# Chemistry 442: Aquatic Chemistry

# Fall Semester 2015

**Professor:** Prof. DeGrandpre (Mike), Office: Chemistry 318 (enter through lab, 317), Office hours: drop by or arrange with me, email: michael.degrandpre@umontana.edu. phone: 243-4118.

**Course overview**: The course is intended for students who are interested in environmental chemistry, aquatic chemistry and applied physical chemistry. From this course you will gain an in-depth understanding of: **1)** solution thermodynamics (acid-base chemistry, solubility, redox equilibria, etc.); **2)** the processes that control the chemistry of rivers, lakes, oceans, coca cola, blood, etc.; and **3)** computational methods for deriving and solving equilibrium models. Lectures are based on the assumption that you've completed one year of general chemistry and a semester of quantitative analysis. The course will focus primarily on thermodynamic models for understanding and predicting the chemical composition of natural waters. We will use spreadsheet programs as our modeling platforms. Because of the emphasis on use of computer computations, your homework is worth 30% of your final grade.

**Required Text**: *A Problem Solving Approach to Aquatic Chemistry* – James N. Jensen, John Wiley and Sons, Inc.

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| **Grading**: | Homework + final project* | 30% |
| | Exams (2)** | 40% |
| | Final exam | 20% |
| | Class participation | 10% |

All final letter grades will use +/- grading.

*The final project will be the application of a thermodynamic model derived from your homework assignments.

**The graduate increment is required by the University for UG (undergrad/grad) courses. Graduate students will have an additional question on each exam to assess their depth of knowledge of the material.

(SEE LECTURE SCHEDULE ON BACK)

| | ***Expected Lecture Schedule*** **Chemistry 442** **Fall Semester 2015** | |
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| **Week** | **Lecture subject** | **Reading** |
| Aug. 31 | course overview - review of solution thermodynamics | Ch. 1-3, 20-21 |
| Sept. 7 | solving multiple chemical equilibria | Ch. 4-9, 20-21 |
| Sept. 14 | solving multiple chemical equilibria | Ch. 4-9 |
| Sept. 21 | solving multiple chemical equilibria, acids/bases | Ch. 4-9 |
| Sept. 28 | acid/bases in natural waters, buffer intensity | Ch. 10-13 |
| Oct. 5 | acid/bases in natural waters, buffer intensity | Ch. 10-13 |
| Oct. 12 | $CO_2$ equilibria, alkalinity and acidity | Ch. 10-13 |
| Oct. 19 | $CO_2$ equilibria, alkalinity and acidity | Ch. 10-13 |
| Oct. 26 | metal ion equilibria, solubility, complexation | Ch. 14-15, 19 |
| Nov. 2 | metal ion equilibria | Ch. 14-15, 19 |
| Nov. 9 | redox equilibria, pε | Ch. 16 |
| Nov. 16 | redox equilibria, pε | Ch. 16 |
| Nov. 23 | redox equilibria, Thanksgiving break | Ch. 16 |
| Nov. 30 | contemporary problems in aquatic chemistry | literature |
| Dec. 7 | contemporary problems in aquatic chemistry, course review | literature |
| Dec. 14 | Finals week (Exam 10:10-12:00 Tuesday Dec. 15) | all of the above |