique à la nutrition : le rôle des senseurs métaboliques</i>	4	2	-	Thorens B.		
Metabolic Phenotyping <i>Phénotypage métabolique</i>	6	2	-	Preitner F.		15
Metabolic Syndrome : Epidemiology and (pre-)Clinical Implications <i>Syndrôme métabolique : épidémiologie et implications (pré-)cliniques</i>	4	2	-	Puder J.		
Metabolism and Cancer <i>Métabolisme et cancer</i>	4	2	-	Fajas L.		
Metabolism and Cell Death <i>Métabolisme et mort cellulaire</i>	2	2	-	Allagnat F.		
No-Coding RNA in Metabolism <i>ARN non-codants dans le métabolisme</i>	4	2	-	Regazzi R.		
Nutritional Physiology <i>Physiologie de la nutrition</i>	4	2	-	Pralong F.		
Nutritional Systems Biology <i>Biologie des systèmes en nutrition</i>	2	-	-	Vergère G.		
The Good (cholesterol), the Bad (cholesterol) and the Lipoproteins <i>Le bon (cholestérol), le mauvais (cholestérol) et les lipoprotéines</i>	4	4	-	Widmann C., Nanchen D.		
What is a Calorie? <i>Qu'est-ce qu'une calorie</i>	-	4	-	Tappy L.		
Biostatistics and Bioinformatics <i>Biostatistiques et Bioinformatique</i>	-	4	-	Diviani D.		
<b>Neuroscience</b>					<b>Responsible: Volterra A.</b>	
<b>Neurosciences</b>						
Neuron-glia Biology <i>Biologie neurones-glie</i>	18	2	-	Volterra A., Pellerin L., Bezzi P., Tschudi-Monnet F.		
Introduction to Psychiatric Neuroscience <i>Introduction aux neurosciences psychiatriques</i>	20	-	-	Do K., Steullet P., Magara F., Marquet P., Rougemont-Buecking A., Cardinaux J.-R., Martin J.-L., Baumann P., Preissmann D.		
Brain Development <i>Développement du cerveau</i>	15	3	2	Hornung J.-P., Cardinaux J.-R., Arsenijevic Y.		15
Modulation of Synaptic Transmission <i>Modulation de la transmission synaptique</i>	14	2	-	Fasshauer D., Lüthi A., Stoop R., Martin J.-L., Pralong E., Varoqueaux F.		
Neuronal Death and Repair in the Central Nervous System <i>Mort neuronale et réparation dans le système nerveux central</i>	16	-	-	Toni N., Widmann C., Hirt L., Deglon N., Brunet J.-F.		
Sensory Functions <i>Fonctions sensorielles</i>	24	-	-	Welker E., Murray M., Hornung J.-P., Decosterd I., Broillet M.-C., Croquelois A.		
Biostatistics and Bioinformatics <i>Biostatistiques et Bioinformatique</i>	-	4	-	Diviani D.		



