BIO-213

Biological chemistry II

Barth Patrick

Cursus	Sem.	Type
Life Sciences Engineering	BA4	Obl.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 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

We need to understand biological macromolecules at the atomic level, as well as their energetic properties and interplay between them. With these insights, we will dissect basic macromolecular structure and how it translates into biological function. Among the major types of biological macromolecules, including nucleic acids, proteins, lipids and glycans, we will put a main emphasis on proteins - the workhorses of cells.

- Signal transduction (Hormones, heterotrimeric G-proteins)
- Signal transduction (RTKs, phosphoinositide signaling)
- Antibody methods and Synthetic Biology
- Bioinformatics practical (major databases)
- Posttranslational modifications (PTMs) Ia: Phosphorylation (Mechanisms)
- PTMs Ib: Phosphorylation (Kinase/Phosphatase structure and regulation)
- Fatty acids and lipids
- PTMs II: Ubiquitination
- DNA structure/Gene regulation
- PTM III: Histone modifications
- Proteomics and protein interaction networks
- Protein-protein interaction domains
- Deregulated signaling networks in cancer
- Drug discovery and chemical biology

Keywords

Proteins, lipids, carbohydrates, nucleic acids, structural biology, biochemistry, metabolism, enzymes, experimental methods, protein folding, biophysics,

Learning Prerequisites

Required courses

Biological Chemistry I

Recommended courses
Biology I + II, Organic Chemistry I + II

Important concepts to start the course
- Basic understanding of chemical composition of biological matter
- Basic thermodynamics
- Basic reaction mechanisms in organic chemistry

Learning Outcomes
By the end of the course, the student must be able to:
- Identify structures of biological macromolecules
- Investigate structural composition of proteins
- Integrate knowledge on divers post-translational modifications of proteins
- Choose appropriate method to analyse the chemical composition, structure and modifications of proteins
- Design experimental workflows for biochemical analysis

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

- Kuriyan/Konforti/Wemmer: The Molecules of Life: Physical and Chemical Principles

Ressources en bibliothèque

- The Molecules of Life: Physical and Chemical Principles / Kuriyan