Overview

The Chemistry for Life Sciences sequence (CHEM 1081/1082/2081 and associated labs) is a three-semester sequence that was specifically designed to fulfill the chemistry needs of students with life science majors and those interested in pursuing health-related careers. CHEM 1081, with the accompanying CHEM 1065 lab, is the first semester in a three-semester sequence of courses designed to provide a strong chemistry background for students pursuing degrees and careers in the life sciences and is a combination of general and organic chemistry.

This lecture/lab pair fulfills the core physical science requirement of the liberal education requirement. A student may ask, “Why is this course considered an important component to my liberal education?” A liberal educated person is one who can understand complex issues, find credible information, analyze that information, problem-solve, and draw reasonable conclusions based on facts. In this course, these objectives are met, in part, by highlighting the experimental basis for physical theories. For example, kinetic molecular theory can be tested via experimental methods, including the measurement of pressure, volume, and temperature. The hydrogen atom emission spectrum will be used to test predictions made by atomic theory. In the co-requisite laboratory course, open-ended experiments provide you the opportunity to practice the scientific method yourself, as you will formulate, test, and refine hypotheses pertinent to the problems you are studying. This course and the 1065 laboratory will help to develop these skills and to prepare you to be an informed citizen and life-long learner.

During the term, students will complete frequent online homework assignments and in-class activities. There will be three midterm exams, and at the end of the course, students will complete a cumulative final exam.
Prerequisites

In order to enroll in CHEM 1061, students must have either

- passed the Chemistry Placement Exam and been advised to take this course, or
- completed CHEM 1015 or an equivalent course with a grade of C- or better.

If you do not meet these criteria, you must report your situation to the staff in 115 Smith Hall (eric1715@umn.edu; (612) 624-0026) immediately, as they handle all enrollment and registration issues for the course.

Goals

As a component of your undergraduate education here at the University of Minnesota, this course will offer you the opportunity to identify, define, and solve problems and will provide a strong foundation for the mastery of knowledge in the chemistry of life sciences.

When students leave CHEM 1081, students

- can identify, define, and solve problems;
- can locate and critically evaluate information;
- have mastered a body of knowledge and a mode of inquiry;
- can communicate effectively; and
- have acquired the skills for effective and life-long learning.

Course mastery is required because CHEM 1082 builds on content from CHEM 1081. Because the bulk of your overall course grade is determined by your exam performance, it is essential that you are able to demonstrate this mastery during timed exams. CHEM 1082 also has timed exams.

You are responsible for managing your time and resources effectively. Homework assignments are due throughout the semester to help you keep on track. There are a variety of resources available during class and on our course website designed to help you be successful in the course. You must seek out these resources and use them effectively. If developed now, time and resource management skills will serve you throughout your college career.

Course Materials

All course materials are available for purchase from U of M Bookstores in Coffman Union and St. Paul Student Center.

Required

Textbook:


OWLv2 access code:

If you purchased your textbook from the UMN Bookstores, an access code comes packaged for free with your Zumdahl textbook – otherwise, you can purchase an access code by following the online homework instructions on Canvas.

Non-programmable scientific calculator

What should I bring to class?

You should bring your class notebook, something to write with, and the calculator you plan to use during exams.

Very Highly Recommended

Molecular modeling kit
Grading

Students will be evaluated based on online homework, in-class activities, and exam performance only. The grading breakdown is as follows.

<table>
<thead>
<tr>
<th>Exams</th>
<th>OWL homework</th>
<th>In-class activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1: 120 points</td>
<td>80 points</td>
<td>40 points</td>
</tr>
<tr>
<td>Exam 2: 120 points</td>
<td></td>
<td></td>
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<tr>
<td>Exam 3: 120 points</td>
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<tr>
<td>Final Exam: 220 points</td>
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<tr>
<td><strong>Total points possible: 700 points</strong></td>
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</tbody>
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Letter grades (A-F) will be assigned based on the student’s overall cumulative percentage, with the B-/C+ cutoff set close to the class average.

For further details, please see policy.umn.edu/education/gradingtranscripts.

Course Websites

Lecture Canvas site. Students registered in this course must use the Canvas site created for this class. This site is where you will find any information associated with the lecture portion of the course. It will contain a course calendar, syllabus, and resources to help you succeed in our course. You will find your exam and homework scores posted here as well, under the “Grades” link.

Lab (CHEM 1065) Canvas site. This site is where you will find your lab syllabus and multiple resources associated with completion of the laboratory projects. You will view your laboratory grades here, under the “Grades” link. Please note that lab is a separate, graded course that must be taken at the same time you take our lecture course.

OWL site. There is a link from the lecture Canvas site to the OWL homework system. Follow the instructions there to set up your account correctly.

How to be Successful in CHEM 1081

Every student defines success differently. At the beginning of the term, define your goal(s) for CHEM 1081 and make a specific, detailed plan on how to get there. If you get nothing else, take this: **Attending lecture and doing the online homework IS NOT ENOUGH to prepare you to do well on exams.** You must practice the material on your own in depth and often.