Pharmacology						Responsible: Broillet M.-C.
Pharmacologie						
MODULE 3	Development of Therapeutics <i>Développement d'agents thérapeutiques</i>	10	-	-	Broillet M.-C.	15
	Development of Drugs : Practical Aspects <i>Développement de médicaments : aspects pratiques</i>	4	-	-	Dumont J.-M.	
	Drug Design <i>Conception de médicaments</i>	4	-	-	Scapozza L.	
	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	-	-	Baume N.	
	Fundamental Principles : Pharmacokinetics / Pharmacogenomics <i>Principes fondamentaux de pharmacocinétique et pharmacogénomique</i>	10	2	-	Firsov D.	
	Pharmacological Treatment of Metabolic Disorders <i>Traitement pharmacologique des troubles métaboliques</i>	2	-	-	Gachon F.	
	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	-	Katanaev V.	
	Regulation and Regulatory Agencies <i>Réglementations et les agences de réglementations</i>	2	-	-	Schild L.	
	System Pharmacology : Cardiovascular Pharmacology <i>Pharmacologie des systèmes : pharmacologie cardiovasculaire</i>	6	2	-	Kellenberger S. Cotecchia S. Diviani D.	
	System Pharmacology : Neuropharmacology <i>Pharmacologie des systèmes : neuropharmacologie</i>	20	2	-	Cotecchia S., Kellenberger S., Eap C.	
	System Pharmacology : Endocrine Pharmacology <i>Pharmacologie des systèmes : pharmacologie endocrinienne</i>	8	2	-	Hummler E.	
	Seminars on Drug Discovery & Development <i>Séminaires sur la découverte et le développement de médicaments</i>	-	12	-	Staub O., Broillet M.-C.	
	Toxicology <i>Toxicologie</i>	10	4	-	Broillet M.-C.	
	Toxicology meets Occupational Hygiene - Biological Monitoring <i>Toxicologie et hygiène du travail : Monitoring biologique</i>	4	-	-	Hopf N.	
	Toxicology : Ecopharmacovigilance <i>Toxicologie : Ecopharmacovigilance</i>	2	-	-	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>	-	-	5	Staub O., 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.	
Transgenic Mice and their Application in Biomedical Research (optional) <i>Les souris transgéniques et leurs applications dans la recherche biomédicale (cours à option)</i>	10	-	-	Hummler E.		
Some Toxic Plant and Poisonous Mushrooms in Biomedical Research (optional) <i>Plantes toxiques et champignons vénéneux : leurs rôles dans la recherche biomédicale (cours à option)</i>	12	-	-	Giroud C.		
Biostatistics and Bioinformatics <i>Biostatistiques et Bioinformatique</i>	-	4	-	Diviani D.		
<b>Total per study path / Total par filière</b>						<b>15</b>

**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

---

**BIOLOGICAL SECURITY**

Patrick Michaux

C	Obl	french	3
A			

N: Master

P: A basic knowledge of microbiology and vegetal science

O: To familiarise future researchers with legislation concerning genetic engineering. In addition, possible biological risks associated to different applications of this technology will be discussed with the help of examples.

C: \* Legislation: article 24 of the Federal Constitution; law concerning environmental protection; law concerning epidemics; ordinance on protection against major accidents; Swiss commissions on biological security: notification and registration of projects.

\* Biological security in the laboratory: containment; security equipment; technical measures: laboratory construction; standard laboratory (microbiological) practice; classification of biological material: plasmids, microorganisms, cell lines, primary cells; security levels 1-4.

\* Release of genetically modified bacteria in the environment: monitoring, survival and dissemination, ecological impact, transfer of genes, containment systems.

\* Potential biological risks associated with the use of transgenic plants: dissemination, cross-pollination, gene transfer.

\* The problem of recombinant vaccines: vectors, DNA vaccines.

\* Somatic genetic therapy I: Illnesses accessible to treatment by somatic genetic therapy, gene transfer methods.

\* Somatic genetic therapy II: Evaluation of the biological risk for the patient and his environment.

---

**CARDIOVASCULAR DISEASES**

Dario Diviani

C	Obl/Opt	english	20
A	2.00		
S	Obl/Opt	english	4
A			

---

 N: Master

---

 O: Integrated overview of the respiratory and cardio-vascular systems  
 Introduction to cardiac and respiratory pathophysiology, pathology, and pharmacology  
 Cellular mechanisms of selected cardiovascular and respiratory diseases

---

 C: respiratory and cardiovascular physiology  
 respiratory and cardiovascular pathophysiology and pharmacology  
 cellular basis of arterial hypertension  
 cellular basis of heart failure  
 heart conduction defectc (problem-based learning)

---

 B: Medical Physiology. W F Boron & E L Boulpaep; Saunders 2003

---

**CELLULAR BIOLOGY**

Olivier Staub

C	Obl/Opt	english	12
A	1.50		
S	Obl/Opt	english	4
A			

N: Master

---

**FROM MEMORY TO MEMORY LOSS : ALZHEIMER'S DISEASE**

Jean-René Cardinaux

C	Obl/Opt	english	18
A	1.50		
S	Obl/Opt	english	4
A			

N: Master

---

**IMMUNOLOGY AND CANCER**

Sanjiv Luther

C	Obl/Opt	english	20
A	2.00		
S	Obl/Opt	english	12
A			

N: Master

---

**INTRACELLULAR SIGNALLING**

Dario Diviani

C	Obl/Opt	english	12
A	1.00		
S	Obl	english	3
A			

N: Master

P: Bachelor in Biology

O: Introduction to the hormonal system. Physiological, pathophysiological and pharmacological aspects

