

BIO-213

Biological chemistry II

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Cursus	Sem.	Type
Life Sciences Engineering	BA4	Obl.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

Biochemistry is a key discipline in the Life Sciences. Biological Chemistry I and II are two tightly interconnected courses that aims to understand in molecular terms the processes that make life possible.

Content

In Biological Chemistry II we will focus on cell metabolism to understand how the molecules that constitute living beings are produced, modified and used for energetic purposes. A specific emphasis will be put on the understanding of organizing principles in metabolism and on the regulatory circuits living beings have evolved to control their metabolic outputs.

- **Bioenergetics and cell metabolism (I)**

[Glycolysis-TCA cycle-PPP-oxidative phosphorylation-B oxidation-AA oxydation]

- **Bioenergetics and cell metabolism (II)**

[Energy storage TAG synthesis and gluconeogenesis]

- **Bioenergetics and cell metabolism (III)**

[Energy and nutrient sensing cell growth/ autophagy]

- **Bioenergetics and cell metabolism (IV)**

[Cellular metabolic specialization, liver muscle and adipose tissue metabolism]

- **Enzymology (I)**

[Enzymes regulation by PTMs]

- **Enzymology (II)**

[Methods to study enzymatic regulation/ proteomics]

- **Enzymology (III)**

[Engineering enzymes]

- **Building a Cell (I)**

[Carbohydrate biosynthesis, AA, and NA biosynthesis]

- **Building a Cell (II)**

[Lipid biosynthesis]

- **Building a Cell (III)**

[Compartmentalization]

- **Metabolic circuits (I)**

[Feedback mechanisms and metabolic network motifs]

- **Metabolic circuits (II)**

[Metabolic Teleonomy and Metabolic Biases]

Keywords

Energy Metabolism, Enzymology, Biosynthetic Pathways, Metabolic Circuits

Learning Prerequisites

Required courses

Biological Chemistry I

Recommended courses

General Biology, Organic chemistry

Important concepts to start the course

- Basic understanding of chemical composition of biological matter
- Basic understanding of cell organization
- Basic understanding of protein structure and function
- Basic reaction mechanisms in organic chemistry

Learning Outcomes

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

- Recognize biochemical pathways
- Integrate cell compartmentalisation and metabolism
- Interpret the topology of metabolic circuits

Transversal skills

- Assess one's own level of skill acquisition, and plan their on-going learning goals.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Demonstrate the capacity for critical thinking
- Access and evaluate appropriate sources of information.

Teaching methods

- Lectures
- Exercise session accompanying each lecture

- Exercise session on bioinformatics and protein structure visualization tools

Expected student activities

- Attendance to classes
- Attendance to exercises
- Class participation

Assessment methods

- Written exam

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

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Ressources en bibliothèque

- [The Molecules of Life: Physical and Chemical Principles / Kuriyan](#)

Moodle Link

- <https://go.epfl.ch/BIO-213>