

The Hebrew University of Jerusalem

Syllabus

From Cell to Tissue: Advanced Cell Biology - 94676

Last update 03-07-2016

HU Credits: 2

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: bio-medical sciences

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: Ein Karem

Course/Module Coordinator: Sharona Even-Ram

Coordinator Email: sharonaer@hadassah.org.il

Coordinator Office Hours: Flexible. By appointment. Call in advance.

Teaching Staff:

Dr. Sharona Even-Ram
Prof Albert Taraboulos
Prof Ophry Pines

Course/Module description:

The course will focus on cell structure, intracellular systems, their unique functions and the relations between systems that underlie tissue organization. Research methods in cell biology will be studied.

Course/Module aims:

Understand the complexity of the cellular systems, the inter-connecting systems, their structures and functions in forming tissues

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

Familiarize with the various cellular systems and understand structure-function relations in intra-cellular and inter-cellular organization as they materialize within different tissues. Understand anabolic and catabolic processes, tissue remodeling and ageing and the way they are implemented in tissue engineering and regenerative medicine.

Attendance requirements(%):

80

Teaching arrangement and method of instruction: Frontal teaching

Course/Module Content:

1) Introduction:

The eukaryotic cell in an evolutionary perspective. Transition from unicellular to multicellular organisms. Preservation of evolutionary steps in human development.

3-6) The endomembrane system

The components of the endomembrane system. Protein synthesis in the ER; folding, glycosylation, GPI proteins, quality control, ER-associated degradation pathway (ERAD). Vesicular traffic: vesicle formation, choosing the cargo, recognizing the target, fusion. COPI and COPII, clathrin, SNARES and Rabs. Protein secretion. The Golgi complex. The plasma membrane. The many types of endocytosis. Lysosomes and lysosomes related organelles (LROs). Lipid rafts and caveolae. Lipid droplets

7) Mitochondria and protein translocation

An introduction to structure, function and biogenesis of mitochondria

8-13) Tissue organization

The cytoskeletal systems and the nucleoskeleton. The extracellular matrix and basement membranes. Cell-cell adhesions and communication. Cell-matrix adhesion and migration. Mechanotransduction, Structure-function relations. Tissue regeneration and stem-cells. Regenerative medicine and tissue engineering

Required Reading:

Group discussion of a recent paper

Additional Reading Material:

*Molecular Biology of the Cell/ Alberts et al.
Molecular Cell Biology/ Lodish et al*

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:

A course for 3rd year students. 2nd year students with sufficient background in cell biology will be also considered.

Students who are required to attend mandatory courses that run in parallel are kindly asked not to register to this course.