

WATER CHEMISTRY 11:375:444
ENVIRONMENTAL GEOCHEMISTRY 01:460:417
APPLICATIONS OF AQUATIC CHEMISTRY 16:375:517

Syllabus – Fall 2020

Mondays & Wednesday 3:55 PM - 5:15 PM, Online-synchronous through Canvas

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

Required Text: Water Chemistry, 2nd Edition (Benjamin, 2015) ISBN 9781478623083

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

Tech and software needs: desktop or laptop computer, webcam, mic, Power point or similar

Office Hours: By appointment

Basis of Grade (375:444 and 460:417): 12 of 14 quizzes (60%); project paper (20%); project presentation (20%)

Graduate students (375:517): 14 quizzes (70%); project paper (20%); project presentation (10%)

Sept	2	Introductions	
	8	Reactions, equilibrium, and ΔG in aquatic systems	(Chap 1: pp. 10-27; Chap 2: pp. 38-75; Chap 4: pp. 132-134, 144-158, 179-206)
	*9	Weak acid equilibria: numerical approach	(Chap 5: pp. 217-233, 252-284)
	14	Weak acid equilibria: logC-pH diagrams	(Chap 5: pp. 238-252, Chap 6: pp. 292-308)
	*16	Weak acid equilibria: Visual Minteq	(Chap 6: pp. 308-327, Chap 7: pp. 354-376)
	21	Alkalinity and the pH of natural waters	(Chap 8: pp. 409-437)
	*23	Open systems and equilibrium with the gas phase	(Chap 9: pp. 470-502, 512-516)
	28	Open systems: Visual Minteq	(Chap 9: pp. 502-508)
	*30	Speciation of dissolved trace metals	(Chap 10: pp. 528-556)
Oct	5	Speciation of dissolved trace metals (cont'd)	
	*7	Speciation of trace metals in the Hudson River estuary: Visual Minteq	
	12	Precipitation and dissolution reactions	(Chap 11: pp. 579-628)
	*14	Precipitation and dissolution reactions (cont'd)	
	19	Effects of biological and geochemical processes on CO ₂ and alkalinity	
	*21	Solubility equilibria: Visual Minteq	
	26	Predominance diagrams	(Chap 10: pp. 556-566, Chap 11: pp. 641-647)
	*28	The mineral-water interface	
Nov	2	Adsorption isotherms	(Chap 13: pp. 770-786)
	*4	Surface complexation and reactions with ligands	
	*9	Modeling adsorption: Visual Minteq	
	11	Redox chemistry	(Chap 12: pp. 633-703)
	*16	<i>How to give a presentation?</i>	
	18	Oxidation/reduction of water and redox sequences	(Chap 12: pp. 719-757)
	*23	Modeling redox reactions: Visual Minteq	
	25	<i>Friday schedule - no class</i>	
	30	Chemical kinetics and rate constants	(Chap 3: pp. 78-113)
Dec	*2	Visual Minteq Exercises	
	*7	Visual Minteq Quiz	
	9	Project presentations (graduate students)	
Exam Week		Project presentations (undergraduate students)	

*Quiz