

HISTO-PATHOLOGY (MBM1)

2 ECTS

Dates: from September 17 to October 19, 2019

Contact: Dre Marie-Luce BOCHATON-PIALLAT Dpt of Pathology and Immunology

Prof. M. Foti Dpt of Cellular Physiology and Metabolism; Dre P. Soulié Dpt of Cellular Physiology and Metabolism; Dre J. Perrin-Simonnot Dpt of Cellular Physiology and Metabolism; Dre. S. Clément Dpt of Clinical Pathology; Dr J-C Tille Dpt of Clinical Pathology.

NB: this module is not opened to MD-PhD students. PhD students are required to attend all sessions.
Number of students : 12 max

- **INTRODUCTION (1 session)**
Thursday September 17 from 10:00 to 12:00
- **HISTOLOGY (2 sessions)**
Friday September 20 from 9:00 to 13:00 and Wednesday September 25 from 13:00 to 17:00
Study of primary tissues (epithelium, connective tissue, muscles, vessels, nervous tissue, lymphoid tissue) and some typical organs.
- **HISTOPATHOLOGY (2 sessions)**
Tuesday October 1 and Monday October 7 from 9:00 to 13:00
Study of the main concepts of general pathology (cell death: necrosis and apoptosis, inflammation, tissue repair, tumor) and some representative organs with typical pathological alterations.
- **HISTO-PATHOLOGY AND RESEARCH (2 sessions)**
Thursday October 3 from 13:00 to 17:00 and Wednesday October 9 from 9:00 to 13:00
Study of different microscopic approaches (optical, immuno-fluorescence, confocal and electron microscopy) and their applications in research (immunogold, immunohisto/cytochemistry, live imaging).
- **ORAL EXAM**
During the week of October 14-19 (Time to select)
Description of slides at the microscope & discussion on research application



The ELN & Data Management module for the new PhD students (MBM2)

1.5 ECTS



Dates: The dates will be announced later but probably during october november course of 4 days. The tentative framework for the module is as follows:

Day 1 and/or 2

- Lectures and introductory sessions highlighting the importance of data management, scientific integrity, etc.
- Overview on different available ELN and data management interfaces, focusing on RSpace and SLIMS.

Day 2/3 and 4

- 2-3 hours/day hands-on sessions with the students utilising RSpace interface (option to utilise SLIMS will be considered as well according to feasibility)

Module in metabolism 2019 (MBM3)

2 ECTS



Session

1. Tuesday 08.10 – 9-12am	Mirko Trajkovski + lab
2. Tuesday 08.10 – 2-5pm	Mirko Trajkovski + lab
3. Tuesday 15.10 – 9-12am	Pierre Maechler and Thierry Brun
4. Friday 18.10 – 2-4pm	Michelangelo Foti
5a. Tuesday 22.10 – 10-12 am	Valerie Schwitzgebel Luscher
5b. Tuesday 22.10 – 1-2.30pm	Overview on the metabolic facilities
6. Wednesday 23.10 – 3-5pm	Roberto Coppari
Discussion/Exam: Wednesday 30.10 – 1-5pm	Mirko Trajkovski and Pierre Maechler

Organizers: Mirko Trajkovski and Pierre Maechler

The module will have six sessions and will include lectures given by the PIs; practical (hands on) work by the students; overview on the most important literature in this area; and overview on the clinical aspects in diagnosis and treatment of several metabolic diseases. The main goal is to familiarise the students with the basic principles governing the regulation of the energy homeostasis and metabolism in health and disease, and will be accomplished by addressing the following specific subjects:

- Human and mouse anatomy in context of metabolism; emphasis on the main metabolic organs;
- Importance of gut microbiota in regulation of energy homeostasis;
- Fat metabolism – different shades of fat, characteristics and importance;
- Function of the pancreas with emphasis on the insulin secretion;
- Importance of liver and muscle in the overall glucose homeostasis;
- Importance of the brain in regulating the energy homeostasis;
- Clinical overview on the metabolic diseases

Scientific writing in the context of cancer biology (MBM4) 1.5 ECTS



Dates: 8.11, 15.11, 22.11, 29.11, 6.12 (Exam), 13.12 (feedback session) from 2-6pm.

