האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

AQUATIC GEOCHEMISTRY - 71913

Last update 13-03-2017

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: soil and water sciences

Academic year: 0

Semester: 2nd Semester

Teaching Languages: English

Campus: Rehovot

Course/Module Coordinator: Dr. Tamara Polubesova

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

Coordinator Office Hours: By appointment via Division for International Studies

Teaching Staff:

Dr. Tamara Polubesova
Ms.

Course/Module description:
Basic concepts in aquatic geo-chemistry, buffer capacity of natural waters, acid rain and acid waters, redox processes in lakes, marine environment and groundwater, photochemical processes in natural waters and sediments, colloids as components of naturals waters, carbonate, iron and sulfur geochemistry in naturals waters and sediments, chemical weathering of minerals, aquatic biochemistry, pollution of natural water bodies, aqueous geochemistry radionuclides, water quality monitoring, chemical composition and contamination of groundwater, chemistry and pollution of marine environment.

Course/Module aims:
to facilitate an advanced understanding of geochemical processes in natural water bodies

Learning outcomes - On successful completion of this module, students should be able to:
• Understand the mechanisms of geochemical processes occurring in different components of hydrosphere
• Understand the effect of variable geochemical processes on the composition of water bodies
• Understand the close correlation between geochemistry of water bodies with environmental chemistry.

Attendance requirements(%):
100

Teaching arrangement and method of instruction: Lectures, and seminars every week. Homework will include exercises (questions, calculations), and reading scientific papers related to the topic of the lectures. During the seminars, exercises will be checked and students will present the papers and answer the questions. Discussions of the results published by the other researchers will help students to develop scientific thinking, and thus might be useful for their M. Sc. studies.

Course/Module Content:
• Lecture 1. The hydrosphere and basic concepts in aquatic geo-chemistry. Natural water bodies – outlines of different hydro-chemical natural environments.

• Lecture 2. Buffer capacity of natural water. Acid rains and acid waters and the impact of the water acidification on the geochemical processes.
• Lecture 3. Redox processes in natural waters. Redox conditions and processes in lakes, marine environment and groundwater.
• Lecture 4. Photochemical processes in natural waters. Heterogeneous photochemistry.
• Lecture 5. Colloids as components of natural water.
• Lecture 6. Trace metals in natural water bodies: chemical reactions and pollution
• Lectures 7-8. Aqueous geochemistry of radionuclides
• Lecture 9. Aquatic biochemistry
• Lecture10. Iron and sulfur geochemistry of natural waters and sediments.
• Lecture 11. Chemical weathering of minerals and chemical composition of natural waters.
• Lecture 12. Groundwater chemistry. The aquifer geochemical system. Water-rock interactions. Geochemistry of contaminant mobility.
• Lecture 13. Chemistry and pollution of the marine environment
• Lecture 14. Water quality of natural water bodies: monitoring and assessment.

Required Reading:

1. Langmuir D. Aqueous Environmental Geochemistry. 1997
2. Stumm W. and Morgan J. J. Aquatic Chemistry. 1996
3. Benjamin M. M. Water Chemistry. 2010.
4. Gianguzza A., Pelizzetti E., Sammartano S. (Eds.). Chemical process in Marine Environments. 2011.
5. Appelo C. A. J., Postma D. Geochemistry, Groundwater and Pollution. 2005.
6. Cornell, R. M., Schwertman U. The iron oxides; structure, properties, reactions, occurrence, and uses, 2003.
7. Perry J., Vanderklein E. Water Quality. Management of a Natural Resource. 1996.

Additional Reading Material:

none

Course/Module evaluation:

End of year written/oral examination 70 %
Presentation 10 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 20 %
Reports 0 %
Research project 0 %
Quizzes 0 %

Other 0 %

Additional information:

None