In the past, students who have been successful in the course follow these directives.

- **Be prepared for lecture.** Briefly scan the material that is going to be covered during lectures before coming. It helps to have a basic knowledge of what is being discussed during lecture and can help you tailor your questions.
- **Participate in class.** Ask questions when you don’t understand.
- **Study the material covered in class.** It is helpful to review your notes while lecture is still fresh in your mind. If there is something you do not understand, you should ask for help as soon as possible.
- **Work on assigned problems.** Chemistry can only be mastered by applying concepts learned, and the best way to do this is to work on problems. Make sure you understand the concepts presented in the chapter; afterward, attempt the problems related to these concepts. The best way to work on these problems is without the aid of the solutions manual.
- **Participate in a study group.** Study groups can be an effective way of succeeding in this course. Forming a group with 2-3 other students from the class can be a great tool for understanding what you have learned and to discover which concepts you’re still struggling with. Do not go to our study group hoping to learn the material you have not studied. Instead, complete your studying and take your questions to your study group.
- **Get help early.** This class moves very quickly, and we cover a lot of material each week. If you get lost, you must be proactive about getting the help that you need, whether that means going to the tutor room or coming to office hours with questions.
In-Class Activities

During class meetings, we will be employing a variety of in-class activities, including (but not limited to) demonstrations, in-class writing, problem-based learning, and quizzes. These activities are designed to help you engage in the class and master the course material. All in-class activities will be completed during class meetings and will be held at the scheduled times. There will be no make-up activities offered under any circumstances. There will be ~45 points available throughout the semester, but a student will be awarded a maximum of 40 points (to account for missed classes).

OWL Homework

You will have regular, required assignments using OWL, and you can expect to spend at least several hours a week working on them. These assignments are designed to help you keep pace with the material we are covering during lecture. You must have an active OWLv2 account to complete these assignments. All graded assignments will be listed and submitted online, and all assignments are due by 11 pm on the due date. Because assignments are available well in advance of the due date, no make-up opportunities are allowed, and there will be no extensions for failing to complete your homework on time. There will also be practice activities (worth no points) on OWL.

Calculators

Acceptable calculators. Any one-line display calculator is allowed. The TI-30Xa is the suggested calculator for this and all CHEM 1XXX courses and for most introductory physics courses. The TI-30X IIS is an acceptable two-line calculator. These calculators are available in the U of M Bookstores. Many other two-line calculators are programmable and would therefore not be allowed. If you are concerned about whether or not your calculator would be acceptable, you could purchase the recommended calculator for the course, just in case.

Sharing calculators during exams. Calculators may not be shared during exams. If you are concerned about battery failure during the exam, bring a second calculator or extra batteries with you.

Grading Policies

S/N grading. If you are registered for this class on an S/N basis, a grade equivalent to C- or above on the A-F scale will be required to earn an S, and a grade equivalent to D+ or below will earn an N. Many programs and transfer courses do not like S/N grading and will assume it represents the minimum possible grade. Monday, September 16, is the last day to change the grading basis for the semester.

Incompletes. Students who have an excused absence from the Final Exam and have taken all midterm exams may be eligible to earn a grade of I in the course. Incompletes will not be granted if the student is not passing based on the work up to the Final Exam. This grade is NOT routinely assigned. Any grade of I must be made up the next semester CHEM 1081 is offered. After that time, all grades of I will become grades of F. You must fill out an Incomplete Request form (available in 115 Smith Hall) and have it signed by the student, the instructor, and a third party within 48 hours of the Final Exam. See your instructor for details.

Withdrawals. If you decide to drop the class, you must officially withdraw from the course following the specific rules of your college. Please know that students withdrawing from the course will not have any records retained for use upon retaking the course. If you are considering withdrawing from the course for academic reasons, I urge you to come and talk with me during office hours. Your situation may not be as bad as you think it is.
Exams

Times. Exams will be held on the dates listed at the scheduled times (4:40-5:40 pm). The Final Exam will be held from 8-10 am. Adjust your schedule NOW, and plan any travel, weddings, employment opportunities, meetings, etc. around these dates. If you have conflicts with any of these exam dates and times, you should resolve them immediately or drop the course. All exams, including the Final Exam, will be given ONLY at the scheduled dates and times. No make-up exams or alternative exam dates are an option under any circumstances. If you are enrolled in a UMN course with a time conflict, you must submit a course conflict form. The Final Exam must be completed in order to earn a passing grade in the course.

Format. Midterm exams will consist of multiple choice and free response questions and will cover material as outlined in the course calendar. The Final Exam will be cumulative and cover all material presented in the course, including any information presented after Exam 3.

Materials for exams. You must have your U-Card at each of the midterm exams and the Final Exam. All exams are closed book and closed note, and no study aids are permitted, except those provided with the exam itself. No smart phones, cell phones, programmable calculators, or other such electronic devices may be used at any time. Only non-programmable, non-graphing calculators are allowed (see specific Calculators policy).