Organizers: Patrick Meraldi and Intidhar Labidi-Galy

The course will be limited to 8 students.

In the first half of the course the students will study the structure and different styles of cancer biology papers; from fundamental research to clinical trials covering the subjects of targeted therapy and immuno-therapy

In the second half we will perform scientific writing exercises based on cancer biology pap

Communicating your science: how to make the message stick! (MBM5)

1.5 ECTS



Dates: October 29th and November 5th, 9.00 am to 5.30 pm (1 hour lunch break).

Participation is limited to 8 people

Organizers: Monica Gotta and Doron Merkler

Goals of the course:

- Communicate persuasively your work in an oral presentation.
- Create slides that respect fundamental design and principles and present data appropriately.
- Experiment strategies to continue improving your presentation skills.
- Write a title and a concise abstract that tells your scientific story.
- The participants will bring a 5 minute presentation of their research project to the first day of the course.



IMMUNITY (MBM6)

1.5 ECTS



Thursday November 14, 2019 at 2 - 5.30 pm

- Paul WALKER : Cancer and the Immune System: From immunosurveillance to immunotherapy.

Monday November 18, 2019 at 2 - 5.30 pm

- Jörg SEEBACH : NK cell biology, transplantation immunology, immune deficiency, inflammation, immunosuppression/biologicals

Thursday November 28, 2019 at 2 – 5.30 pm

- Stéphanie HUGUES : Antigen presentation, autoimmune diseases, peripheral tolerance.

Thursday December 5, 2019 at 2 – 5.30 pm

- Christoph SCHEIERMANN: The circadian immune system - a new paradigm

Tuesday December 10, 2019 at 2 - 5.30 pm

- Examination

The course will take place with a minimum of 6 and a maximum of 15 participants. Exact times are subject to confirmation. The aim of the course will be to present selected areas of basic and applied immunology over 4 themed sessions. The interdependence of innate and adaptive immune interactions will be stressed, and a selection of protective and pathologic immune processes will be discussed. Students are expected to attend all sessions and to actively participate. Assessment will be made both during the courses (some reading will be required beforehand) and in a final exam.

PROJECT DEVELOPMENT in GENE EXPRESSION REGULATION (MBM7) 1,5 ECTS



- The introductory meeting will be held on Friday 13 December 2019 from 14h30 to 16h.
- The sessions will take place on Fridays 17, 24, 31 January and 7 February 2020 from 14h30-18h,
- Monitors: Prof. Martine Collart (Department of Microbiology and Molecular Medicine, Prof. Emmanouil Dermitzakis & Prof. Rabih Murr (Department of Genetic Medicine and Development). Prof Guillaume Andrey.
- ATTENDANCE AT ALL SESSIONS IS MANDATORY
- The course will only take place with a minimum of 5 participants and a maximum of 15
- The module comprises four 3,5 hour sessions, including a break. The "philosophy" of the course will be briefly presented at an introductory meeting.
- Before each session: A research problem related to gene expression regulation is proposed to the students, at least one week before each session. The problem is divided into several objectives and each group of students will be assigned to address one objective. To help the students in this process, a few articles will be suggested for reading.
- During the session: Each group will be given 20 minutes to present their part of the proposal (in English), which should include: 1) a clear mention of the steps needed to reach the objective, 2) the experimental approach(es) used and the reasons behind choosing these approaches, and 3) expected results. The presentations will be interactively discussed in a critical and detailed manner.
- This module aims at helping the students in developing the ability to design and interpret research projects addressing important questions in the field of gene expression regulation. The process will provide the students with a general knowledge of the mechanisms underlying the extraordinary diversity in gene expression. However, the module is not meant to be exhaustive but rather focuses on a few key questions in the field.

