

UNIVERSIDAD PABLO DE OLAVIDE
Centro de Estudios para Extranjeros

BIO 361: BIOCHEMISTRY

This course is taught in English.

3 semester credits (45 contact hours)

Professor: Carlos Santos Ocaña

Location: CABD Room 133

AIMS: The aim of the course is introduce the students to the principal topics of cell metabolism taking into account the relationship between these processes and the physiology, medicine, health and ecology, in order to show that all questions are linked in one: life.

EVALUATION: There will be one exam during the term. Lessons include discussion sections and students must take part in them. Active participation will be monitored throughout the term and counts as 40%. The exams will count as 30% of the final grade. The laboratory work is an introduction to main questions in biochemistry and cell biology research. It will count as 30% of the final grade.

PROGRAM:

Lectures (30 h).

A. Biomolecules

1. Interaction between molecules
2. Lipids
3. Carbohydrates
4. Nucleic acids
5. Amino acids
6. Proteins

B. Bioenergetic and enzymology

1. The energy and the living cells
 - 1.1. Relationship life and energy
 - 1.2. The thermodynamics laws
 - 1.3. Free energy and entropy
 - 1.4. Energy capture
 - 1.5. Energy storing
2. The enzymes
 - 2.1. Characteristics of enzymes
 - 2.1. Parameters of enzymatic kinetic
 - 2.2. Biochemical reactions and equilibrium
 - 2.3. Enzymatic inhibition

C. Metabolism

1. Energetic coupling of reactions
2. Regulation by enzymatic activity modulation

- 2.1. Covalent modification
- 2.2. Non-covalent modification
- 2.3. Allosteric
3. Regulation models
 - 3.1. The pyruvate dehydrogenase
 - 3.2. The fructose 2,6 bisphosphate
4. Metabolic pathways
 - 4.1. Linear
 - 4.2. Branched
 - 4.3. Kinds of regulation
5. Models of coupling of metabolic regulation and cell signaling
 - 5.1. Insulin-Epinephrine (Glycogen)
 - 5.2. Glucagon-Epinephrine (triglycerides)
6. Overview of biochemical pathways

Laboratory work

1. Work with buffers:
 - Preparation of buffers
 - How works a buffer
 - Effect of pH on enzymatic reactions
2. Lipid separation by TLC
3. Starch digestion: disaccharide analysis by chemical methods
4. PCR, quantification and digestion of DNA
5. Enzymology: K_m and V_{max}

Bibliography

Core Book

Color Atlas of Biochemistry 2nd ed. Jan Koolman and Klaus-Heinrich Roehm. Publisher: Thieme Stuttgart Pub. Date: May 2005

Lehninger Principles of Biochemistry 3rd ed. David L. Nelson, Michael M. Cox and Albert L. Lehninger, Publisher: Worth Publishers, Incorporated Pub. Date: May 2000

Biochemistry 3rd ed Donald Voet and Judith G. Voet. Publisher: Wiley, John & Sons, Incorporated Pub. Date: January 2001.

Biochemistry 4th ed. Lubert Stryer. Publisher: W. H. Freeman Company Pub. Date: August 1999

Biochemistry 2nd ed. Philip W. Kuchel and Gregory B. Ralston. Schaum's Outlines series Publisher: McGraw-Hill Pub. Date: 1998