C: 1) Signal transduction by peptide hormones (G protein-coupled receptors, second messengers, protein kinases, genetic pathologies, pharmacological targets).  
 2) Receptor-mediated endocytosis (transferrin, LDL, toxins, virus, ligand-targeted therapeutics)  
 3) Signal transduction by steroid hormones (mechanism of action, pathologies, pharmacological targets)

B: - Endocrinology: An Integrated Approach.

Nussey, S.S.; Whitehead, S.A. London: Taylor &amp; Francis; c2001

- Molecular Biology of the Cell 4th ed.

Alberts, Bruce; Johnson, Alexander; Lewis, Julian; Raff, Martin; Roberts, Keith; Walter, Peter, New York and London: Garland Science; c2002

---

**METABOLIC DISEASES**

Christian Widmann

C	Obl/Opt	english	16
A	1.50		
S	Obl/Opt	english	4
A			

N: Master

---

P: The following metabolic pathway should be known beforehand:

- Glycolysis
- Neoglucogenesis
- Glycogen synthesis
- Fatty acids and triglyceride synthesis
- Krebs cycle

The basic regulation of receptor tyrosine kinases, G protein-coupled receptors, small GTP-binding proteins should also be known.

---

O: The objectives of this course is to understand the complex aetiology of diabetes by studying the environmental, genetic, and molecular factors underlying the development of the disease

- 
- C:
1. Physiopathology, genetic and environmental factors in diabetes.
  2. Epidemiology of and complications in diabetes.
  3. Diabetes: a pancreatic beta cell disease.
  4. Diabetes: an insulin-resistance disease.
  5. Genetics of diabetes



---

**MICROBIOLOGY**

Stefan Kunz

C	Obl/Opt	english	18
A	2.00		
S	Obl/Opt	english	4
A			

N: Master

---

P: Course Virology B.Sc. 5th semester (Kunz) or equivalent

---

O: This course will provide an overview over medical microbiology at an advanced level. Introductory parts will cover the basic concepts of bacterial, viral, and fungal infections in humans. Selected pathogens will be used to highlight the principles underlying human infectious diseases from the standpoint of the pathogen and the host defense.

## C: Outline course Medical Microbiology

## Part I Medical Bacteriology (Gilbert Greub, 6 hours total)

This part of the course will first present the concepts of bacterial colonization, of infection and of barriers against invading micro-organisms. The importance of clinical bacteriology for the etiological diagnosis of infectious diseases will be presented, as well as the main diagnosis approaches used. Then, the most important virulence factors implicated in bacterial pathogenesis and in the transmission of pathogenic agents will be presented. These fundamental principles will be illustrated using relevant human pathogens as examples. First, we will present the pathogenesis of some pyogenic bacteria (*Escherichia coli*, *Staphylococcus* spp., *Streptococcus* spp.), highlighting the importance of bacterial toxins and of bacteriophages. Then, we will present some specific aspects of the mode of transmission and pathogenesis of infections due to intracellular bacteria, using as examples the atypical pneumonia and the zoonotic infections. Finally, we will illustrate using mycobacteria some key principles in bacterial pathogenesis including the importance of pathogens evolution and of immune defense.