Medical Genetic (MBM9)

1.5 ECTS



From 14pm to 4pm room E09.2753.A

Prof. E. Zdobnov (Département de Médecine Génétique et Développement)

- Monday 2 march 2020: Introduction **by Prof. E. Zdobnov**
- Thursday 5 march 2019 : Genetic Variation **by Prof. E. Dermitzakis**
- Monday 9 march 2019 : Mendelian Disorders **by Prof. S.E. Antonarakis**
- Thursday 12 march 2019 : Cytogenetics **by Dre F. Bena**
- Monday 16 march 2019 : Technology **by Dre E. Kriventseva**
- Thursday 19 march 2019 :Complex Disorders /Traits **by Prof. E. Dermitzakis**
- Monday 23 march 2019 : Comparative Genomics by Prof. E. Zdobnov
- Thursday 26 march 2019 : Epigenetics **by Prof. R. Murr**
- Monday 30 march 2019 : Exam **by Prof. E. Zdobnov**

CELL INTERACTION (MBM10)

1.5 ECTS



Dates: Friday, March 20th, Wednesday, March 25rd, Friday, March 27th, Wednesday, April 1st, Friday, April 3rd, Wednesday, April 8th from 14pm to 16pm CMU/Room 5000

ORAL EXAM : 21st-22nd of April 2020

The number of participants is limited to 8 students

- « *Adhesion, Integrins and Signaling* », Dr. B. Wehrle-Haller
- « *the actin cytoskeleton in cell-adhesion* », Dr. B. Wehrle-Haller
- « *to be announced* »
- « *Direct Communication : Gap Junctions* », Prof. Filippo Molica
- « *Using informatics tool to study 3D structures* », Dr. B. Wehrle-Haller
- « *Bacterial Interactions* », Prof. W. Kelley

The course aims to introduce students to the biology of cell interaction, from pathogen-host to cell-cell communication, and from molecular and genetic factors to tissue function and disease. The course involves attending 6 sessions held in a three –week period, guided by experts in their respective fields.

Each session lasts no more than 2 hours and is focused on discussing current knowledge and techniques used in studying cell interactions, using as reference pre-assigned research articles relevant to the chosen topics (see below). It is essential for students to read the material before class and to actively engage in the discussions. Student evaluation is achieved through a 30 minutes oral examination and the format will be explained during the first session.

Statistics course (MBM11)

1,5 ECTS



Sessions (from 2:15 to 5:00 pm, weekday: Thursday):

- Descriptive statistics and introduction to GraphPad (27.02.2020)
- Statistical inference and confidence intervals (05.03.2020)
- Basic principles of statistical hypothesis testing (12.03.2020)
- Common statistical tests (26.03.2020)
- Statistical power and sample size (02.04.2020)
- Correlation and principle of linear regression models (23.04.2020)
- Reporting statistical analyses / **Exam** (07.05.2020)

PD Christophe COMBESCURE, Service d'épidémiologie clinique, Direction médicale et qualité, HUG

Contact : Christophe COMBESCURE

Number of course participants: minimum 6, maximum 14.

The aim of this course is to provide to the students a basic knowledge of statistical inference, methods to describe data, to test hypotheses and to characterize associations between two variables. In addition to the theory, students will put into practice statistical methods with a statistical software and will conduct a critical appraisal of the statistical methodology in a selection of published articles.

Bioimaging Course 2020: Light microscopy course and advanced fluorescence imaging techniques for life sciences (MBM12) 1.5 ECTs



- **Dates: Thursday 23 April and Friday 24 April**
- F. Prodon, O. Brun, N. Liaudet. Maximum students 8, minimum 4.
- This course will provide underlying principles and advanced concepts in light microscopy. The focus will be on state-of-the-art techniques in light microscopy based on fluorescence approaches. An essential part will be spent on the demonstration/explanation how challenging questions in the field of Life Sciences and Biology can be addressed by using light microscopy. A global overview will be made on the main techniques used and it will also include advanced concepts as multi-dimensional imaging (x, y, z, t and more ?), F-techniques (Fluorescence Recovery After Photobleaching/FRAP, Fluorescence Resonance Energy Transfer/ FRET) and super resolution techniques (such as structured illumination, STED and localization techniques). The aim is to understand the basics in fluorescence microscopy by a practical work with the help of the equipment available at the Bioimaging Core Facility, Faculty of Medicine. Emphasis will be placed on the methods to study colocalization between two molecules labelled in fluorescence.
- The course is open to PhD students with a restricted knowledge in photon microscopy (**8 maximum. Level: Novice**). This course will take place in 2 sessions of 1 day each (total duration of this module: **2 days**). Hand-on sessions will be organized in order to recess the theoretically taught content.
- Basic optical principles
- Light microscopy, fluorescence microscopy
- confocal microscopy
- Molecular interactions : Fluorescence Resonance Energy Transfer (FRET)
- Photobleaching, photoactivation techniques, Fluorescence Recovery after Photobleaching (FRAP)
- Total Internal Reflection Fluorescence microscopy (TIRF)
- Super-resolution microscopy: Structured Illumination microscopy (SIM), Localization techniques (PALM, STORM), Stimulated Emission depletion (STED) microscopy
- Data analysis: basics in image treatment
- Colocalization in Cell Biology
- Image manipulation and digital image ethics

