CH1122: Studio Laboratory II
Spring 2012

Class info

Laboratory: Tuesday/Thursday, 9:35 am – 12:20 pm in ChemSci 708
Recitation: Tuesday, 2:05 – 2:55 pm in ChemSci 106
Text: Chemistry (8th Edition) by Zumdahl and Zumdahl

Contact info

Instructor: Sarah Weinreis (call me Sarah)
Email: saweinre@mtu.edu
Webpage: on Canvas: http://mtu.instructure.com/
Office Hours: Mon. 1 – 3 pm; Wed. 8:30 – 10:00 am; Thu. 2 – 4 pm in ChemSci 701A.
Also available by appointment (email me)

Recitation: Dr. Sarah Hill
Email: sarahill@mtu.edu

TA: Gregg Hasman
Email: gdhasman@mtu.edu

CLC: Lois Blau
Email: lablau@mtu.edu

What this class is about

The Studio Laboratory provides an overview of the chemical concepts and laboratory techniques that the chemistry department believes are important to your chemistry careers. This course places a strong emphasis on developing your laboratory skills.

Studio Laboratory II focuses on kinetics, equilibrium, acids and bases, electrochemistry, organic chemistry, and biochemistry.

Class structure

A typical week will be laid out as follows:

Tuesday: 9:35 am – 12:20 pm Laboratory Session
2:05 pm – 2:55 pm Recitation Session
Thursday: 9:35 am – 12:20 pm Laboratory Session

Recitations will be structured to provide you with opportunities to ask questions and improve your understanding of material from the previous week. Your recitation instructor, Dr. Hill, will describe the recitation format during the first session.

Note: Theory is important!

The first 30-60 minutes of each laboratory session will focus on the theory behind the experiments you will be performing. The material presented in class will provide ONLY a foundation on which to build your independent study. In order to earn a good grade in this course, you will need to spend a few hours each week working problems independently and using your textbook to expand your notes. It is up to you to make sure that you understand the theory behind the experiments you perform in this class.
Lab reports

A formal, typed lab report will be assigned for approximately one experiment each week. This report will be collected one week after the experiment is performed. Experiments requiring a formal lab report are indicated on the course schedule. Please see the “Lab Report” handout for specific lab report requirements.

Lab notebooks

You will be provided with a lab notebook for this course. For experiments not requiring a formal lab report, you will be graded based solely on your notebook pages. These will be collected one week after the experiment is performed. For experiments requiring a formal lab report, you must hand in your notebook pages with the report. Please see the “Lab Notebook” handout for notebook formatting details.

Homework

We will have weekly homework assignments that will comprise 15% of your grade. These assignments will be assigned in class on Thursday and are due the following Friday. Some important rules:

- **iClickers.** We will use iClickers in lecture. 20% of each homework assignment grade will come from your iClicker score for that week in lecture (10% participation, 10% correctness).
- **You may (and should!) work with classmates.** However, you must hand in an individual copy of the assignment. See “Collaboration” below.
- **Show and explain all of your work!** Show enough work and include enough explanations so that a classmate could verify and understand every step on their own, without having to make any big leaps of logic. If you're not sure, ask me.
- If you have questions, feel free to come to my office hours, or email me.

Collaboration

You may (and should!) work and study with your classmates. Some rules:

- **Collaborate, don’t copy.** The best way to work with others is to discuss problems together at a whiteboard. Directly copying work isn’t collaboration.
- **Write only what you understand.** If a classmate helped you solve a problem and you’re still confused, don’t turn it in as your own work. See me before it’s due.
- **Give credit where credit is due.** If someone helped you with a problem, write a note in the margin giving them credit. Cite your sources in a lab report. This is good form and won’t hurt your grade.

Handouts

You will be provided with digital and print copies of the class PowerPoint slides in class. Copies of these notes are NOT designed to replace taking good notes, but they will allow you to focus on classroom discussion rather than frantically copying everything from the slides. I will pace my lectures based on the assumption that you are using your copies of the PowerPoint slides.

Exams

There will be three midterm exams, each worth 10% of your grade. Dates are listed on the attached schedule. Exams will be hand-graded. There will be one comprehensive final exam on Thursday, April 26 (8 – 10 am).