Colonisation, infection and barriers against invading pathogens (1hour)

Colonisation, physiological flora

Infection and inflammation

Chemical, mechanical, physical and biological barriers

Diagnostic bacteriology (1hour)

Gram and direct examination

Cultures approaches

Bacterial identification

Molecular diagnosis/serology

Pyogenic bacterial infections and toxins (1hour)

*Escherichia coli*: commensal and pathogen: (ETEC/EPEC/EIEC)

*Staphylococcus aureus*: virulence factors

*Streptococcus*, superantigens and bacteriophages

Pneumonia (1hour)

Etiological diagnosis of pneumonia

Pneumococques and other encapsulated pyogenic bacteria

*Legionella pneumophila*, water and amoebae

Other agents of atypical pneumonia (*Chlamydia* spp., *Coxiella burnetii*)

Zoonotic infections (1hour)

Ticks/fleas/lice: role in the transmission

*Rickettsia*: pathogenesis and reductive evolution

*Bartonella*: red blood cells and endothelial cells

*Mycobacteria* (1hour)

Importance of immune defense mechanisms

Pathogenomic with an evolutionary perspective

## Part II Medical Virology

This part of the course will cover fundamental aspects of medical virology and viral diseases in humans. A short introduction will provide a survey of the landscape and outline basic principles of human viral infection and viral pathogenesis. These fundamental principles will then be illustrated using relevant human pathogens as examples. The most important families of human pathogenic viruses will be presented in a general way. From each family, we will select specific viruses that will serve as examples to illustrate fundamental aspects of virus-host interaction and viral pathogenesis in a more detailed manner. A final block will cover virus infections in the central nervous system (CNS) and re-visit the basic principles outlined before to give a synthesis of the highly complex virus-host interaction underlying viral CNS disorders.

Introduction to medical virology (1 hour) Stefan Kunz

Basic principles of human viral infection

Basic principles of innate and adaptive anti-viral defense

Virus infection of the central nervous system (1 hour) Stefan Kunz

Mechanisms of CNS invasion by viruses

Anti-viral immune defense in the CNS

Acute viral infection of the CNS: meningitis and encephalitis

Persistent viral infection in the CNS

Infection of the developing CNS: virus infection in pediatric medicine

Human pathogenic DNA viruses (2 hours) Stefan Kunz

Overview human pathogenic DNA viruses

Poxviruses

Overview poxviruses

Pathogenesis of smallpox

Subversion of innate host cell immunity by poxviruses

Adenoviruses

Adenoviruses as human pathogens

Herpesviruses

Overview human pathogenic herpesviruses

Herpes simplex virus and viral latency

Epstein-Barr Virus: viral latency and cancer

Human pathogenic RNA viruses I (1 hour) Stefan Kunz

Overview human pathogenic DNA viruses

Enteroviruses

Overview human pathogenic enteroviruses

Rhinoviruses and coxsackievirus: viral tropism and pathogenesis

Parvovirus

---

B: Will be provided for each block.

---

## SCIENTIFIC WRITING - HOW TO INCREASE THE IMPACT OF YOUR RESEARCH

Marie-Christine Broillet, Stefan Kohler

C	Obl	english	8
A	0.50		
S	Obl	english	2
A			

N: Master

---

**LTK1 MODULE: TRAINING IN ANIMAL EXPERIMENTATION**

Corinne Berthonneche

C	Opt	english	20
A	3.00		
TP	Opt	english	20
A			

N: Master

---

**INTRODUCTION TO CLINICAL RESEARCH MODULE (EH)**

Luc Tappy

C	Opt	english	20
A	3.00		
TP	Opt	english	20
A			

N: Master

- 
- O: To get acquainted with basic methods in clinical research
- o study design
  - o statistical analysis
  - o ethical considerations
  - o legal aspects
- To know the basic skills for the realization of research protocols on human beings
- o Techniques of asepsis, iv drips
  - o how to react in case of acute adverse effects
  - o basic life support
- To understand the relationships between clinical practice and research
- o cancer
  - o metabolic disorders
  - o neuro-psychiatric disorders

**FIRST STEP PROJECT**

Christian Fankhauser, Olivier Staub, Claus Wedekind

TP	Obl	MSc BEC	english	224
A	15.00			
TP	Obl	MSc MB	english	282
A	15.00			
TP	Obl	MSc MLS	english	250
A	14.00			

N: Master

P: Practicals performed during the bachelor (molecular biology, genetics, biochemistry, bioinformatics)

O:

- An initiation to the work of a scientist
- Conduct experimental work in research lab (wet bench or in silico)
- Interpretation of research results
- Implement basic principles in experimental design (e.g. include the appropriate controls, statistical significance of the results etc...)
- Present your experimental work in a written report which will be organized like a typical research article (introduction, results, discussion, materials and methods)
- present your work orally (seminar style)

C: Perform laboratory work for about 12 weeks during the time when the student does not follow theoretical classes. This research project will typically be performed under the guidance of a PhD student or a post-doc from the host laboratory.

