The Hebrew University of Jerusalem

Syllabus

CELL AND TISSUE CULTURE - 71213

Last update 13-03-2025

<u>HU Credits:</u> 3

<u>Degree/Cycle:</u> 1st degree (Bachelor)

<u>Responsible Department:</u> Plant Sciences in Agriculture -Special in Biotec

<u>Academic year:</u> 0

<u>Semester:</u> 2nd Semester

<u>Teaching Languages:</u> Hebrew

<u>Campus:</u> Rehovot

<u>Course/Module Coordinator:</u> Dr. Sharon Schlesinger

<u>Coordinator Email:</u> Sharon.shle@mail.huji.ac.il

<u>Coordinator Office Hours:</u> via email

<u>Teaching Staff:</u>

Dr. Sharon Schlesinger,
Dr. Osnat Yanai

Course/Module description:
Mammalian and plant cell and tissue culture are an important tool in many biotechnological applications. Both agricultural and medical. They are used extensively in the relevant basic research and for generation of plant and animal byproducts. The variety of technical aspects and procedures for culture of mammalian and plant cells will be surveyed (media, environmental conditions and facilities). Basic biological processes related to cell and tissue culture will be examined, including the cell cycle, signal transduction and regeneration/differentiation processes, and morph genetic potential. Special emphasis is given to the various applications of plant and mammalian cell cultures in medicine biotechnology.

Course/Module aims:
Improve theoretical and practical fundaments of cell and tissue culture techniques to provide students with the ability to adapt basic cell culture procedures for various research requirements.

Learning outcomes - On successful completion of this module, students should be able to:
Explain the various components of cell and tissue culture media, e.g. minerals, growth factors, hormones, ECM and what governs the choice of components
Explain the various steps taken to establish and optimise media for particular purposes in different species and cell lines,
Explain and perform the common cell culture techniques, plants and mammalian cell culture
Explain the various cell lines used in mammalian tissue culture and their origins and uses
Explain derivation and use of various stem cells, embryonic, adult and iPS
Understand use of cells and ECM in engineered tissues
At the conclusion of this course you will understand how to initiate, grow and harvest eukaryotic cells and their uses.
Understand the applications of in vitro biology for plant propagation including the process of culture initiation, multiplication and regeneration of roots and shoots.
Basic work skills with tissue cultures

Attendance requirements(%):
80% in lectures 100% in labs

Teaching arrangement and method of instruction: Classes tought by one of the teachers and hands-on lab practice on selected topics

Course/Module Content:
*   Introduction to plant and animal cell biology*
1. introduction to plant and mammalian cell biology (class)
2. introduction to plant and mammalian cell culture (class)
Mammalian cultures

3. Culturing primary cultures (class + lab)
4. Inducing differentiation by media and factors (class + lab)
5. Reprograming somatic cells into iPS cells (class + lab)
6. Transfection of gene of interest (class + lab)
7. Collection and integration of results (mostly lab)
Plant tissue culture
8. The botanical basis for Tissue Culture (TC) (class + lab)
9. Media Ingredients, plant hormone and their function in TC (class + lab)
10. Totipotent cells, differentiation and plant regeneration (class + lab)
11. Interspecific crosses and in vitro embryo rescue techniques (class + lab)
12. Summary of the observations and discussion (class + lab)
Summary and current development
13. Tissue engineering (class)
14. Summary (class)

Required Reading:
will be found on Moodel

Additional Reading Material:
*   None*

Grading Scheme:

Additional information:
*   In pairs/triplets, the students will submit 2 laboratory reports and 2 research proposals, and give a 5-minute presentation. During the laboratories, there will be mid-term personal tests aimed at monitoring the students' understanding of the material.*