I. Logistics

Instructor
Professor Betsy Stone
Chemistry Building W376
(319) 384-1863
betsy-stone@uiowa.edu

Class Location/Time
Chemistry Building W228
10:30 – 11:20am MWF

Office Hours
Monday 8:30 – 10:00am and 1:30 – 3:00pm
By appointment

II. Course Description and Objectives

Description
Analytical Chemistry I is targeted at students pursuing higher education in the chemical sciences. The goal of this course is to equip students with basic principles of analytical chemistry, a high-level understanding of solution equilibria, and a working knowledge of electrochemistry.

Objectives
Throughout this course, we will focus on the following learning objectives:
1. Identify the critical steps in the analytical process
2. Understand the fundamental concepts of chemical equilibrium
3. Parameterize solution behavior and calculate solution concentrations given the appropriate equilibrium constants
4. Apply knowledge of equilibrium constraints to a range of systems of interest
5. Investigate solution behavior using electrochemical methods, including potentiometry, voltammetry, and ion selective electrodes.

Prerequisite Skill Set
The background needed for successful completion of this course includes first-year chemistry, stoichiometry, algebra, spreadsheet skills, and interpretation of chemical information and science writing.
III. Course Content

1. Introduction
   a. The Analytical Process (Ch 0) and Measurements (Ch 1)
   b. Experimental Error (Ch 3) and Statistics (Ch 4)
   c. Quality Assurance (Ch 5)
   d. Review (Appendices A, B, D, E)

2. Chemical Equilibria, Part I
   a. Equilibrium Fundamentals (Ch 6, 7 [exclude 7.4-7.5], 8.1-8.3)
   b. Systematic Treatment of Equilibrium (Sec 8.4-8.5)
   c. Acids and Bases (Ch 9, 10, 11, 13)

3. Electroanalytical Chemistry
   a. Fundamentals (Ch 14)
   b. Potentiometry (Ch 15)
   c. Redox Titrations (Ch 16)
   d. Electroanalytical Techniques (Ch 17)

4. Chemical Equilibria, Part II
   a. Complexation (Ch 12)
   b. Gravimetry (Ch 27)
   c. Precipitation Titrations (Sec 7.4-7.5)
   d. Advanced Applications

Required Text

Course Website
The course website is under ICON (http://icon.uiowa.edu). Login with your username and password. Announcements, syllabus, course content, supplemental readings, and grades will be posted here. Please check for homework updates that may contain clarifying information.

Practice Problems
The following problems from the course textbook are recommended to practice problem solving skills needed for exams. These problems will not be collected or graded. Answers to some of these problems may be found in the textbook; the optional Solutions Manual will contain all solutions.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Suggested Problems</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>A-C, 12, 15, 19, 20, 26, 28, 33</td>
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<tr>
<td>3</td>
<td>4, 7, 11, 13, 14, 15, 18</td>
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<tr>
<td>4</td>
<td>A, B, G, 1, 11, 16, 32</td>
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<tr>
<td>5</td>
<td>A, B, D, 5, 6, 11, 12, 14, 18, 23, 30</td>
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</table>
IV. Grading

Format
Plus or minus grades will be appended to the letter grades assigned for the course. Final grades will be weighted.

Problem Sets
There will be ten graded problem sets in this course. Problem sets are designed to highlight important concepts and critical problem-solving skills. They are intended to be challenging and will require time, thought, and practice. Do not wait until the last minute to start on these assignments.

You are encouraged to work in groups on problem sets. Acceptable group behavior is described below.

Due dates are listed in the schedule below. Note that problem sets are due at the start of class. No late assignments will be accepted.

Exams
There will be four exams in this course. Three exams will be held in-class and will cover the following material:

Exam 1: Introduction, Equilibrium Fundamentals
Exam 2: Systematic Treatment of Equilibrium, Acids and Bases
Exam 3: Electroanalytical Chemistry

The final exam is cumulative and will be held during final exam week. Exam dates are listed in the schedule below.
Grading Scheme
Problem Sets 30% (each assignment 3%)
In-class exams 45% (each exam 15%)
Final exam 25%

Re-grading
Adjustments to grades will only be considered within one week after an assignment or exam is returned. The re-grade request must be accompanied by a written, detailed description of the grading concern. Re-grading will involve re-assessment of the entire assignment and may increase or decrease of the grade.

Extra Credit
Any extra credit will be given at the discretion of the instructor. Extra credit opportunities may appear in the form of classroom participation, pop-quizzes, or exam questions.