---

**INTRODUCTION TO CLINICAL MEDICINE**

Olivier Bonny

C	Obl	english	22
S			
TP	Obl	english	8
S			

N: Master

P: Bachelor of Science

O: The main goals of this course is to have the students able to:  
 1) describe the basic principles underlying human clinical medicine;  
 2) explain the concepts and language used in clinical medicine and research

C: -

B: /

I: -



---

**BIOSTATISTICS AND BIOINFORMATICS**

Dario Diviani

S	Obl	english	4
S			

---

N: Master

---

P: Basics of biostatistics and bioinformatics

---

O: Methodology in biostatistics and bioinformatics

---

C: At the end of this module, the students will have used and developed the needed biostatistics or bioinformatics tools to analyze the data obtained during their Master thesis work.

---

B: /

---

I: /

---

**IMMUNOLOGY II**

Sanjiv Luther

C	Obl	english	22
S			
S	Obl	english	4
S			

N: Master

---

P: The key concepts of immunology which are summarized in chapter 1 of 'Janeways Immunobiology' by Kenneth Murphy (Garland Science) 2011

---

O: Know dendritic cells and lymphocytes  
Know lymphoid organ structure and function  
Know the cellular migration and interaction  
Know the molecular basis of cellular interactions  
Know how antigen is recognized, sampled, processed and presented to lymphocytes  
Know how lymphocytes get activated, proliferate and differentiate into effector cells  
Know the effector function  
Know what memory cells are and do  
Know the phases of adaptive immunity  
Know the pros and cons of adaptive immune responses

---

C: See under goals

## LIST OF COURSES

---

### IMMUNOLOGY III

Sanjiv Luther

C	Obl	english	14
S			
S	Obl	english	4
S			

N: Master

---

**CANCER II**

Nicolas Fasel

C	Obl	english	15
S			
S	Obl	english	3
S			

N: Master

---

**CANCER III**

Denise Nardelli Haefliger

C	Obl	english	11
S			
S	Obl	english	3
S			

N: Master

---

**TREATMENTS**

Pedro Romero

C	Obl	english	10
S			
S	Obl	english	2
S			

N: Master

P: Have a basic knowledge of the principles of humoral and cellular immunology. Innate and adaptive immune responses. Basic mechanisms of cell transformation and cancer development.

O: Provide an overview of the principles of tumor immunology and the applications to cancer immunotherapy

C: Immunosurveillance of tumors  
 Tumor antigens  
 Approches to cancer immunotherapy  
 Immunosuppression in the tumor microenvironment  
 Immune checkpoint blockade with monoclonal antibodies

B: - Mellman I, Coukos G, Dranoff G. Cancer immunotherapy comes of age. *Nature*. 2011 480(7378):480-9. doi:10.1038/nature10673.  
 - Schreiber RD, Old LJ, Smyth MJ. Cancer immunoediting: integrating immunity's roles in cancer suppression and promotion. *Science*. 2011 331(6024):1565-70. doi:10.1126/science.1203486.

