האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Personalized Medicine in Cancer and Neurodegenerative Diseases - 98824

Last update 19-02-2025

HU Credits: *2*

Degree/Cycle: *2nd degree (Master)*

Responsible Department: *Bio-Medical Sciences*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *Hebrew*

Campus: *Ein Karem*

Course/Module Coordinator: *Prof Iris Lavon and Dr Adi vaknin*

Coordinator Email: *Irisl@hadassah.org.il*

Coordinator Office Hours: *Mon 10-12*

Teaching Staff:
Dr. Iris Lavon,
Dr. Shai Rosenberg,
Dr. dana ekstein,
Dr. David Arkadir,
Prof. Adi Vaknin,
Prof. Sara Eyal

Course/Module description:
To understand the importance of personalized medicine. As a proof of concept will focus primarily on the diagnosis and treatment of cancer and neurodegenerative diseases

Course/Module aims:
To understand the importance of personalized medicine. As a proof of concept will focus primarily on the diagnosis and treatment of cancer and neurodegenerative diseases

Learning outcomes - On successful completion of this module, students should be able to:
To understent what personalized medicine is
To understand the various aspects of this approch and its complexity
To understand the chances and risks of this approach
to learn about the methods used today with a look to the future to implement the method

Attendance requirements(%):
100

Teaching arrangement and method of instruction:

Course/Module Content:
1 24.03.2025 Prof. Iris Lavon Introductory Lecture: Explanation of the course structure and requirements. Introduction to personalized medicine: Discussion on the rapid development of personalized medicine, future prospects, and potential challenges of this approach.
2 31.03.2025 Prof. Shai Rosenberg Bioinformatics: Introduction to deep sequencing from a bioinformatics perspective. Examples of bioinformatics analysis in deep sequencing applications for diagnosis and treatment in personalized medicine.

Review of data integration methods in advanced analyses. Discussion on the challenges that personalized medicine poses to bioinformatics.
3 07.04.2025 Prof. Shai Rosenberg Advanced/Future Bioinformatics Approaches in Personalized Medicine: Interpretation of genomic changes (DNA) in non-coding regions, integration of various genomic alterations (mutations, indels, CNVs, breakpoints) and prediction of their clinical significance. Example: PHIAL algorithm. Use of transcriptomics (RNA) to identify therapeutic targets, such as network-based approaches to pinpoint bottlenecks of master regulators. Integration of DNA and RNA analyses to identify multi-drug treatment targets. Example: SIMS algorithm and SPRING research.
-- Passover Break
4 21.04.2025 Prof. Iris Lavon Personalized Medicine in Brain Tumors: Review of developments in brain tumor research over the past decade. Overview of molecular tests commonly used for brain tumors and their impact on diagnostic methods.
5 28.04.2025 Prof. Iris Lavon Personalized Medicine in Brain Tumors – Continued
6 05.05.2025 Dr. Atira Bik fMRI and DTI Before Brain Tumor Surgery: Explanation of the use of advanced imaging techniques for mapping functional areas and white matter tracts before brain surgery. Brief discussion on using fMRI for diagnostic purposes in unconscious patients and those with visual impairments. Review of methods for assessing brain connectivity and their clinical potential, as well as research applications of fMRI in understanding brain disorders.
7 12.05.2025 Prof. David Arkadir Personalized Medicine in Parkinson’s Disease: Overview of how Parkinson’s disease, once considered a single-etiology disorder, has been redefined through genetic discoveries revealing multiple etiologies. Discussion on different genetic causes and future treatments based on the patient's specific genetic profile.
8 19.05.2025 Prof. Dana Eckstein Personalized Medicine in Epilepsy: Developments in personalized medicine for epilepsy, from molecular etiological diagnostics and detailed semiological classification of epileptic seizures to pharmacogenetics. Discussion on the expanding clinical implications of these advances.
9 26.05.2025 Dr. Tal Ben Uliel Personalized Medicine in Epilepsy – Continued
-- Shavuot Break
10 09.06.2025 Prof. Sara Eyal Pharmacogenetics: Overview of factors influencing drug metabolism and action. Discussion on the potential effects of genetic variability on these processes. Students will receive an article for reading, which will serve as a basis for class discussion.
11 16.06.2025 Prof. Sara Eyal Pharmacogenetics – Continued
12 23.06.2025 Prof. Adi Vaknin Personalized Diagnosis and Treatment in Neuroimmunological Diseases: Overview of inflammatory diseases affecting the brain and spinal cord. Discussion on the importance of precise differentiation among these diseases for preventing disability. Currently, there are around 20 different treatment options, and selection is tailored to the individual patient based on immune, imaging, and electrophysiological profiles. Future approaches may include advanced genetic profiling and comprehensive immunological panels, which are currently used only in research.
13 30.06.2025 Prof. Adi Vaknin & Prof. Iris Lavon Course Summary and Exam

Guidelines

Required Reading:
will be advice during the lectures

Additional Reading Material:

Grading Scheme:
Written Exam % 90
Attendance / Participation in Field Excursion 10 %

Additional information: