

## Metabolism of Biomolecules

Code: 101915

ECTS Credits: 6

Degree	Type	Year	Semester
2501230 Biomedical Sciences	FB	1	2

### Contact

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### Use of languages

Principal working language: catalan (cat)

Some groups entirely in English: No

Some groups entirely in Catalan: No

Some groups entirely in Spanish: No

### Other comments on languages

Students will be asked to volunteer to an English group of "Seminaris d'autoaprenentatge Tutoritzat"

### Teachers

José Miguel Lizcano de Vega

Carles Gil Giró

Francisco Blanco Vaca

Jose Ramon Bayascas Ramirez

### Prerequisites

Although there are no official prerequisites, it is highly recommended to have passed Structure and function of Biomolecules and Organic Chemistry.

It is convenient to review the following subjects of the baccalaureate program:

- Chemical reactions of oxidation-reduction and nucleophilic substitutions
- Cell metabolism: Glicolysis, Krebs cycle and ATP synthesis

### Objectives and Contextualisation

In the context of Basic Biochemistry, the Metabolism of Biomolecules subject focuses on knowledge of sources, forms of storage and use of energy and nutrients for human body cells. The catabolic and anabolic pathways of carbohydrates, lipids, amino acids and nucleotides, and their hormonal regulation, are studied. Emphasis is placed on the mechanisms of metabolic regulation, differentiating states of good nutrition and fasting, and on the discussion of biochemical changes present in common metabolic pathologies.

The aim is for the student to achieve a global understanding of human metabolism that integrates their main mechanisms, functions and regulation. This understanding will be used as a basis to be able to deepen in specific subjects during the rest of the degree studies with the help of textbooks, in particular in subjects such

as Molecular Biology of the Cell, Systems Physiology, Pharmacology, Clinical Biochemistry and Biological Bases of Pathology. Critical reading of the bibliography and tutored discussions should be used to describe molecular processes that cause pathologies using a correct biochemical terminology.

## **Content**

Topic 1. Introduction to metabolism.

Bioenergetics. Molecular mechanisms of intercellular communication. Interaction between hormones and receptors. Main intracellular signaling pathways. Control of energy metabolism.

Topic 2. Common phase of oxidative metabolism.

Mitochondrial energy metabolism. Cycle of tricarboxylic acids. Electron transfers. ATP synthesis. Free radicals

Topic 3. Structure and metabolism of carbohydrates.

Characteristics, origin and function of carbohydrates. Digestion and absorption of carbohydrates. Glycolysis. Gluconeogenesis. Glycogen metabolism. Pentose phosphate pathway. Common alterations in the regulation of carbohydrate metabolism.

Topic 4. Structure and metabolism of lipids.

Energy reserve. Obtaining energy from fatty acids. Synthesis of fatty acids and triacylglycerides. Metabolism of lipids with structural function. Cholesterol metabolism. Transport of lipids in blood by lipoproteins. Common alterations in the regulation of lipid metabolism.

Topic 5. Metabolism of nitrogen compounds.

Metabolism of amino acids. Urea cycle. Metabolism of nucleotides. Derivatives of amino acids and nucleotides.

Topic 6. Integration and control of metabolism.

Metabolic particularities of some tissues. Interrelationships between tissues during the feed-fast cycle and in various nutritional or hormonal states. Physical exercise. Obesity. Diabetes