



SCIENZE BIOMEDICHE

6 CFU - 1° Semester

Teaching Staff

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LEARNING OBJECTIVES

▪ Chemistry and Biochemistry

The course includes the presentation of the general concepts of chemistry and biochemistry underlying mechanisms of cellular metabolism. The student, at the end of the course, it requires a full understanding of the subject, and the 'acquisition of significant capacity for autonomous conceptual elaboration.

▪ Applied Biology

The course aims to give students competences in research and analysis laboratory, in direct collaboration with the qualified personnel, both in public and private facilities. At the end of the course students must demonstrate good processing ability of the results obtained by an adequate preparation of the basic disciplines, such as to enable a better understanding of the elements which are the basis of normal and pathological processes.

COURSE STRUCTURE

▪ Applied Biology

The general characteristics of living matter. Chemical composition of living matter. Cell Theory.

BASES OF BIOLOGICAL ORGANIZATION: Organisms classification. Structure and function of prokaryotic cells: plasmatic membrane, cell wall, nucleoid. Structure and function of eukaryotic cells: plasma membrane, nucleus, nucleolus, nucleoplasm, endoplasmic reticulum, ribosomes,

Golgi apparatus, lysosomes, peroxisomes, cytoskeleton (microfilaments, microtubules, intermediate filaments). Virus (mode of infection, lytic and lysogenic cycle).

NUCLEIC ACIDS: structure and function of DNA and RNA.

GENE FUNCTION AND STRUCTURE

Structure of prokaryotic genes: organization of operons.

Structure of eukaryotic genes: function of promoters, exons and introns.

DNA DUPLICATION

Semi-conservative replication. General features of DNA duplication: DNA-polymerases, topoisomerases, replication fork, Okazaki fragments, 'proofreading activity'. Replication in bacteria. Replication in eukaryotes: telomeres replication.

TRANSCRIPTION AND RNA MATURATION

Central dogma of molecular biology. Structure and function of first, second and third class RNAs. General features of transcription. RNA polymerases. Transcription factors. Transcription in prokaryotes: start and termination of rho-dependent and-independent transcription. Transcription in eukaryotes: formation of the pre-initiation complex, end of transcription. Mechanism of mRNA maturation: capping, polyA tail, splicing.

PROTEIN SYNTHESIS

Properties of the genetic code. Translation apparatus: structure and functions of tRNA and ribosomes. Translation initiation. Elongation. Termination.

MITOSIS AND MEIOSIS: The meaning of meiosis.

MENDELIAN GENETICS

DETAILED COURSE CONTENT

▪ **Chemistry and Biochemistry** **PROGRAM OF THE COURSE**

Elements of Organic Chemistry

- Hydrocarbons
- alcohols and ethers
- Other organic compounds
- Aromatic compounds
- Heterocyclic compounds

Biochemistry

- Carbohydrates
- Lipids

- Amino acids and proteins
- Enzymes
- Metabolism of Carbohydrates
- Electrical Transport and Oxidative Phosphorylation
- Metabolism of Lipids
- Metabolism of Proteins
- Metabolism of Nucleotides
- Biological Fluids
- Vitamins
- Hormones

TEXTBOOK INFORMATION

▪ Chemistry and Biochemistry

TEXTS OF REFERENCE

1. **Chemistry Biochemistry and Applied Biology**
Massimo Stefani, Nicholas Taddei
And home. Zanichelli

2. **Chemicals for Biomedical Sciences**
George I. Sackheim
Dennis D. Lehman
EdiSES

3. **Biochemistry**
Campbell / Farrell
EdiSES
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