CH-313

Chemical biology

Aye Yimon

Cursus	Sem.	Type
Chimie	BA5	Obl.
HES - CGC	H	Opt.

Language	English
Credits	2
Session	Winter
Semester	Fall
Exam	Written
Workload	60h
Weeks	14
Hours	**2 weekly**
Lecture	2 weekly
Number of positions	

Summary

Closely interfacing with bioengineering and medicine, this course provides foundational concepts in applying small-molecule chemical toolsets to probe the functions of living systems at the mechanistic and molecular level with emphasis placed on quantitative understanding and improving human health.

Content

This class discusses the organic chemistry underpinning the regulation of biology and disease. The main focus is on the innovation and applications of chemical-biology tools.
Part I of the course (first half of the semester) discusses chemical toolsets for:
(1) modulating enzyme activity and protein function;
(2) probing nucleic acid biology; and
(3) proteome-level signaling and post-translational modifications.
Part II (second half of the semester) further discusses metabolic regulation with the focus centered on how small-molecule metabolites serve as critical cues to regulate cell signaling networks and vice versa.

Keywords

Chemical biology tools; biological pathways and signaling mechanisms; metabolic regulation

Learning Prerequisites

Required courses

Students in this 3rd-year bachelors course are expected to have taken in their preceding years introductory organic chemistry courses, and in their 2nd-year, CH-210: Biochemistry (by Prof. Christian Heinis). Introductory bioengineering, genetics and cell biology course in place of the Biochemistry course above is also a suitable option.

Recommended courses

The following parallel course offered in EPFL is recommended:
Macromolecular structure and interactions (in Fall 2019, by Prof. Beat Fierz)

Important concepts to start the course

Students will benefit by refreshing introductory organic chemistry and biochemistry principles prior to the start of the course. Students are welcome to contact the lecturer should they desire background reading in advance of the course.

Teaching methods

Lecture notes and discussion along with power-point presentations as lecture aids

Expected student activities

Students are expected to take detailed notes and work on problems discussed in the class and additional exercises distributed outside the class.

Assessment methods

- Final written exam (90%) and exercises (10%)

Supervision

Office hours	Yes
Assistants	No
Forum	Yes
Others	Students are welcomed to contact the lecturer via email to fix appointments

Resources

Bibliography

Given the relatively short history and interfacial nature of chemical biology as a field, there is no single textbook that covers all the subjects for this course. Lecture notes, slides, and discussion are the most useful sets of resources for the students to do well in this course.
Handouts and slides on the course website posted in advance of each lecture.
Recommended text books:
For Part I of the course:
“Introduction to Bioorganic Chemistry & Chemical Biology” by David van Vranken & Gregory Weiss; Garland Science.
“Cell signaling: principles & mechanisms” by Wendell Lim, Bruce Mayer, Tony Pawson; Garland Science.
For Part II of the course:
"Biochemistry" by Berg & Stryer. W.H. Freeman & Company (not mandatory).

Ressources en bibliothèque

- Introduction to bioorganic chemistry and chemical biology / Vranken
- Cell signaling : principles and mechanisms / Lim
- Biochemistry / Berg