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

Molecular Mechanisms of Diseases

Translational Research

Master in Medical Biology
WHAT WE OFFER

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

Development 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**
- **Sept-Dec 2018**
  - **Module 1**: Compulsory and optional courses (15 credits ECTS)

**Semester 2**
- **Feb – April 2019**
  - **Module 3**: Filières / Commun course (15 credits ECTS)

**Semester 3**
- **May 2019 – Jan 2020**
  - **Module 2**: First step research project (15 credits ECTS)
  - **Module 4**: Master Research Project: A personal project (45 credits ECTS)

Exams

Defense of the Master project
Module 1

Courses:
- Cell Biology & Signalling
- Medical Microbiology
- Cardiovascular diseases
- From memory to memory loss: Alzheimer Disease
- Immunology & Cancer
- Metabolic Diseases
- Scientific Communication
  How to prepare a poster, a talk, a report, an article, a patent?

Optional modules:
- Training in animal experimentation
  or
- Introduction to clinical research
From memory to memory loss: 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.
Semester 1

Module 1

Courses:
- Cell Biology & Signalling
- Medical Microbiology
- Cardiovascular diseases
- From memory to memory loss: Alzheimer Disease
- Immunology & Cancer
- Metabolic Diseases
- Scientific Communication
  How to prepare a poster, a talk, a report, a grant or deposit a patent?

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

Courses:
- Cell Biology & Signalling
- Medical Microbiology
- Cardiovascular diseases
- From memory to memory loss: Alzheimer Disease
- Immunology & Cancer
- Metabolic Diseases
- Scientific Communication
  How to prepare a poster, a talk, a patent?

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

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

Prof. Luc Tappy, Department of Physiology
021 692 55 41, Luc.Tappy@unil.ch
Aims of the clinical research course

• Get acquainted with the **fundamentals in Clinical Research**
  – Study design
  – Statistics
  – 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**
  - **Module 1**: Compulsory and optional courses (15 credits ECTS)
  - **Start**: Sept-Dec 2018
- **Exams**

- **Semester 2**
  - **Module 2**: First step research project (15 credits ECTS)
  - **Start**: Feb – April 2019
  - **Exams**

- **Semester 3**
  - **Module 3**: Filières / Commun course (15 credits ECTS)
    - **Start**: Feb – April 2019
  - **Module 4**: Master Research Project: A personal project (45 credits ECTS)
    - **Start**: May 2019 – Jan 2020
  - **Exams**

**Defense of the Master project**
Almost 100 laboratories provide First step or Master projects
Our sites

Dept. of fundamental Neurosciences
Dept. Of Physiology
Dept. of Pharmacology and Toxicology

CIG
CHUV

Infection and immunity center (CIIL)
Cery

Master in Medical Biology
Organization of the studies: 3 semesters (90 ECTS)

- **Module 1**: Compulsory and optional courses (15 credits ECTS) - Sept-Dec 2018
- **Module 2**: First step research project (15 credits ECTS) - Feb – April 2019
- **Module 3**: Filières / Commun course (15 credits ECTS) - Feb – April 2019
- **Module 4**: Master Research Project: A personal project (45 credits ECTS) - May 2019 – Jan 2020

Defense of the Master project
Module 3

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

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

Coordinator: Prof. Olivier Bonny
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 measurement)
– **Clinical demonstrations** (dermatology, neuropsychology, bedside approach of a patient,...)
Module 3

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

- Specializations (Filières)
  - Immunology & Cancer
  - Metabolism
  - Neurosciences
  - Pharmacology & toxicology
Module 3: Four specializations (Filières, tracks...)

