

The Hebrew University of Jerusalem

Syllabus

INTRODUCTION TO SOIL CHEMISTRY - 71618

Last update 11-08-2022

HU Credits: 2

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Soil and Water Sciences

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Rehovot

Course/Module Coordinator: Dr. Tamara Polubesova

Coordinator Email: Tamara.Polubesova@mail.huji.ac.il

Coordinator Office Hours:

Teaching Staff:

Dr. Tamara Polubesova

Course/Module description:

Chemistry of organic and inorganic components of soils, surface properties of soil colloids, organo-clay interactions, chemistry of soil solutions, review of the chemical reactions and processes in soils, chemistry of soil acidity, chemistry of soil formation, environmental chemistry of heavy metals.

Course/Module aims:

To promote fundamental understanding of chemical reactions and processes in the soil.

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

To understand the mechanisms of chemical reactions and processes occurring in soils, soil minerals and soil organic matter.

Attendance requirements(%):

80

Teaching arrangement and method of instruction: lectures and exercises

Course/Module Content:

1. Surface properties of soil colloids and clay.
2. Double electric layer associated with clay particles.
3. Attraction and repulsion, balance forces on clay suspensions.
4. Soil solution chemistry. Part 1. Principles of soil solution.
5. Soil solution chemistry. Part 2. Composition of the soil solution.
6. Soil absorption
7. Anions adsorption in soil.
8. Interactions between organic compounds and in soil.
9. Chemistry of soil acidity.
10. Redox processes in soil.
11. Chemistry of sub-aqueous soil.
12. Chemistry of soil weathering (part 1).
13. Chemistry of soil weathering (part 2).
14. Heavy metal behavior in soil.

Required Reading:

none

Additional Reading Material:

- Bohn H. L., McNeal B. L., O'Connor G. A. 2001. *Soil Chemistry*. John Willey & Sons, N -Y.
- Cornell R. M., Schwermann U. 2003. *The iron oxides: structure, properties, reactions, occurrence, and uses*. Wiley-VCH.
- Cresser M., Edwards K. K. 1993. *Soil chemistry and its application*. Cambridge University Press, Cambridge.
- Dixon J. B., Weed S. B. (eds.) 1989. *Minerals in soil environments*. SSSA Publisher, Madison, Wisconsin, USA.
- Dixon, J.B., Schulze, D.G. (Eds). 2002. *Soil mineralogy with environmental applications*. SSSA, Publisher. Madison, Wisconsin, USA.
- Essington M. E. 2004. *Soil and water chemistry. An integrative approach*. CRC Press, Boca Raton, USA.
- Sparks D. 2003. *Environmental soil chemistry*. Academic Press, Amsterdam.
- Sposito G. 1984. *The surface chemistry of soils*. Oxford University Press, N-Y.
- Stevenson F. J. 1994. *Humus Chemistry. Genesis, Composition, Reactions*.
- Tabatabai M. A., Sparks D. L. (Eds.) 2005. *Chemical processes in soils*. SSSA Publisher, Madison, Wisconsin, USA.
- Tan H. T. 1992. *Principles of soil chemistry*. Marcel Dekker, N-Y. John Willey & Sons, N-Y.

Grading Scheme:

Additional information:

None