To compensate for the evening exams, I will cancel the three hour laboratory session on Thursday, March 1st, which is the Thursday before Spring Break.
Pre-lab quizzes

On Thursdays, the TA will administer pre-lab quizzes. These quizzes will cover material from the previous two lectures and will measure your preparation for the day’s experiment. The pre-lab quizzes will contribute to your “laboratory” grade, which makes up 20% of your final grade in CH1122.

Absences and late work

Late assignments will be penalized 10% of the assignment value per working day (M-F). If you require an extension, you must request that extension when the assignment is distributed, not when it is due.

Attendance in class is mandatory. If you miss more than two unexcused class sessions, you risk an automatic fail in this course. If you are repeatedly late to class, you risk an automatic half-grade reduction.

For exams, an unexcused absence = an automatic zero. The Office of Student Affairs or your instructor may grant an excused absence:

- If you know ahead of time that you are going to miss an exam for a university excused absence, let me know immediately! Failure to provide at least one weeks’ notice will result in your misery.
- If you unexpectedly miss an exam with an excuse, let me know immediately afterwards! In the case of sickness, you must have a doctor’s note stating that your illness prevented you from taking the exam, not simply that you visited the doctor’s office.
- The Office of Student Affairs can help you with excused absences. If you are unable to notify instructors concerning your absence from class or if you must notify several instructors on short notice, you should contact the office at 906-487-2212 or deanofstudents@mtu.edu.

Excused absences will not be given to travel home or to attend a social event.

Grades!

Here’s a breakdown of your grade:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Component</th>
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<tbody>
<tr>
<td>10%</td>
<td>Exam 1</td>
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<tr>
<td>10%</td>
<td>Exam 2</td>
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<tr>
<td>10%</td>
<td>Exam 3</td>
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<tr>
<td>20%</td>
<td>Final Exam (comprehensive)</td>
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<tr>
<td>20%</td>
<td>Laboratory (reports, notebook, and pre-lab quizzes)</td>
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<tr>
<td>15%</td>
<td>Homework</td>
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<tr>
<td>15%</td>
<td>Recitation</td>
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</table>

Your grade will be based on the percentage of total accumulated points, weighted as shown above. Final grades will be assigned using the following grading scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>88% - 100%</td>
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<tr>
<td>AB</td>
<td>85% - 87.9%</td>
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<tr>
<td>B</td>
<td>78% - 84.9%</td>
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<tr>
<td>BC</td>
<td>75% - 77.9%</td>
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<tr>
<td>C</td>
<td>68% - 74.9%</td>
</tr>
<tr>
<td>CD</td>
<td>65% - 67.9%</td>
</tr>
<tr>
<td>D</td>
<td>60% - 64.9%</td>
</tr>
<tr>
<td>Fail</td>
<td>below 60%</td>
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</table>

I reserve the right to modify this grading scale, but only in ways that do not hurt your grade. Borderline grades are set at my discretion. If you are worried about your grade, see me sooner rather than later. I’m glad to discuss your grade and discuss ways to improve it.
Academic Integrity policy

MTU expects honesty and integrity to be the ordinary way of life in all university activities. Plagiarism, cheating, fabrication, and facilitating academic misconduct are all forms of academic dishonesty are defined in the university policy (see Definitions of Academic Dishonesty in the university policy). Specific violations in this course would be copying raw data for a lab without actually participating in the work resulting in the data, inventing raw data, using old lab reports for anything more than formal purposes, the intentional use of any unauthorized study aids, equipment, or another’s work during an examination, and allowing/helping another individual to cheat. Possible sanctions include an academic integrity warning, grade reduction, an “F*” grade indicating failure due to academic dishonesty, suspension, or expulsion.

Chemistry Learning Center

The CLC is a free service provided by the Department of Chemistry and the University to provide support for students enrolled in first year chemistry courses. The CLC is located in room 208 of the ChemSci building and staffed by upper level undergraduates (coaches). The CLC offers include weekly appointments, walk-in assistance, a reference library, computer-assisted learning, and a comfortable place to study chemistry. Stop by for more information.

