

CELL PHYSIOLOGY

Prof. Luisa Gioia (lgioia@unite.it)

Basic properties of cell membrane and organelles. Mechanisms of transport of molecules across the cell membrane. Osmosis. Electrical properties of the cell membrane. General properties of channels. Transmembrane voltage. Nerve and muscle cells: electrical signaling. The action potential and its propagation. The nucleus. Transport to and from the nucleus. The cell cycle and its control. The cell division: mitosis and meiosis. Cytoskeletal structures and their function. Intracellular signaling. Intercellular communication. The laboratory of cell culture: basic equipment and proper laboratory set-up. What is cell culture? Principles of cell culture. Culture conditions. Sterile techniques. Characteristics of the salt solutions and the culture media. Serum. Methods and cell culture protocols: counting cells. Determine the cell viability: Trypan Blu exclusion and Live-Dead kit. Assay for evaluation of cell proliferation; Basic procedure for cell cryopreservation.

TEXTBOOK:

Bruce Alberts et al. "Molecular Biology of the Cell". Garland Science. Sixth edition. ISBN 978-0-8153-4432-2 (hardcover); ISBN 978-0-8153-4524-4 (loose-leaf).

FURTHER TEXTS IN ENGLISH ON CELL CULTURES:

R Ian Freshney, "Culture of animal cells: a manual of basic techniques and specialized applications" 6th Ed. book 2010 Wiley-Liss, Inc. New York, NY;

General Techniques of Cell Culture; by A. Maureen Harrison, R. Ian Freshney - Cambridge University Press, 1997

MEDICAL and APPLIED GENETICS

Prof. Alessia Colosimo (acolosimo@unite.it)

Basic notions of the human genome; Mendelian inheritance (autosomal dominant, autosomal recessive, sex-linked); Human normal karyotype and chromosomal abnormalities (both numerical and structural); Complex and multifactorial disorders; Molecular cytogenetics techniques (FISH, SKY, CGH, aCGH, quantitative fluorescence PCR); Molecular genetics techniques for monogenic diseases (Southern blotting, ARMS-PCR, Reverse Dot blot, Sequencing, NGS, MLPA).

TEXTBOOKS

Strachan & Read- Human Molecular Genetics - Ed. UTET

CYTOLOGY and HISTOLOGY

Prof. Annunziata Mauro (amauro@unite.it)

Cytology - General Characteristics of Living Organisms: Prokaryotic and Eukaryotic Cells. The Cell Theory: Organization of Living Matter. Plasma Membrane: Structure and Function. Glycocalyx (Pericellular matrix). Endocellular Membrane System: Endoplasmic Reticulum, Golgi Apparatus: Structure and Function. Ribosomes. Vesicular Transport, Exo- and Endocytosis. Nucleus: Structure and Function, DNA and RNA Nuclear Proteins, Nuclear Membrane: Nuclear Pores and Nuclear Traffic, Chromatin Organization – Nucleosome, Nucleolus. Mitochondria: Structure and Function, Lysosomes and Peroxisomes. Cytoskeleton: Structure and Function. Centrioles and Axoneme. Stem Cells.
Histology - Sensory and Secretory Epithelial Tissues. Muscle Tissues. Nervous Tissue. Connective Tissues. Specialized Connective Tissues: Osseous, Cartilaginous, Blood.
Laboratory Techniques for the Morphological Observation of Cells and Tissues.

TEXTBOOKS

Bruce Alberts et al. "Molecular Biology of the Cell." Garland Science. Sixth edition. ISBN 978-0-8153-4432-2; ISBN 978-0-8153-4524-4.

Young et al. "Wheater's Functional Histology: A Text and Colour Atlas. 6th Edition." Published by ISBN 10: 0702047473; ISBN 13: 9780702047473.

BIOCHEMISTRY and MOLECULAR BIOLOGY

Prof. Beatrice Dufrusine (bdfufrusine@unite.it)

The elementary composition of the organism: macromolecules and elements.
Water and aqueous solutions, Chemical-physical properties of water, solubility, colligative properties of aqueous solutions. The osmotic pressure and Osmolarity.
Amino acids and proteins: Structure, chemical properties, isoelectric point and folding.
Carbohydrates: Polysaccharides and chemical-physical properties.
Lipids: structure, classification, and properties.
Nucleotides and nucleic acids: structure, definition and properties.
Signaling mechanisms, Chemical kinetics, and biological catalysts.

TEXTBOOKS

Biochemistry- Voet D. & Voet, J.G.

Lehninge's Principles of Biochemistry- Nelson D.L. & Cox M.M.