**Instructors:** Nathan Yee, nyee@envsci.rutgers.edu; John Reinfelder, reinfelder@envsci.rutgers.edu

**Text:** Water Chemistry (Benjamin, 2015)

**Other useful references:** Aquatic Chemistry, Stumm and Morgan; Principles and Applications of Aquatic Chemistry, Morel and Hering; The Geochemistry of Natural Waters, Drever

**Office hours:** By appointment

**Basis for grade:** 8 of 10 quizzes (40%); 2 exams (30% each)

**Graduate students:** Visual Minteq model

**Note:** The pre-requisite to enroll in 11:375:444 is Chemical Principles of Environmental Science (11:375:202) or 1 semester of organic chemistry (01:160:307 or 01:375:209).

**Topics:**
- Units, reactions, activities, and equilibrium of aquatic systems
- Entropy, thermodynamics, and ΔG
- Weak acid equilibria
- Constructing and using logC-pH diagrams
- Solving aquatic equilibria with computer models
- Components and mole balance equations
- Non-ideal effects
- Alkalinity and the pH of natural waters
- Open systems and equilibrium with the gas phase
- Metals in aquatic systems
- Predominance diagrams
- Precipitation and dissolution reactions
- Water-rock interactions
- Adsorption isotherms and surface complexation modeling
- Electrochemistry and redox equilibria
- Eh-pH diagrams, redox conditions of natural waters
- Chemical kinetics, rate laws, activation energy
- Biogeochemistry: microbial controls on water chemistry