Fall 9-1-2000

CHEM 542.01: The Physical Chemistry of Natural Waters

Michael D. DeGrandpre
University of Montana - Missoula, michael.degrandpre@umontana.edu

Follow this and additional works at: http://scholarworks.umt.edu/syllabi

Recommended Citation
http://scholarworks.umt.edu/syllabi/4869

This Syllabus is brought to you for free and open access by the Course Syllabi at ScholarWorks at University of Montana. It has been accepted for inclusion in Syllabi by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mail.lib.umt.edu.
Chemistry 542: The Physical Chemistry of Natural Waters

Fall Semester 2000

Professor: Dr. Mike DeGrandpre, CP 313. Office hours: Wed. and Fri. 10:30-11:30 a.m.

Course overview: The course is intended for graduate students who are interested in aquatic chemistry and/or applied physical chemistry. A strong background in chemistry is assumed but we will spend some time reviewing basic thermodynamic and kinetic concepts. The course will focus primarily on thermodynamic models (i.e. equilibrium-based models) for understanding and describing the chemical composition of natural waters. We will use spreadsheet programs as our modeling platforms although you are welcome to use programming languages such as BASIC or FORTRAN. Since the course is structured around quantitative computations, student grades will be primarily based upon successful completion of homework problems. A term paper (discussed below) and final exam will also be part of the final grade.


Grading: Homework 50%
Class participation 10%
Term paper 20%
Final exam 20%

Term paper: The term paper should be a review of a topical aquatic chemistry problem reported in the scientific literature. The subject area should not be directly related to your thesis research and must be okayed by me. The paper text should be 5-7 pages single spaced including abstract and figures (but not references). I will give you a handout describing the text format (font size, etc.). References and citations within the text should be in a journal format of your own choosing (e.g. Limnology and Oceanography, Journal of Geophysical Research, Environmental Science and Technology, etc.). The paper will be critically-evaluated and returned to you for revision. You must have your paper “accepted” to receive a passing grade in the course. The paper should be turned in by the end of the third week in November to allow time for revisions.
## Tentative Lecture Schedule

**Chemistry 542**  
**Fall Semester 2000**

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Subject</th>
<th>Reading</th>
</tr>
</thead>
</table>
| Sept. 4 | course overview  
review of solution thermodynamics and kinetics | Ch. 1,2   |
| Sept. 11 | review of solution thermodynamics and kinetics  
**pH, acids and bases** | Ch. 1,2,3 |
| Sept. 18 | multi-equilibria calculations | Ch. 3,4,5 |
| Sept. 25 | multi-equilibria calculations | Ch. 3,4,5 |
| Oct. 2  | multi-equilibria calculations  
**pH as a master variable** | Ch. 5,6   |
| Oct. 9  | acid-base behavior (titrations, buffer intensity) | Ch. 6,7,8 |
| Oct. 16 | inorganic carbon equilibria | Ch. 9     |
| Oct. 23 | inorganic carbon equilibria | Ch. 9     |
| Oct. 30 | solubility models | Ch. 11    |
| Nov. 6  | solubility models | Ch. 11,12,13 |
| Nov. 13 | solubility models | Ch. 11,12,13,14 |
| Nov. 20 | macroscopic particle solubility  
Thanksgiving break | Ch. 15    |
| Nov. 27 | complexation reactions | Ch. 18    |
| Dec. 4  | redox reactions | Ch. 19    |
| Dec. 11 | redox reactions (pe-pH diagrams)  
course review | Ch. 19,20 |
| Dec. 198 | Final (3:20-5:20 Tuesday Dec. 19) | all of the above |