VIROLOGY (MBM13)

1.5 ECTS



The course will be held on:

- Monday May 4 2020 : Introduction virology–introduction viral cycle.
- Monday May 11 2020: Viral cycle (presentation 3 publications) – Introduction quasi-species
- Monday May 18 2020: Quasi-species (presentation 3 publications)– Introduction innate immunity
- Monday May 25 2020 : Innate immunity (presentation 3 publications)
- Tuesday JUNE 2 2020 :EXAM
- Location : will be specified later

Pr. D. Garcin, Dépt de Microbiologie et Médecine Moléculaire

- Virus cycle (entry, replication, budding...)
- RNA viruses : genetic variability, quasi-species, adaptation and evolution..
- Anti-viral innate immunity, detection, interferon system and viral counter measures.
- An introductory course in each topic, articles to read and present, discussions, critical analysis (sort of «battle» over the article 😊).
- 4 sessions of 3 to 4 hours plus one session for the exam.

Developmental Biology (MBM14)

1.5 ECTS



Every Wednesday of May (27.05.20) & June (03/10/17.06.2020); room E09.2753.a, from 2pm to 5pm. (4 sessions) EXAM DATE TO BE CONFIRMED

Prof. P. Herrera, Dr. F. Thorel (dépt. de médecine génétique & développement CMU).

M.O. Fazio, Service de Transgénése (cours pratique sur la production de souris transgéniques).

- The course will only take place with a minimum of 4 and a maximum of 12 students.
- Attendance at all sessions is mandatory
- Transgenics and mouse molecular genetics
- Sex determination
- Regenerative medicine : ES and IPS cells; cell reprogramming
- Pancreas development and regeneration

Module/Workshop glycobiology (MBM15)

2 ECTS



- Nov 20-22
- Day 1: Structural glycobiology
- Lectures (9:30am – 1pm)
- 50mn lecture + 10mn questions with 30mn break
- Serge Perez: “Carbohydrate chemistry and 3D modelling”
- SRB: “Structural biochemistry of the extracellular matrix and cell surface glycosaminoglycans”
- FRL: “MS-based high throughput glycan data generation”
- Practical (2pm- 5pm)
- Glycan representation and structure drawing
- MS-based identification of glycan structures

- Day 2: Functional glycobiology
- Lectures (9:30am – 1pm)
- 50mn lecture + 10mn questions with 30mn break

Module/Workshop glycobiology (MBM15)

2 ECTS



- Anne Imberty: “Carbohydrate-binding proteins and bioengineering”
- Thierry Hennet: “Glycan array technology and clinical applications”
- SRB: “Structure and functions of bioactive fragments of glycosaminoglycans: size matters”
- Practical:
- Array data analysis and interpretation
- Surface Plasmon Resonance (SPR) and Bio-Layer Interferometry (BLI) data analysis and interpretation
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- Day 3: Glycoinformatics
- Lectures (9:30am – 1pm)
- 50mn lecture + 10mn questions with 30mn break
- FRL: “Common glyco-databases and analysis software”
- Serge Perez: “Software for studying glycans in 3D”
- François Bonnardel: “Software for studying interactions with glycans”
- Practical:
- Database searches
- Virtual reality of glycans