---

**PROTEOMICS AND 3D MODELING**

Manfredo Riccardo Quadroni, Ekaterini Servi

C	Obl	english	16
S			
TP	Obl	english	36
S			

N: Master

---

**PW IMMUNOLOGY / CANCER**

Sanjiv Luther, Anne Wilson

C	Obl	english	8
S			
TP	Obl	english	28
S			
S	Obl	english	3
S			

N: Master



---

**E-LEARNING EXERCISES**

Sanjiv Luther

C	Obl	english	1
S			
E	Obl	english	9
S			

N: Master

---

**BIOINFORMATICS TOOLS FOR THE STUDY OF METABOLISM**

Ioannis Xenarios

C	Obl	english	2
S			

N: Master

---

**BRAIN METABOLISM**

Luc Pellerin

S	Obl	english	2
S			
C	Obl	english	4
S			

N: Master

---

**CIRCADIAN RHYTHM AND METABOLISM**

David Gatfield

C	Obl	english	2
S			
S	Obl	english	2
S			

N: Master

---

**CRITICAL READING AND EFFECTIVE PRESENTATION IN SCIENCE**

Christian Widmann

C	Obl	english	2
S			
S	Obl	english	8
S			

N: Master

---

## EXPERIMENTAL TECHNIQUES : TRANSGENESIS AND GENE KNOCKOUT

Edith Hummler Beermann

C	Obl	english	4
S			
S	Obl	english	2
S			

N: Master

---

## G-COUPLE RECEPTORS AND AUTONOMIC NERVOUS SYSTEM

Dario Diviani

S	Obl	english	2
S			
C	Obl	english	4
S			

N: Master

---

**GLUCOSE AS SIGNAL IN METABOLISM REGULATION**

Bernard Thorens

S	Obl	english	2
S			
C	Obl	english	4
S			

N: Master



---

**HYPOTHALAMUS AND THE INTERACTION BETWEEN METABOLISM AND REPRODUCTION**

François Pralong

S	Obl	english	2
S			
C	Obl	english	4
S			

N: Master

---

**METABOLIC ADAPTATION TO FASTING : ROLE OF METABOLIC SENSORS**

Bernard Thorens

C	Obl	english	4
S			
S	Obl	english	2
S			

N: Master

---

**METABOLIC PHENOTYPING**

Frédéric Preitner

C	Obl	english	6
S			
S	Obl	english	2
S			

N: Master

---

**METABOLIC SYNDROME : EPIDEMIOLOGY AND (PRE-)CLINICAL IMPLICATIONS**

Jardena Puder

C	Obl	english	4
S			
S	Obl	english	2
S			

N: Master

B: Kahn R et al. The metabolic syndrome: time for a critical appraisal. Joint statement from the American Diabetes Association and the European Association for the study of Diabetes. (2005) *Diabetologia*:48:1684-1699  
 Expert panel on the detection, evaluation and treatment of high blood cholesterol in adults. ATP III (2001). *JAMA* 285-2486-2497

---

## METABOLISM AND CANCER

Lluís Fajás Coll

C	Obl	english	4
S			
S	Obl	english	2
S			

N: Master

---

## METABOLISM AND CELL DEATH

Florent Allagnat

C	Obl	english	2
S			
S	Obl	english	2
S			

N: Master

---

**NO-CODING RNA IN METABOLISM**

Romano Regazzi

C	Obl	english	4
S			
S	Obl	english	2
S			

N: Master

---

**NUTRITIONAL PHYSIOLOGY**

François Pralong

C	Obl	english	4
S			
S	Obl	english	2
S			

N: Master



---

**NUTRITIONAL SYSTEMS BIOLOGY**

Guy Vergères

C	Obl	english	2
S			

N: Master

---

**THE GOOD (CHOLESTEROL), THE BAD (CHOLESTEROL) AND THE LIPOPROTEINS**

David Nanchen, Christian Widmann

S	Obl	english	4
S			
C	Obl	english	4
S			

N: Master

O: Understand how cholesterol is taken up and produced, how it is transported from one organ to another, and what are its functions in our organism.

C: - Cholesterol (function, origin, and synthesis)  
- Lipoprotéines (chylomicrons, VLDL, LDL et HDL)

B: Endocrinol.Metab Clin.North Am. (1998) vol 27 pp. 503-519

---

## WHAT IS A CALORIE ?

Luc Tappy

S	Obl	english	4
S			

N: Master

---

## NEURON-GLIA BIOLOGY

Andrea Volterra

C	Obl	english	18
S			
S	Obl	english	2
S			

N: Master

---

**INTRODUCTION TO PSYCHIATRIC NEUROSCIENCE**

Kim Quang Do Cuenod

C	Obl	english	20
S			

N: Master

B: Quelques références :

- Kandel, EJ et al (last edition) Principles of Neural Science. Elsevier
  - Schenk F, Leuba G, Büla C (2004). Du vieillissement cérébral à la maladie d'Alzheimer, De Boeck.
  - Charney DS & Nestler EJ (last edition) Neurobiology of Mental Illness, Oxford University Press
  - Jeannerod M, Le Cerveau volontaire, Odile Jacob, 2009
- une bibliographie spécifique sera distribuée pour chaque volet du cours.

