

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
<b>Hours</b>	<b>4 weekly</b>
Lecture	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**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>