CH-412

Frontiers in chemical biology

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Cursus	Sem.	Type
Biotechnology minor	E	Opt.
Chemistry and Chemical Engineering		Obl.
Chimiste	MA2, MA4	Opt.
Life Sciences Engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
Hours	**2 weekly**
Lecture	2 weekly
Number of positions	

Summary

Chemical biology is a key discipline in biomedical research for drug discovery, synthetic biology and protein functional annotation. We will give a broad perspective of the field ranging from seminal classical experiments to state-of-the-art approaches to dissect and perturb biological systems.

Content

- Chemical & genetic screening
- DNA-encoded libraries
- Retooling the genetic code
- Chemical genetics methods
- Chemical genomics methods
- RNA-based probes
- Synthetic biology methods
- Site-specific protein tagging
- Transcriptional reporters
- Optochemical genetics
- Induced protein degradation
- Target ID and interactome profiling
- Activity-based probes
- Enzyme inhibitors: design and analysis

Keywords

Chemical biology, drug discovery, high-throughput screening, imaging, protein biochemistry, protein biophysics, post-translational modifications, biotechnology.

Learning Prerequisites

Required courses

Students in this masters course are expected to have had previous bachelors courses in organic chemistry as well as biochemistry/chemical biology/biological chemistry. Basic genetics and cell biology background will also be helpful but are not necessary to do well in this course.

Recommended courses

The following master's courses offered in EPFL are recommended:
Cellular signaling (in Spring 2020, by Prof. Ruud Hovius)
Chemical biology of cell imaging (in Fall 2019, by Prof. Rivera-Fuentes)

Important concepts to start the course

Students will benefit by refreshing basic organic chemistry and biological chemistry concepts and principles prior to the start of the course. Students are welcome to contact either of the two lecturers should they desire background reading/refreshing in advance of the course or specific topics.

Learning Outcomes

By the end of the course, the student must be able to:

- Interpret key experimental strategies to address scientific problems with chemical biology techniques
- Assess / Evaluate chemical biology literature
- Design valid chemical biology experiments to answer biological questions

Transversal skills

- Demonstrate the capacity for critical thinking
- Access and evaluate appropriate sources of information.

Teaching methods

- Lectures
- Presentation and discussion of scientific literature

Expected student activities

- Attendance to classes
- Discussion of scientific literature
- Class participation

Assessment methods

- Final written exam

Supervision

Office hours	Yes
Assistants	No
Forum	Yes

Resources

Bibliography

Given the rapid development of this field, there is no single book that covers all the subjects for this course. Original research articles and reviews on the topic covered during the course will be discussed.

Notes/Handbook

Handouts and slides on the course website posted in advance of each lecture.