האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Analytical and Spectral Chemistry - 64651

Last update 03-10-2021

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 Orit Cohen*

Coordinator Email: *orit.cohen@mail.huji.ac.il*

Coordinator Office Hours:

Teaching Staff:

Dr. Orit Cohen

Course/Module description:

The course is intended for science graduates to refresh the knowledge of course participants in the analytical methods commonly used in chemistry and pharmacy laboratories. Participants will study wet analytical methods like titrations and spectral methods like NMR, FTIR, UV and more.

Course/Module aims:

The course provides basic background to quantitative analytical methods commonly used in chemical and pharmaceutical laboratories. In addition, background and practice in useful spectral methods will be provided.

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

At the end of this course;
The students will understand the principles of analytical methods used in main quantitative determinaтion.
The students will be able to analyze the results in the lab and the possible error sources.
The students will be able to choose a good analytical method for a given compound.

Attendance requirements(%):

Teaching arrangement and method of instruction: The course will be taught in the first semester by distance learning using the Moodle program. Course contents are already on the course website and participants are required to study each week a chapter containing recorded lectures and exercises for solving and submitting. Every week there will be a zoom meeting with the course coordinator who will give a summary of the content of the chapter being studied accompanied by exercises. In addition, you will be required to solve a homework assignment and submit it until after two days using the Moodle. During the semester there is be an exam, in addition to the final course exam.

Course/Module Content:

List of topics:
1. Refreshing mathematical skills and some statistics: Scientific notation, value and

units, units, systematic errors and random errors, normal error curve, average and standard deviation, the accumulation of errors, finding the best linear dependence between two variables and the correlation coefficient.
2. Different concentration units and dilution; molarity, molality, volume and weight percentage, ppm and ppb.
3. Acids and bases: Bronshtad acids and bases, equilibrium constants of acids and bases, acids and bases in nonaqueous solvents, the ionization of water, pH, ionic strength and activity, indicators, neutralization, buffers.
4. Titrations of acids and bases: Basic terms in volumetric analysis, types of titration, standards, calculation of titration curves for strong and weak acids and bases and for polyprotic acids, equivalent concentrations and the normal.
5. Solubility of insoluble salts and product of solubility, precipitation titrations, EDTA complexes with metals.
6. Redox: Oxidising and reducing reagents, balancing redox processes, redox titrations, equivalent concentration in redox reactions, introduction to electrolchemical cells (electrolytic and Galvanic), glass electrode and pH measurement.
7. Introduction to spectroscopy: Absorption spectroscopy in UV, Beer-Lambert law and deviations from this rule.principals and quantitive uses.
8. Introduction to IR chromatography
9. Introduction NMR chromatography
10. MS principals and uses.
11. Principles of separation by partition, liquid chromatography LC and TLC, and Gas Chromatography GC.

Required Reading:
Course presentations and additional information that will be loaded in the Moodle.

Additional Reading Material:
D.C. Harris
Quantitative Chemical
Analysis
any edition

Course/Module evaluation:
End of year written/oral examination 70 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 30 %
Reports 0 %
Research project 0 %

Quizzes 0 %
Other 0 %

Additional information: