



BIOLOGY AND GENETICS - channel 3

BIO/13 - 10 CFU - 1° Semester

Teaching Staff

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LEARNING OBJECTIVES

Integrated study of cells and living organisms, with emphasis on the basic mechanisms involved in the following processes: duplication and transmission of genetic information and its expression, development, differentiation, cell proliferation, biogenesis of organelles and cellular structures, interactions among cells, biomolecular bases of behavior and evolution. The applications of this knowledge to Medicine and Biotechnology are a relevant aspect of this field. Learning of all advanced biological technologies, including recombinant DNA technology and the use of transgenic animals, is essential to achieving the stated objectives.

COURSE STRUCTURE

Taught class of the teacher by using powerpoint slides

DETAILED COURSE CONTENT

The Cell theory: cells and organisms.

Structural and functional organization of eukaryotic and prokaryotic cells.

Viruses.

Principles and biomolecular mechanisms of evolution.

From genotype to phenotype.

Phenotype and environment.

Biological and molecular mechanisms of differentiation.

The nuclear genome – Cell organelles.

Cell proliferation: the cycle and related control mechanisms.

Chromatin and chromosomes.

DNA replication: molecular mechanisms.

Polymerase Chain Reaction (PCR) technology and its implications for Medicine.

Expression and biological functions of the genome.

Classification and structure of eukaryotic, prokaryotic and viral genes.

Transcription: synthesis and processing of RNA [mRNA and non-coding RNAs (ncRNAs), as miRNAs and lncRNAs].

The genetic code.

Protein synthesis.

Genetic mutations and epigenetic modifications of DNA.

Cell division: binary fission, mitosis and meiosis.

Mode of transmission of genetic traits in humans. Mendelian Genetics.

The limits of the Mendelian model.

Genome Projects.

Role of Computational Biology and Bioinformatics in Medicine.

Genetic diseases of *Homo sapiens*.

Cell membranes: structure and function.

Organelles: structure, function and evolution.

Intra- and intercellular molecular traffic. Role of microvesicles and exosomes.

Signal transduction.

Mechanisms of interaction between cells.

The neoplastic phenotype.

Stem Cells and Regenerative Medicine.

Differentiation and apoptosis.

Cloning.

TEXTBOOK INFORMATION

1. Lodish e Coll, Biologia Molecolare della Cellula, Ed Zanichelli
2. Alberts e Coll, Biologia molecolare della cellula, Ed Zanichelli
3. Thompson e Thompson, Genetica in Medicina, Ed Idelson Gnocchi
4. Strachan e Read, Genetica umana molecolare, Ed Utet
5. De Leo e Coll, Biologia e Genetica, Ed Edises

OF NOTE: It is important to use the most recent edition of each textbook