---

**BRAIN DEVELOPMENT**

Jean-Pierre Hornung

C	Obl	english	15
S			
S	Obl	english	3
S			
TP	Obl	english	2
S			

N: Master

---

## MODULATION OF SYNAPTIC TRANSMISSION

Dirk Fasshauer

C	Obl	english	14
S			
S	Obl	english	2
S			

N: Master

---

## NEURONAL DEATH AND REPAIR IN THE CENTRAL NERVOUS SYSTEM

Nicolas Toni

C	Obl	english	16
S			

N: Master

P: Basic knowledge of neurobiology and of cell biology.

O: Understand the roles of neuronal death occurring in normal development and the factors which determine it. Understand the various cellular mechanisms of neuronal death, active in both normal and pathological situations. Understand the roles of neuronal death in various pathological situations including cerebral ischemia, Parkinson's disease and motoneuron diseases.

C: Cell death: introduction, history and typology  
 Pathways of apoptosis  
 Trophic influences and neuronal death  
 Neuronal death in development and its regulation  
 Excitotoxicity, its signalling pathways and neuroprotection against it  
 Cerebral ischemia and its treatment  
 Alzheimer's disease  
 Parkinson's disease

B: Les six enseignants impliqués dans ce module proposeront des matières de lecture.



---

**SENSORY FUNCTIONS**

Egbert Welker

C	Obl	english	24
S			

N: Master

---

**DEVELOPMENT OF THERAPEUTICS**

Marie-Christine Broillet

C	Obl	english	10
S			

N: Master

---

**DEVELOPMENT OF DRUGS : PRACTICAL ASPECTS**

Jean-Maurice Dumont

C	Obl	english	4
S			

N: Master

---

**DRUG DESIGN**

Leonardo Scapozza

C	Obl	english	4
S			

N: Master

P: - Basics of Biochemistry and Chemistry

O: - To give an introduction and a general overview on Drug Design.

C: - Definitions and basic principles of Drug Design (what is a drug?; Which are the protein-ligand interactions; What is drug design?  
 - Which are the fundamental questions in drug design?  
 - Ligand-based drug design: principles and examples  
 - Target-based drug design: principles and examples  
 - The whole process will be exemplified by means of case study namely the development of Glivec, a molecularly targeted anti-cancer drug.

B: - Höltje, Hans-Dieter; Sippl, Wolfgang; Rognan, Didier; Folkers, Gerd "Molecular Modeling: Basic Principles and Applications" 3., revised and expanded Edition - January 2008, Wiley-VCH, Weinheim  
 - Capdeville R., Buchdunger E., Zimmermann J. and Matter A. GLIVEC (STI571,IMATINIB), A RATIONALLY DEVELOPED, TARGETED ANTICANCER DRUG Nature Review Drug Discovery (2002) 1:| 493

---

## OPTIMIZATION OF DRUG TREATMENT

Laurent Décosterd

C	Obl	english	6
S			

N: Master

---

## PHARMACEUTICALS AS DOPING DRUGS

Norbert Baume

C	Obl	english	4
S			

N: Master

---

**FUNDAMENTAL PRINCIPLES : PHARMACOKINETICS / PHARMACOGENOMICS**

Dmitri Firsov

C	Obl	english	10
S			
S	Obl	english	2
S			

N: Master

---

P: good knowledge of physiology, human anatomy and genetics

---

O: to provide a description of factors that influence drug action in human population

---

C: Pharmacokinetics: principal models and parameters  
Drug Absorbtion, Distribution, Metabolism and Excretion (ADME)  
Chronopharmacology: effect of circadian time on drug action  
Pharmacogenetics: candidate genes for variable drug response

