

The Hebrew University of Jerusalem

Syllabus

INTRODUCTION TO CELL BIOLOGY - 64104

Last update 06-09-2018

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: School of Pharmacy

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Ein Karem

Course/Module Coordinator: Dr. Zvika Granot

Coordinator Email: zvikag@ekmd.huji.ac.il

Coordinator Office Hours: everyday, Coordination by E.mail

Teaching Staff:

Dr. Zvika Granot,
Dr. Yossi Buganim,
Dr. Morris Nehama,
Dr. Sheera Adar

Course/Module description:

A basic course in cell biology. The course emphasizes the relationship between structure and function , and demonstrate the clinical implications

Course/Module aims:

The course provides basic concepts in cell biology and genetics principles

Learning outcomes - On successful completion of this module, students should be able to:

To know the structure of the eukaryotic cell
To understand intracellular processes
To understand the connection between cell structure and function
To understand the basic principles of Genetics
Apply basic principles in solving simple problems

Attendance requirements(%):

None

Teaching arrangement and method of instruction: lectures

Course/Module Content:

Introduction to the Cell:
The Evolution of the Cell: From Molecules to the First Cell; From Prokaryotes to Eukaryotes; From Single Cells to Multicellular Organisms
Small Molecules, Energy, and Biosynthesis: The Chemical Components of a Cell; Biological Order and Energy
Macromolecules- Structure, Shape, and Information: Molecular Recognition Processes; Nucleic Acids; Protein Structure; Proteins as Catalysts
Cell Membrane Structure: The Lipid Bilayer; Membrane Proteins Membrane Transport of Small Molecules and the Ionic Basis of Membrane Excitability: Principles of Membrane Transport; Carrier Proteins and Active Membrane Transport; Ion Channels and Electrical Properties of Membranes
Organelles:
Internal Organization of the Cell

The Compartmentalization of Higher Cells

Mitochondria; Peroxisomes; The Endoplasmic Reticulum; Golgi Apparatus; Lysosomes; Ribosomes

The Cytoskeleton

The Nature of the Cytoskeleton; Intermediate Filaments; Microtubules; Cilia and Centrioles; Actin Filaments; Actin-binding Proteins

The Cell Nucleus

Structure of the nucleus and its envelope; trafficking of proteins in and out of the nucleus; what is a gene; structure of the RNA; Chromosomal DNA and Its Packaging; The Global Structure of Chromosomes; Chromosome Replication; RNA Synthesis and RNA Processing; The Organization and Evolution of the Nuclear Genome; DNA Repair; DNA Replication; Genetic Recombination

Cell Cycle

The General Strategy of the Cell Cycle; The Early Embryonic Cell Cycle and the Role of MPF; Molecular Genetics of Cell-Cycle Control; Mitosis; Cytokinesis

Proteins: structure & production

From RNA to a protein; ribosomes and translation; RNA splicing

Endocytosis & Exocytosis

Transport from the ER through the Golgi Apparatus; Transport from the Trans Golgi Network to Lysosomes; Transport from the Plasma Membrane via Endosomes: Endocytosis; Transport from the Trans Golgi Network to the Cell Surface: Exocytosis; The Molecular Mechanisms of Vesicular Transport and the Maintenance of Compartmental Diversity

Cell Junctions

Cell Junctions; Cell-Cell Adhesion and their function in the multicellular organism

Signal Transduction pathways

Signaling via G-Protein-linked Cell-Surface Receptors; Signaling via Enzyme-linked Cell-Surface Receptors

Cell death

Apoptosis and programmed cell death

Molecular basis of Cancer

Cancer as a Microevolutionary Process; The Molecular Genetics of Cancer including Oncogenes and Tumor suppressor genes; Cancer is caused by numerous changes in genes; novel therapeutics- gene targeted therapy

Genetics

Basic principles of genetics

Required Reading:

Alberts et al, Essential Cell Biology, 3rd edition, 2009

Additional Reading Material:

cell biology textbooks

Course/Module evaluation:

End of year written/oral examination 100 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 0 %

Reports 0 %

Research project 0 %

Quizzes 0 %

Other 0 %

Additional information: