COLORADO STATE UNIVERSITY

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CIVE 538

AQUEOUS CHEMISTRY

Spring 2017

Lecture:	Tuesday	9:30-10:45	229 Scott Bioengineering
	Thursday	9:30-10:45	229 Scott Bioengineering

Instructor: Ken Carlson

Office Hours: 11-12 T (and upon request)

E-mail: kcarlson@engr.colostate.edu

TEXT

Brezonik, P.L., Arnold, W.A., Water chemistry: an introduction to the chemistry of natural and engineered aquatic systems, First Edition, Oxford University Press, 2011, ISBN 978-0-19-973072-8.

ADDITIONAL REFERENCES

Benjamin, M.M., *Water Chemistry*, First Edition, McGraw-Hill, 2002, ISBN 0-07-238390-9.

Jensen, James N., Aquatic Chemistry, First Edition, Wiley, ISBN 0-471-41386-0

Pankow, J.F., *Aquatic Chemistry Concepts*, Lewis Publishers, Chelsea, Michigan, 1991. ISBN 0-97371-150-5.

Sawyer, C., N., McCarty , P.L., *Chemistry for Environmental Engineering*, Third Edition, McGraw-Hill Publishing Company, 1978, New York, ISBN 0-07-054971-0.

Snoeyink, V.L., and Jenkins, D., *Water Chemistry*, John Wiley & Sons, Inc., New York, 1980, ISBN 0-471-05196-9.

Stumm, W., and Morgan, J.J., *Aquatic Chemistry*, Third Edition, John Wiley & Sons, Inc., New York, 1996, ISBN 0-471-83941-8.

HOMEWORK

Homework problems will be assigned approximately every other Tuesday and will be due the following Tuesday. Completion of the problem sets is critical for understanding the material that will be on exams. Some of the homework will be reviewing journal articles and presenting to class in groups.

GRADING

Mid-term	50%
Final Exam	50%

Exams will be take-home format with an engineering problem solving emphasis.

COURSE SYLLABUS

WEEK	LECTURES	READING
1	Introduction Chemistry fundamentals	 Chapter 1
2	Inorganic chemical principles Chemical pollutants in water	Chapter 2 Chapter 2
3	Thermodynamics and equilibrium Chemical equilibrium examples	Chapter 3 Handouts
4	Chemical kinetics Chemical kinetics examples	Chapter 5 Handouts
5	Principles of environmental organic chemistry Environmental organic chemistry problems	Chapter 6 Handouts
6	Acid base equilibrium Solving acid-base problems	Chapter 8 Chapter 8
7	Acid base problems Applications of acid base equilibrium	Handouts Handouts

Mid-term Exam

8	Chemical equilibrium software Solving problems with equilibrium software	Handouts Handouts
9	Spring Break	
10	Complexation Precipitation and solubility	Chapter 9 Chapter 10
11	Surface chemistry and sorption Sorption Isotherms	Chapter 14 Handouts
12	Applications of sorption reactions Oxidation – reduction principles	Handouts Chapter 11
13	Oxidation- reduction equilibria Solving redox problems	Chapter 11 Chapter 11
14	Redox applications Water chemistry solutions with chemical equilibrium software; produced water	Handouts Handouts
15	Aqueous chemistry applications Aqueous chemistry applications	Student Groups Student Groups
16	Aqueous chemistry applications Aqueous chemistry applications	Student Groups Student Groups

Thursday, May 10th FINAL EXAM