האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

ANALYTICAL CHEMISTRY A - 69106

Last update 10-04-2020

HU Credits: *4*

Degree/Cycle: *1st degree (Bachelor)*

Responsible Department: *Chemistry*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Prof. Ovadia Lev*

Coordinator Email: *Ovadia@huji.ac.il*

Coordinator Office Hours: *Sundays, 12:00-13:00*

Teaching Staff:

Prof Ovadia Lev
Mr. Yahel Shner

Course/Module description:
The course gives basic knowledge in analytical chemistry, and covers wet and instrumental analytical chemistry techniques.
The aim of the course is to present to the students the needed knowledge for conducting quantitative analyses. Students will get acquainted with electrochemical, spectroscopic and chromatographic techniques.

Course/Module aims:
See Learning Outcomes.

Learning outcomes - On successful completion of this module, students should be able to:
Use analytical equipment for quantitative determinations.

Quantitatively analyze the measuring results by an analytical equipment.

Independently and intelligently evaluate the best analysis method.

Develop new analytical techniques.

Attendance requirements(%):
80% of lectures
Calculated from the date of the initiation of in campus studies

Teaching arrangement and method of instruction: Lecture and exercise

Course/Module Content:
1. Short introduction to statistics and data analysis: average, standard deviation, random (stochastic) and systematic errors, normal distribution, accumulation of errors, significant figures, calibration curves.
2. Different concentrations.
3. Weak and strong acids and bases, conjugated acids and bases.
4. Equilibrium.
5. Voltammetry: first principle, reaction types, equivalent point and end point.
6. Acid-base reactions between strong acids and bases, pH calculations, calculation of titration curves.
7. Acid-base reactions between weak acid and strong base (and vice versa),

calculation of titration curves, buffers and pH calculations in buffers.
8. Polyprotic acids and bases, their reactions, titration curved, ionic fraction and ionization level.
9. Precipitation titrations, solubility product, solubility and concentrations, calculations of titration curves.
10. Oxidation-Reduction, electrochemical cells (galvanic and electrolytic), Nernst equation, half-cell and full-cell voltage calculations, voltage - equilibrium constant relation, redox titrations.
11. Electrodes (reference and measurement), potentiometric methods, glass electrode, pH measurement, potentiometric titration, end-point determination.
12. I-V in cells, over-voltage, voltage vs. time in a cell, Faraday laws, Electrogravimetry.
13. Introduction to spectroscopy.
14. Beer-Lambert law and deviations.
15. Analytical methods in electronic spectroscopy.

Required Reading:
Slides of course presentation, and the relevant chapters in

Fundamentals of Analytical Chemistry, Skoog DA et al., 9th Ed.

Additional Reading Material:
Will be assigned in the lectures.

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:
80% homework assignment submission is obligatory.

The final grade is composed of weighted averaging with the homework assignments submitted during the semester.

In case that a frontal lecture would not be possible the exam will be carried out as a

home assignment

Some homework assignments will have heavier weight.

Under-submission of homework assignments will deduct upto 20 points from the final grade.

Missing more than 20% of the lectures (starting at the date of the initiation of the in-campus lectures) will deduct upto 10 points from the final grade.

We shall consider a mid semester exam which will provide 15% protective score.