To know more about the...

Master of Science in Medical Biology

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Department of Pharmacology and Toxicology
Master in Medical Biology
WHY

“Over 95 percent of the world's population has health problems -- with over a third having more than 5 ailments”.
THE LANCET (June, 2015)
WHAT WE OFFER

Studies of the molecular mechanisms involved in physiology and human pathophysiology
WHAT WE OFFER

Understanding of new diagnostic and therapeutic tools
WHAT WE OFFER

Molecular Mechanisms of Diseases

Translational Research

Master in Medical Biology
OUR COMPETENCES

- Immunology and Cancer
- Metabolism, obesity, diabetes, and cardiovascular pathologies
- Pharmacology & Toxicology
- Medical Microbiology
- Neurosciences
Organization of the studies: 3 semesters (90 ECTS)

**Semester 1**
- **Module 1**: Compulsory and optional courses (15 credits ECTS)
- **Module 2**: First step research project (15 credits ECTS)
- Exams

**Semester 2**
- **Module 3**: Filières / Common course (15 credits ECTS)  Feb – April 2020
- Exams

**Semester 3**
- **Module 4**: Master Research Project: A personal project (45 credits ECTS)  May 2020 – Jan 2021
- Defense of the Master project
Module 1

Courses:
- Cell Biology & Signalling
- Medical Microbiology
- Cardiovascular diseases
- Brain Diseases
- Immunology & Cancer
- Metabolic Diseases
- An introduction to research

Optional modules:
- Training in animal experimentation
  or
- Introduction to clinical research
Module 1

Courses:
- Cell Biology & Signalling
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Brain diseases: Alzheimer’s disease

Why a course on Alzheimer’s disease (AD)?

- **The most common and challenging human brain disease**
- 10% of people **older than 65** and up to **45%** of people **older than 80**.
- In **2030**: **3-fold more**: the main public health problem for our society

*It poses questions at many levels: clinical (diagnosis, prognosis, therapy), experimental (pathogenesis, mechanisms), therapeutic (approaches), and also social and ethical.*
Module 1

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« An introduction to research... »

Lab life: How to plan an experiment, write down your results and analyze your data?

Scientific communication: How to prepare a poster, a talk, a report, a grant or deposit a patent?
Semester 1

Module 1

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Introductory Course in Laboratory Animal Science

Aims

- To acquire the practical and theoretical skills to work with laboratory animals as requested by legislation (20h theory + 20h practical work)

- Federal accreditation to perform animal experimentation (Swiss federal veterinary office, module LTK1)
Introduction to Clinical Research

Aims

- To learn how to design and run a clinical study (theory and practical work)
Aims of the clinical research course

• Get acquainted with the **fundamentals in Clinical Research**
  – Study design
  – Statistics
  – Human ethics
  – Regulations and legal requirements, safety, quality controls

• Learn **specific skills** for human research
  – Insert iv lines, collect blood samples
  – Know how to react in case of an emergency
Organization of the studies: 3 semesters (90 ECTS)

**Semester 1**
- **Sept-Dec 2019**
  - **Module 1**
    - Compulsory and optional courses
    - (15 credits ECTS)
  - **Exams**

**Semester 2**
- **Feb-April 2020**
  - **Module 3**
    - Filières / Common course
    - (15 credits ECTS)
    - Feb-April 2020
  - **Exams**

**Semester 3**
- **May 2020-Jan 2021**
  - **Module 2**
    - First step research project
    - (15 credits ECTS)
  - **Module 4**
    - Master Research Project: A personal project
    - (45 credits ECTS)
    - May 2020-Jan 2021
  - **Defense of the Master project**
Almost 100 laboratories provide First step or Master projects
Organization of the studies: 3 semesters (90 ECTS)

- **Semester 1**: Sept-Dec 2019
  - **Module 1**: Compulsory and optional courses (15 credits ECTS)
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- **Semester 2**: Feb – April 2020
  - **Module 3**: Filières / Common course (15 credits ECTS)
  - **Module 4**: Master Research Project: A personal project (45 credits ECTS)

- **Semester 3**: May 2020 – Jan 2021

- **Defense of the Master project**
Semester 2

Module 3

- **Common practical classes**
  - Introduction to clinical medicine
  - Bioinformatics & Biostatistics

- **Tracks (Filières)**
  - Immunology & Cancer
  - Neurosciences
  - Pharmacology & toxicology
Semester 2

Module 3

- **Common practical classes**
  - Introduction to clinical medicine
  - Bioinformatics & Biostatistics

- **Tracks (Filières)**
  - Immunology & Cancer
  - Neurosciences
  - Pharmacology & toxicology
Introduction to clinical medicine (Module 3, common course)

Coordinator: Prof. Olivier Bonny, MD PhD
Department of Pharmacology & Toxicology
Olivier.Bonny@unil.ch
Tel. 021 692 54 17

Monday afternoons

– Lectures by clinical doctors, MD-PhDs or PhDs involved in biomedical research
– Clinical exercises (ECG, blood pressure measurements)
– Clinical demonstrations (dermatology, neuropsychology, bedside approach of a patient,...)
Module 3

- Common practical classes
  - Introduction to clinical medicine
  - Bioinformatics & Biostatistics

- Tracks (Filières)
  - Immunology & Cancer
  - Metabolism
  - Neurosciences
  - Pharmacology & toxicology
Module 3: 3 tracks (Filières)