---

**PHARMACOLOGICAL TREATMENT OF METABOLIC DISORDERS**

Frédéric Gachon

C	Obl	english	2
S			

N: Master



---

## PRINCIPLES OF CHEMOTHERAPY : INFECTIOUS DISEASES

Olivier Staub

C	Obl	english	6
S			
S	Obl	english	2
S			

N: Master

---

**PRINCIPLES OF CHEMOTHERAPY : CANCER**

Vladimir Katanaev

C	Obl	english	6
S			
S	Obl	english	2
S			

N: Master

---

## REGULATIONS AND REGULATORY AGENCIES

Laurent Schild

C	Obl	english	2
S			

N: Master

**SYSTEM PHARMACOLOGY : CARDIOVASCULAR PHARMACOLOGY**

Susanna Cotecchia, Stephan Kellenberger

C	Obl	english	6
S			
S	Obl	english	2
S			

N: Master

P: B. Sc.

O: Introduction to pharmacology of the cardiovascular system

C: - G Protein-coupled receptors  
 - Pharmacology of blood hemostasis and thrombosis  
 - Hyperlipidemia and lipid-lowering agents  
 - Pharmacology of heart failure

B: - Principles of Pharmacology, by D.E. Golan et al., 3rd edition, Lippincott-Williams & Wilkins, 2011  
 - Pharmacology, by Rang, Dale et al., 7th edition, Elsevier Churchill Livingstone, 2012

I: -

---

**SYSTEM PHARMACOLOGY : NEUROPHARMACOLOGY**

Susanna Cotecchia, Stephan Kellenberger

C	Obl	english	20
S			
S	Obl	english	2
S			

N: Master

P: Bachelor in Biology

O: Introduction to Neuropharmacology

C: - Pharmacology of the central and peripheral nervous system  
 - Pharmacology of ion channels: Introduction, principles; pain pharmacology; targeting GABAA receptors; antiepileptic drugs; local anesthetic drugs.  
 - Pharmacogenetics in Psychiatry

B: - Principles of Pharmacology, by D.E. Golan et al., 3rd edition, Lippincott-Williams & Wilkins, 2011  
 - Pharmacology, by Rang, Dale et al., 7th edition, Elsevier Churchill Livingstone, 2012

---

**SYSTEM PHARMACOLOGY : ENDOCRINE PHARMACOLOGY**

Edith Hummler Beermann

C	Obl	english	8
S			
S	Obl	english	2
S			

N: Master

---

**SEMINARS ON DRUG DISCOVERY & DEVELOPMENT**

Marie-Christine Broillet, Olivier Staub

S	Obl	english	12
S			

N: Master

---

**TOXICOLOGY**

Marie-Christine Broillet

C	Obl	english	10
S			
S	Obl	english	2
S			

N: Master



---

**TOXICOLOGY MEETS OCCUPATIONAL HYGIENE - BIOLOGICAL MONITORING**

Nancy Hopf

C	Obl	english	4
S			

N: Master

---

**TOXICOLOGY : ECOPHARMACOVIGILANCE**

Nathalie Chèvre

C	Obl	english	2
S			

N: Master

---

**TOXICOLOGY : E-LEARNING**

Marie-Christine Broillet

E	Obl	english	8
S			

N: Master

---

## VISIT OF AN INDUSTRIAL PHARMACEUTICAL RESEARCH CENTER

Marie-Christine Broillet, Olivier Staub

EXC	Obl	english	5
S			

N: Master

---

**INFLAMMATION AND CANCER : ROLE OF REACTIVE OXYGEN SPECIES**

Emanuela Felley-Bosco

C	Opt	english	10
S			

N: Master

---

**TRANSGENIC MICE AND THEIR APPLICATION IN BIOMEDICAL RESEARCH**

Edith Hummler Beermann

C	Opt	english	10
S			

N: Master

---

**SOME TOXIC PLANT AND POISONOUS MUSHROOMS IN BIOMEDICAL RESEARCH**  
Christian Giroud

C	Opt	english	12
S			

N: Master