V. Course Conduct

Attendance
Attendance is mandatory for all exams. In the case of an excusable absence (e.g. illness, mandatory religious obligation, certain University activities, or unavoidable circumstances), documentation must be provided to the instructor in advance of foreseeable absences or within 72 hours of unforeseeable absences.

For non-examination class periods, attendance is strongly encouraged, but not required.

Classroom Etiquette
Students shall conduct themselves in a manner that will not disrupt the learning of other students.

Cell phones may not be used in class for any reason. All personal devices must be silenced prior to the start of class.

Students may not use internet in class, unless instructed.

Exam Conduct
Calculators: To minimize the possibility of academic misconduct during exams, students will not be allowed to use their own calculators. Calculators will be provided for use on exams.

Time Limit: In-class exams are limited to the class period and a strict time limit is enforced. A two-hour period is allowed for the final exam. Please show up on time for exams and turn in your exam promptly at the end of the period when asked.

Personal Belongings: During exams, all personal belongings, including books, bags, notes, mobile devices, and computers, must be left at the front of the room.
Group Work

Students are encouraged to work in groups on graded problem sets. Discussion and collaboration will inspire creative and critical thinking. Remember that each student is required to turn in their own work. You may not copy from one another. Any questions about what constitutes acceptable group behavior should be directed to the instructor.

Cheating

You are expected to be honest and honorable in your fulfillment of assignments and in test-taking situations. Cheating is not tolerated. If you are found to be cheating, I will pursue the maximum possible penalties. If you have any questions about what constitutes cheating, please consult the Student Academic Handbook and/or the instructor.

VI. Schedule

<table>
<thead>
<tr>
<th>Due</th>
<th>Date</th>
<th>Time</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework 1</td>
<td>September 03</td>
<td>10:30 AM</td>
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<tr>
<td>Homework 2</td>
<td>September 10</td>
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<tr>
<td>Homework 3</td>
<td>September 17</td>
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<td>Exam 1</td>
<td>September 24</td>
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<td>Homework 4</td>
<td>October 01</td>
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<td>Homework 5</td>
<td>October 08</td>
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<td>Homework 6</td>
<td>October 15</td>
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<tr>
<td>Exam 2</td>
<td>October 22</td>
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<td>Homework 7</td>
<td>October 29</td>
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<td>Homework 8</td>
<td>November 05</td>
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<tr>
<td>Homework 9</td>
<td>November 12</td>
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<td>30</td>
</tr>
<tr>
<td>Exam 3</td>
<td>November 19</td>
<td>10:30 AM</td>
<td>150</td>
</tr>
<tr>
<td>Homework 10</td>
<td>December 03</td>
<td>10:30 AM</td>
<td>30</td>
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<tr>
<td>Final Exam</td>
<td>December 15</td>
<td>9:45 AM</td>
<td>250</td>
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</tbody>
</table>

TOTAL 1000

VII. Administrative Details

Chemistry Center
Chemistry Building E225
(319) 335-1341

Here, you may obtain signatures to add/drop chemistry courses.

Department of Chemistry Office
Mark Arnold, Departmental Executive Officer
Chemistry Building E331
(319) 335-1350
**Administrative Home**
The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Student Academic Handbook.

**Electronic Communication**
University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences. (*Operations Manual, III.15.2. Scroll down to k.11.*)

**Accommodating Disabilities**
A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See [www.uiowa.edu/~sds/](http://www.uiowa.edu/~sds/) for more information.

**Academic Fraud**
Plagiarism and any other activities when students present work that is not their own are academic fraud. Academic fraud is a serious matter and is reported to the departmental DEO and to the Associate Dean for Undergraduate Programs and Curriculum. Instructors and DEOs decide on appropriate consequences at the departmental level while the Associate Dean enforces additional consequences at the collegiate level. See the CLAS Academic Fraud section of the Student Academic Handbook.

**CLAS Final Examination Policies**
Final exams may be offered only during finals week. No exams of any kind are allowed during the last week of classes. Students should not ask their instructor to reschedule a final exam since the College does not permit rescheduling of a final exam once the semester has begun. Questions should be addressed to the Associate Dean for Undergraduate Programs and Curriculum.

**Making a Suggestion or a Complaint**
Students with a suggestion or complaint should first visit the instructor, then the course supervisor, and then the departmental DEO. Complaints must be made within six months of the incident. See the CLAS Student Academic Handbook.

**Understanding Sexual Harassment**
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.
Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety website.

*These CLAS policy and procedural statements have been summarized from the web pages of the College of Liberal Arts and Sciences and The University of Iowa Operations Manual.