- Immunology & Cancer
- Pharmacology
- Neuroscience

Sanjiv Luther
Marie-Christine Broillet
Jean-René Cardinaux
Immunology and Cancer

Dangers from outside

Infections
(viruses, fungi, bacteria, parasites)

Allergies, asthma

Dangers from inside

Autoimmunity

Cancer

Subject: highly disease-relevant
Cause of death

Infections

- Acute respiratory infections (including pneumonia and influenza): 3.5 million
- AIDS: 2.3 million
- Diarrheal diseases: 2.2 million
- TB: 1.5 million
- Malaria: 1.1 million
- Measles: 0.9 million

Cancer

- Lung: 1.4 million
- Stomach: 0.8 million
- Liver: 0.7 million
- Colon: 0.6 million
- Breast: 0.5 million
- Genital: 0.3 million

Cause no. 1 in poor countries

Cause no. 1 in rich countries

Subject: concerns everybody and all age ranges.
And: need for new vaccines and therapies!
CIIL: Center of Immunity and Infection Lausanne-Epalinges

Newly renovated UNIL research campus (since 2014);
> 350 scientists, > 50 research groups

- International atmosphere, many students
- Basic and clinical research side-by-side
- Many seminars and courses
- Modern facilities and technology platforms

New cancer research centers in Epalinges and next to CHUV

One of Europe’s biggest centers dedicated to immunology and oncology research
International PhD program in ‘Immunology and Cancer’

40 research laboratories
A wide choice of theoretical and practical courses
http://www.unil.ch/cancer-immunology
Marie-Christine Broillet, Department of Pharmacology & Toxicology
1. Fundamental Principles
   Pharmacokinetics–Pharmacodynamics
   Pharmacogenetics-genomic (personalized medicine)

2. Practical Aspects
   Drug design and discovery
   Drug development
   Optimization of drug treatment
   Regulations and Regulatory agencies

2. System Pharmacology
   Neuropharmacology
   Cardiovascular pharmacology
   Endocrine pharmacology
   ...

3. Principles of chemotherapy
   Cancer
   Infectious diseases

4. Toxicology
   Pharmacotoxicology
   Food toxicology
   Ecotoxicology

Courses, PBL, e-learning, article presentations, seminars, visits
Toxicology Visits
Filière pharmacology and toxicology: why?

• Entry in the world of pharmaceutical drugs with theoretical and practical knowledges

• Active awareness of the different toxicology issues

• Multidisciplinary approaches: neurosciences, cardiovascular, cancer, metabolism, etc.

• General Basis for future careers in biomedical and pharmaceutical research with a critical mind

...Problem-based learning activities will provide critical thinking about the Pharma industry... the necessity of pharmacovigilance and ecopharmacology
From genes to synapses to circuits in order to understand brain function, behaviour and neuropsychiatric disorders.
Filière Neurosciences

6 Modules

- Brain Development
- Sensory Functions
- Neuronal Death and Repair
- Modulation of Synaptic Transmission
- Neuron-Glia Biology
- Introduction to Psychiatric Neuroscience

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Jean-Rene.Cardinaux@chuv.ch, CNP
According to the American journal Science, the Lake Geneva region is considered to be the third most important study centre in Europe for neuroscience behind Oxford and Cambridge in Britain.
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Semester 1
Sept-Dec 2019

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Exams

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Filières / Common course
(15 credits ECTS)
Feb – April 2020

Exams

Module 4
Master Research Project:
A personal project
(45 credits ECTS)
May 2020 – Jan 2021

Defense of the Master project

Semester 2

Semester 3
Semesters 2 and 3

Module 4

Master Project

- In many laboratories of the affiliated research departments of UNIL, the CHUV or in outside laboratories (LAD, UNIGE, EPFL)
- Mobility
- Medical Biology Poster Day
Semesters 2 and 3

Module 4

Master Project

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- Medical Biology Poster Day
Medical Biology Poster Day
Master Project: Aims

- Read scientific articles and critically evaluate the quality and interpretation of experimental data
- Identify biologically relevant questions based on the scientific literature
- Plan and conduct meaningful experiments
- Learn careful data analysis and data presentation (including statistics)
- Present and discuss experimental data in a clear and convincing way
- Write a comprehensive scientific thesis in English
- Be comfortable to work independently as well as in a TEAM
- Learn to manage a project and to move it forward successfully
Our ambition

- **Multidisciplinary training** in various domains of biomedical sciences (neurosciences, metabolism, cancer, immunology, cardiovascular, pharmacology)

- Acquisition of **advanced skills in basic and translational research**
  (genomics, imaging, electrophysiology, transgenesis,…)

- **High quality courses.** Internationally competitive. In English.
  (50% of students come from outside UNIL)
Academic Research
Pharma
Biomedical Industries
Biotechs
Lab Med
Hospitals (FAMH)
Tox Labs
Patent Offices
Regulatory affairs
Governmental Agencies
Scientific journals
Teaching

Job Openings
You want to know more?

http://www.unil.ch/eb-mb/home.html

For further questions: please contact the School of Biology or Marie-Christine Broillet (Marie-Christine.Broillet@unil.ch)
You want to know more?

Master of Medical Biology: Information session

Monday, March 25th 2019

Department of Biochemistry, Room B301
Chemin de Boveresses
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Metro station “Croisettes” (M2)