IMMUNOLOGY AND CANCER

Courses cover basic physiology, diseases and treatments

Director: Sanjiv Luther, Department of Biochemistry

Master in Medical Biology
Why study Immunology and Cancer at UNIL?
Immunology and Cancer (IC)

Dangers from outside

- Infections (viruses, bacteria, fungi, parasites)

Dangers from inside

- Autoimmunity
- Allergies, asthma
- Cancer

Subject: highly disease-relevant
Cause of death

Infections

Cause no. 1 in poorer countries

Cancer

Cause no. 1 in richer countries

Coronavirus pandemic: Major cause of death worldwide!

Subject: concerns everybody and all age ranges.
And: need for new vaccines and therapies!
Lausanne: lot of expertise in immunology and cancer

Biochemistry Department

Oncology Dep. / Ludwig Center

11 different CHUV Departments

EPFL

Other

HSeT

More than 35 group leaders give lectures and provide Master projects
CIIL: Center of Immunity and Infection Lausanne-Epalinges

Newly renovated UNIL research campus (since 2014).
One of Europe’s biggest centers dedicated to immunology and oncology research!

• Several institutions under one roof
• > 350 academic scientists
• > 50 academic research groups
• Basic and translational research
• International atmosphere, many students
• Many seminars and courses
• Modern animal facilities, technology platforms, restaurants etc.
Two new cancer research centers and more

2019: Agora Cancer Center
(CHUV - Bugnon)

2022/3: Ludwig Cancer Center
(Epalinges)

Space for 400 scientists and clinicians

In future: Ludwig Foundation will invest 100mio sFr. in Epalinges over the next 10 years
Immunotherapy of cancer

2018 Nobel Prize in Medicine Awarded to 2 Cancer Immunotherapy Researchers

Dec. 2013:

28.10.2017

L’oncologie personnalisée est en marche

Santé Les oncologues romands peuvent solliciter une nouvelle plate-forme d’expertise CHUV-HUG pour les cancers avancés et résistants.

2018: operational GMP facility for personalized immunotherapies in man for molecules and cells (plus one in 2020 on Epalinges site)
What is the course program?
Master in Immunology and Cancer

**1st semester**
- Fall semester: Review the basic knowledge and major concepts
- Christmas
  - Lectures
  - Evaluation
  - First step Project (8wk)

**2nd semester**
- Spring semester: Study path: IC
- Mid-may
  - Lectures
  - Practical work
  - Lectures
  - Practical work
  - Evaluation
  - Grant writing

**3rd semester**
- Fall semester: Study path: IC
- Early June
  - Master thesis project (7 months)
- Early Jan.
  - Evaluation

Review the basic knowledge and major concepts

To understand the diseases, means of prevention and therapies

PW: practical work
Eval.: Evaluation (exam)

To be able to study them by yourself
Website: Immunology and Cancer

Welcome to the Immunology and Cancer course

This website is designed for students attending the Immunology and Cancer course for the second semester of the Master (MSc) in Medical Biology.

The left hand pane lists all materials that are available for your use:

- Program: the detailed program of the course.
- Lecture handouts: the downloadable courses of the teachers (posted 24h before each course)
- Lecture prerequisites: This is content that you are required to read before the lecture starts. TI immunity to be held on Wednesday, March 26.
- Online teaching: eLearning activities including:
  - One article-based learning (ABL) in Proteomics & Cancer
  - One article-based learning (ABL) in Immunology
  - One case based-learning (CBL) in Immunology & Cancer
  - Two web-assisted histology practical sessions: one on Immunology and another one on Cancer
- Journal club: the list of articles to be presented by students individually.
- Practicals: the manuals for the TP of Proteomics and Immunology.
- Online resources: This additional material is intended to support the Immunology lectures with visualize how the immune system works. This material has been developed by the HSeT Foundation not been reviewed by the lecturers.
- Want to learn more: more web pages on immunology and statistics for those who want to deep

Only the teachers' lectures and the material provided for the online teaching constitute the material.

All the material offered in the portal will remain accessible during the entire training course of the student each year by sending an e-mail to Nathalie Debard.

Enjoy the website!

Tests of knowledge (Multiple choice)

Training site: ‘Basics in Immunology and Cancer’
Encyclopedia, animations

Documents: courses and practicals, annotated publications, exercises etc.

http://unil.bio-med.ch
(restricted access)
1st semester: Immunology and Cancer

**Immunology (12h):**
*Innate immunity* (Prof. W. Held)
*Adaptive immunity* (Prof. S. Luther)

**Biology of Cancer (12h):**
*Clinical aspects* (Prof. D. Speiser/Dr. N. Rufer)
*Molecular aspects* (Prof. F. Martinon)

Course: Overview of basic concepts as well as in depth lectures
Pre-master project: A wide and diverse choice of laboratories
2nd semester: Immunology and Cancer

In-depth lectures: From basic science to clinical cases and therapies

Courses by more than 30 specialists in:

- key aspects of immunology and cancer
- autoimmune diseases, infections, types of cancer
- prevention of disease (vaccines)
- development of drugs
- therapies of disease (cancer, autoimmunity/allergy)