Immunology & Cancer

Sanjiv Luther

Pharmacology

Marie-Christine Broillet

Neuroscience

Jean-René Cardinaux

Metabolism

Christian Widmann

http://www.unil.ch/eb-mb/home.html
Filière
Immunology and Cancer

Infection
Autoimmunity
Cancer

Courses cover basic physiology, diseases and treatments

Sanjiv Luther, Department of Biochemistry

Master in Medical Biology
Immunology and Cancer (IC)

Dangers from outside

- Infections
  (viruses, fungi, bacteria, parasites)

- Allergies, asthma

Dangers from inside

- Autoimmunity
- Cancer

Subject: highly disease-relevant
Cause of death

Infections

Cancer

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

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

Biopole 3 (Epalinges), with two new buildings being completed by 2018 and 2020

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
Fueling the brain

Stress and metabolism

Diabetes

Obesity

Hypertension

Cancer cell metabolism

Exercise and performance

Christian Widmann, Department of Physiology
Research and teaching

**METABOLISM** at the crossroad of many scientific fields

- Glucose and nutrient sensing
- Brain energetics
- Lipoproteins and lipid metabolism (→ clinic)
- Cancer development
- Exercise and training
- Nutrition
- Non-coding RNAs and metabolism
- Circadian rhythms
- Omics tools for the study of metabolism
One location for learning -
A community of researchers
for teaching

LIMNA
Lausanne Integrative
Metabolism and Nutrition
Alliance

Department of Physiology
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

Courses, PBL, article presentations, seminars, visit

Program

What’s on my food?

4. Toxicology
   Pharmacotoxicology
   Food toxicology
   Ecotoxicology

Courses, e-learning, visits

Master in Medical Biology
Visit of an INDUSTRY research center
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
- Neuron-Glia Biology
- Neuronal Death and Repair
- Modulation of Synaptic Transmission
- Introduction to Psychiatric Neuroscience

For information: Andrea.Volterra@unil.ch, DNF Jean-Rene.Cardinaux@chuv.ch, CNP
The Lemanic Neuroscience Doctoral School (LNDS) organizes student training both in theoretical and experimental aspects of neuroscience. Research projects take place at affiliated laboratories in Geneva and Lausanne. About 130 PhD students receive their training through comprehensive coursework within the LN Program and by attending seminars, journal clubs and workshops. They are also encouraged, and often sponsored, to present their research at national and international neuroscience conferences. Facilitating interaction between students and senior researchers helps the students build a network for future collaboration and employment. Our graduates have successful careers in a variety of areas including academia, teaching, research foundations, industry and scientific editing.

LN students are welcome to play an active role in the workings of the program and other outreach events. Every year LN students get involved in organizing the LN Annual Meeting and the Brain Awareness Week. At FENS meeting in Geneva (July 12-16th 2009), they organized and hosted the successful Jump-the-FENS 08 evenings for their European and world-wide colleagues. Since 2006 many LN students have also supervised international PhD students and postdocs on lab projects at the FENS-IBRO Imaging Training Center.

**Lemanic strength...**

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.
## Organization of the studies: 3 semesters (90 ECTS)

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1</strong></td>
<td><strong>Module 3</strong></td>
<td><strong>Defense of the Master project</strong></td>
</tr>
<tr>
<td>Compulsory and optional courses (15 credits ECTS)</td>
<td>Filières / Commun course (15 credits ECTS)</td>
<td></td>
</tr>
<tr>
<td><strong>Exams</strong></td>
<td><strong>Exams</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Module 2</strong></td>
<td><strong>Module 4</strong></td>
<td></td>
</tr>
<tr>
<td>First step research project (15 credits ECTS)</td>
<td>Master Research Project: A personal project (45 credits ECTS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>May 2019 – Jan 2020</td>
<td></td>
</tr>
</tbody>
</table>
Semesters 2 and 3

Module 4

Master Project

- In many laboratories of the affiliated research departments of UNIL, the CHUV or in outside laboratories of the Master's degree (LAD, UNIGE, EPFL)
- Mobility
- Medical Biology Poster Day
Medical Biology Poster Day
Our ambition

- 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)
Job Openings

Academic Research
Pharma
Biomedical Industries
Biotechs
Lab Med
Hospitals (FAMH)
Tox Labs
Patent Offices
Regulatory affairs
Governmental Agencies
Scientific journals
Teaching
You want to know more?

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

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

Master of Medical Biology: Information session

Monday, March 26, 2018

Department of Biochemistry, Room B301
Chemin de Boveresses
155, 1066 Epalinges,
Metro station “Croisettes” (M2)