

1. Chemistry of Water (3 Credits)
001-2-0003

Aims:

Students will acquire deep understanding of key chemical equilibrium processes in both natural and engineered aqueous systems. Students will be able to quantitatively analyze equilibrium processes via experimentally obtainable parameters and will learn how to measure these parameters. Students will be introduced to environmentally important Redox reactions and will be able to balance Redox equation.

Course contents:

- Introduction to chemical reactions in the aqueous phase: Units, activity-coefficients.
- Introduction to acids and bases: Water dissociation, concept and measurement of pH, Strong acids and bases. Definition of weak-acids and of pKa.
- Acid-base equilibrium: Speciation calculation, Proton Balance Equation, Equivalent points, Graphical solutions
- Alkalinity and Acidity: mathematical definitions and relations
- Solving complex aqueous acid-base problems using alkalinity/acidity
- Titrations, Buffer capacity Laboratory methods for determining Alkalinity and Acidity
- Gas-Liquid Equilibrium: Henry's law combined with acid-base equilibrium
- Solid-Liquid Equilibrium: Precipitation-Dissolution combined with acid-base equilibrium
- Multiphase equilibrium
- Introduction to Oxidation Reduction Processes, balancing reactions and solving problems combining redox with multiphase equilibrium

Grade and Requirements:

Homework: 15%; Lab Report 15%; Written Exam 70%

Literature:

1) Lahav, O.; Birnhack, L. Aquatic Chemistry: For Water and Wastewater Treatment Applications; de Gruyter: Boston, MA, 2019.

2) "Aquatic Chemistry" 3rd edition, Werner Stumm and James J. Morgan

Lecturer: Oded Nir, odni@bgu.ac.il. Office hours for the course: coordinate by email