8 weeks of courses in immunology/cancer
# 2nd semester: Immunology and Cancer

## Immunology

<table>
<thead>
<tr>
<th>Course</th>
<th>Instructor(s)</th>
<th>Topics</th>
<th>C</th>
<th>S</th>
<th>Total</th>
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<tbody>
<tr>
<td>Immunology II</td>
<td>S. Luther (SL)</td>
<td>Course introduction, Lymphoid organs</td>
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<td>M. Thome (MT)</td>
<td>Signaling in lymphocytes</td>
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<td>W. Held (WH)</td>
<td>NK-cells, Innate lymphoid cells</td>
<td>3h</td>
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<td>4h</td>
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<td>F. Tacchini (FTC)</td>
<td>Macrophages, neutrophils, T cell differentiation</td>
<td>5h</td>
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<td>6h</td>
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<td>P.-C. Ho (POCH)</td>
<td>Metabolism of T cells and macrophages</td>
<td>3h</td>
<td>1h</td>
<td>4h</td>
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<td>Immunology III</td>
<td>S. Luther (SL)</td>
<td>Mucosal immunity and microbiome</td>
<td>5h</td>
<td>1h</td>
<td>6h</td>
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<td>D. Velin (DV)</td>
<td>Acute and chronic viral infections</td>
<td>4h</td>
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<td>5h</td>
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<td>M. Perreau (MP)</td>
<td>Innate immunity and bacterial infection</td>
<td>4h</td>
<td>1h</td>
<td>5h</td>
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<td>P. Broz (PB)</td>
<td>Sepsis</td>
<td>2h</td>
<td>1h</td>
<td>3h</td>
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<td>T. Roger (TR)</td>
<td>Autoimmunity and neuroinflammation</td>
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<td>C. Pot (CP)</td>
<td>Mouse models, immune monitoring</td>
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**Total**: 41h

## Cancer

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<tbody>
<tr>
<td>Cancer II</td>
<td>P. Romero (PR)</td>
<td>Cancer: a summary</td>
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<td>D. Hanahan (DH)</td>
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<td>E. Missiaglia (EM)</td>
<td>Epigenetics of cancer</td>
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<td>Cancer III</td>
<td>P. Romero (PR)</td>
<td>Tumor vessels and microenvironment</td>
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<td>1h</td>
<td>6h</td>
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<td>T. Petrova (TP)</td>
<td>Tumor invasion and metastasis, glioma</td>
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<td>1h</td>
<td>6h</td>
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<td>J. Joyce (JJ)</td>
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**Total**: 20h

## Treatments

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<td>Treatments</td>
<td>P. Romero (PR)</td>
<td>Antitumor immunity</td>
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<td>1h</td>
<td>5h</td>
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<td>M.-C. Vozenin (MV)</td>
<td>Radio- and Chemotherapy</td>
<td>2h</td>
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<td>L. Kandalaf (LK)</td>
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<td>I. Knezevic (IK)</td>
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<td>D. Nardelli (DN)</td>
<td>HPV cancers and vaccines</td>
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<td>4h</td>
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<td>D. Golshayan (DGa)</td>
<td>Immunology of organ transplantsations</td>
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<td>1h</td>
<td>3h</td>
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<td>D. Comte (DC)</td>
<td>Allergies and treatments</td>
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**Total**: 22h

Learn from the specialists (biologists and medical doctors)
2nd semester: Immunology and Cancer

Practical work: T lymphocyte responses, cancer
molecules → cells → organs → organisms

- Bioinformatics
- Proteome analysis, big data analysis
- 3D modelling

- In vitro cellular assays
- 5 color flow cytometry
- Histology

Interactive teaching, group work, at the bench / computer, e-learning
2nd and 3rd semester: Immunology and Cancer

Mid-may

Grant writing + defense

Master Thesis Project

8½ months (100%)

Learn the work at the bench and within a team. Discover the fascinating world of « research ». 
Research groups participating in this master

http://www.unil.ch/ib
http://www.chuv.ch/chuv_home/recherche
http://www.unil.ch/licr
https://www.unil.ch/dof/home.html
We look for:
Highly motivated students
with strong interests in the two main subjects

We offer:
In depth teaching using modern tools,
top labs to do research in,
training of research and presentation skills,
...all you need to get an interesting job!
International PhD program in ‘Immunology and Cancer’

40 research laboratories
A wide choice of theoretical and practical courses
http://www.unil.ch/cancer-immunology
Career prospects

**Academic career:**
- Basic research,
- Translational research,
- Clinical research,
  - in immunology,
  - infectious diseases,
  - vaccinology,
  - cancer

Teaching of
- biological sciences,
- biomedical sciences

**Non-academic field:**
- Research in the industry,
- Science Management
- Granting agencies,
- Scientific journals,
- Regulation agencies,
- Patents,
- Clinical trials,
- Investment banking
Epalinges campus: a vibrant biotech hub

Le Biopôle en pleine croissance
Immunology and Cancer: need more information?

CIIL, Department of Biochemistry, PhD program:
www.unil.ch/ib
http://www.unil.ch/fbm
www.unil.ch/cancer-immunology

School of Biology: Master in medical biology
www.unil.ch/ecoledebiologie

Master in immunology and cancer:
unil.bio-med.ch (restricted access)

Fanny.Dubois@unil.ch (secretary)
Sanjiv.Luther@unil.ch

Come and join us in the Immunology and cancer branch!