Walk-in Assistance: Beginning on Tuesday, January 17th, the CLC walk-in hours are:

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Not open Spring Semester</th>
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<tbody>
<tr>
<td>Sunday</td>
<td></td>
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<tr>
<td>Monday</td>
<td>12:00 noon – 4:00 pm</td>
<td>7:00 – 9:00 pm</td>
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<tr>
<td>Tuesday</td>
<td>12:00 noon – 4:00 pm</td>
<td>7:00 – 9:00 pm</td>
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<tr>
<td>Wednesday</td>
<td>12:00 noon – 4:00 pm</td>
<td>7:00 – 9:00 pm</td>
</tr>
<tr>
<td>Thursday</td>
<td>12:00 noon – 4:00 pm</td>
<td>Closed</td>
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</tbody>
</table>

Weekly Appointments: Students who would like to have a scheduled weekly individual appointment with a coach must be enrolled in CH0100. Students enrolled in CH0100 should visit the CLC during the first week of class to sign up for a weekly appointment time. You must attend your first weekly appointment, which begins the second week of classes. Grades in CH0100 are satisfactory/unsatisfactory based on attendance. You are expected to attend every appointment. However, you are allowed to miss one appointment if an emergency comes up and still receive a satisfactory grade.

Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990 (ADA). If you have a disability and need a reasonable accommodation for equal access to education or services, please contact the Office of Student Affairs, Administration/Student Services Room 170, 487-2951.
Topics to be covered

Below, you can find a list of topics we will cover in this course. The attached schedule will help you prepare for class by reading the relevant chapters both before and after lecture. Please note that the schedule is tentative – things may change, and you will be alerted to these changes in class, by email, and on the course Canvas page.

**Topic 1: Chemical Kinetics**
- Reaction Rates (12.1)
- Rate Laws (12.2 - 12.3)
- Integrated Rate Laws (12.4)
- Reaction Mechanisms (12.5)
- Temperature Dependence (12.6)
- Catalysis (12.7)

**Topic 2: Chemical Equilibrium**
- Equilibrium Condition (13.1)
- Equilibrium Constants (13.2 - 13.4)
- Equilibrium Concentrations (13.5 - 13.6)
- Le Châtelier’s Principle (13.7)

**Topic 3: Acids & Bases**
- Acid-Base Concept (14.1)
- Acid Strength (14.2, 14.9, 14.10)
- The pH of Strong and Weak Acids (14.3-14.5)
- Bases (14.6)
- Polyprotic Acids (14.7)
- Acid-Base Properties of Salts (14.8)

**Topic 4: Aqueous Equilibria**
- Common Ion Effect (15.1)
- Buffers (15.2 & 15.3)
- Titrations (15.4 & 15.5)
- Solubility & Solubility Product (16.1)
- Precipitation & Qualitative Analysis (16.2)
- Complex Ion Equilibria (16.3)

**Topic 5: Redox & Electrochemistry**
- Redox Reaction Recap (4.9, 4.10, 18.1)
- Galvanic Cells and Reduction Potentials (18.2 - 18.4)
- Concentration Cells (18.5)
- Batteries and Corrosion (18.6 & 18.7)
- Electrolysis (18.8 & 18.9)

**Topic 6: Organic Chemistry**
- Alkanes, Alkenes, and Alkynes (22.1 & 22.2)
- Aromatic Hydrocarbons (22.3)
- Hydrocarbon Derivatives (22.4)
- Polymers (22.5 & 22.6)

**Topic 7: Biochemistry**
- TBA (handouts)
# CH 1122 Preliminary Schedule

Changes may be announced in class, on Canvas, and on the email list.

A superscript "R" indicates that a formal lab report is required for the experiment. Section numbers correspond to Zumdahl and Zumdahl, 8th Ed.

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>1 1/9</td>
<td>1/9 Intro/Check-In ID of an Unknown Chemical Compound&lt;sup&gt;R&lt;/sup&gt;</td>
<td>Kinetics (12.3 - 12.4): Rate and Order of a Chemical Reaction&lt;sup&gt;R&lt;/sup&gt;</td>
<td>Kinetics (12.5 - 12.6): Decomposition of Hydrogen Peroxide</td>
<td>Homework 1 Due Noon</td>
<td></td>
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<tr>
<td>2 1/16</td>
<td>MLK Day</td>
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<tr>
<td>3 1/23</td>
<td>Kinetics (12.6 - 12.7): Rate Determination and Activation Energy&lt;sup&gt;R&lt;/sup&gt;</td>
<td>Equilibrium (13.1-13.4): Iron Thiocyanate Equilibrium Constant</td>
<td>Homework 2 Due Noon</td>
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<tr>
<td>4 1/30</td>
<td>Equilibrium (13.5-13.6): Diammine Silver Equilibrium Constant&lt;sup&gt;R&lt;/sup&gt;</td>
<td></td>
<td>Acid-Base (13.7 - 14.2): Standardization of NaOH Solutions</td>
<td>Homework 3 Due Noon</td>
<td></td>
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<tr>
<td>5 2/6</td>
<td>Exam 1 6 - 7 pm ChemSci 102</td>
<td>Acid-Base (14.3-14.5; 15.4); Acid-Base Titrations&lt;sup&gt;R&lt;/sup&gt;</td>
<td></td>
<td>Winter Carnival</td>
<td></td>
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<tr>
<td>6 2/13</td>
<td>Acid-Base (14.6-14.8): Titration of Diprotic Acids&lt;sup&gt;R&lt;/sup&gt;</td>
<td>Acid-Base (14.9-14.10; 15.4): Det. of $K_a$ by 1/2-titration of a weak acid</td>
<td>Homework 4 Due Noon</td>
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<tr>
<td>7 2/20</td>
<td>Acid-Base (15.2 - 15.3): Buffers&lt;sup&gt;R&lt;/sup&gt;</td>
<td>Acid-Base (15.1, 15.5): Indicators</td>
<td>Homework 5 Due Noon</td>
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<tr>
<td>8 2/27</td>
<td>Aqueous Equilibrium (16.1): $K_{sp}$ of Ca(OH)&lt;sub&gt;2&lt;/sub&gt;&lt;sup&gt;R&lt;/sup&gt;</td>
<td>End Exam 2 Material</td>
<td>No Class</td>
<td>Homework 6 Due Noon</td>
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<td>Spring Break</td>
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<tr>
<td>9 3/12</td>
<td>Qualitative Analysis (16.2; Review Ch. 14 and 15): Cations</td>
<td>Exam 2 6 - 7 pm ChemSci 101</td>
<td>Qualitative Analysis (16.2; Review Ch. 14 &amp; 15): Cations Day 2&lt;sup&gt;R&lt;/sup&gt;</td>
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<tr>
<td>10 3/19</td>
<td>Qualitative Analysis (16.3): Anions</td>
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<td>Qualitative Analysis (18.1): Anions Day 2&lt;sup&gt;R&lt;/sup&gt;</td>
<td>Homework 7 Due Noon</td>
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<tr>
<td>11 3/26</td>
<td>Electrochemistry (18.2 - 18.4): Redox Titrations</td>
<td>Electrochem (18.5-18.9): Voltaic and Electrolytic Cells&lt;sup&gt;R&lt;/sup&gt;</td>
<td></td>
<td>Homework 8 Due Noon</td>
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<tr>
<td>12 4/2</td>
<td>Organic Chemistry (22.1, 22.4): Esterification</td>
<td>Organic Chemistry (22.2, 22.3): Organic Analysis&lt;sup&gt;R&lt;/sup&gt;</td>
<td></td>
<td>Homework 9 Due Noon</td>
<td></td>
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<tr>
<td>13 4/9</td>
<td>Organic Chemistry (22.5 - 22.6): Mozzarella Cheese</td>
<td>Biochemistry: TBA&lt;sup&gt;R&lt;/sup&gt;</td>
<td></td>
<td>Homework 10 Due Noon End Exam 3 Material</td>
<td></td>
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<tr>
<td>14 4/16</td>
<td>Biochemistry: TBA</td>
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<td>Final Exam 8 - 10 am</td>
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<tr>
<td>Finals 4/23</td>
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