Exam regrades. Regrade requests must be submitted, via E-mail directly to the instructor, within seven days of exam score posting.

Missed exams. In situations of a true emergency, serious illness, or University-sponsored travel, an excused absence may be granted for a midterm exam. To obtain an excused absence, students must contact the instructor as soon as circumstances allow to discuss the nature of the emergency and to arrange for documentation. The unweighted average of all the student’s other midterm exam scores will replace the zero from the excused midterm exam. Only one missed midterm exam will be replaced in this fashion. If circumstances prevent a student from taking more than one midterm exam, a meeting must be scheduled immediately with the instructor to discuss any options available. Student-athletes with a travel letter who miss an exam due to University-related travel should also contact the instructor early in the semester to determine what arrangements may be able to be made. For more information, please see: http://policy.umn.edu/education/makeupwork.

Tutoring

General and organic chemistry tutor room. General chemistry tutors are available for free on a drop-in basis during the semester in 124 Smith Hall (the schedule is posted on our course Canvas page and on the door of the tutor room). The tutors are there to help you learn and not to simply give you answers. The tutors are actually instructed to ask you questions that will help you understand what concept you are missing that is preventing you from solving a particular problem. Solving the problem yourself with a tutor’s guidance will enhance the depth and retention of your knowledge.

It is important to me that your time is well spent in the tutor room. If tutors are not present at scheduled times, are not helpful, or if they leave for extended periods of time, please let me know immediately.

Private tutors. A list of people available for hire as private tutors is available on our course Canvas site, if this is something you’re interested in.
Appropriate student use of class notes and course material

Taking notes is a means of recording information and personally absorbing and integrating the educational experience. However, disseminating class notes and materials (including exams, lecture videos, practice exams, worksheets, handouts, etc.) beyond the classroom community and/or accepting compensation for taking and/or distributing class notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see http://policy.umn.edu/education/studentresp.

Sexual harassment

“Sexual harassment” means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual’s work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult the Board of Regents policy: http://regents.umn.edu/sites/regents.umn.edu/files/policies/SexHarassment.pdf.

Late registration

Please be advised that joining the course after the start of classes does not excuse you from attendance and/or any work collected and/or graded. You should give careful consideration to this prior to late addition (after the first day of classes) to our course.

Overlapping and back-to-back courses

Enrolling in overlapping or back-to-back courses that do not allow enough travel time to arrive at class meetings (including exams) on time is prohibited. For more information, see http://policy.umn.edu/education/overlappingclasses.

Course Policies

Mental health and stress management

As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health website: http://www.mentalhealth.umn.edu.

Many international students and scholars experience difficulty during their stay in the US, and International Student and Scholar Services (www.iiss.umn.edu) office is available to help.

Student workload expectations per undergraduate credits

For fall and spring semester, one credit represents, for the average University undergraduate student, three hours of academic work per week, averaged over the term, in order to complete the work of the course to achieve an average grade. One credit equals 42-45 hours of work over the course of the term (1 credit x 3 hours of work per week x 14 or 15 weeks in a semester = 42 to 45 hours of academic work. Thus, enrollment for 15 credits in a term represents approximately 45 hours of work per week, on average, over the course of the term.

Student conduct code

As a student at the University you are expected to adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf.

Note that the conduct code specifically addresses disruptive classroom conduct, which means “engaging in behavior that substantially or repeatedly interrupts either the instructor’s ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities.”

Equity, diversity, equal opportunity, and affirmative action

The Department of Chemistry is united in the belief that diversity in all of its forms is good. Collaboration among people of all cultures and backgrounds enhances our experience as scientists and contributes to excellence in teaching, learning, and research. We strive to promote a climate that celebrates our differences and strengthens our department by embracing and working to increase our diversity.

The University provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf.

Issues with your instructor

On occasion you may have a concern or problem regarding this course. You will find your instructor quite willing to discuss this with you. If, however, you wish to discuss it with someone other than your instructor, please contact Prof. Angela Perkins, Director of Chemistry for the Life Sciences, at aperkins@umn.edu. She will serve as a mediator in helping to resolve the issue.

Use of personal electronic devices in the classroom

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. For complete information, please reference http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html.
Disability accommodations

The University of Minnesota views disability as an important aspect of diversity and is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attention, learning, chronic health, sensory, or physical), please contact DRC at (612) 626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with Disability Resource Center and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DRC website, https://diversity.umn.edu/disability/.

Academic freedom and responsibility

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help: your instructor, the department chair, your academic advisor, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost. See the Board of Regents policy for further information: http://regents.umn.edu/sites/regents.umn.edu/files/policies/Academic_Freedom.pdf.

* Language adapted from the American Association of University Professors “Joint Statement on Rights and Freedoms of Students”.

Scholastic dishonesty

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Please see the Student Conduct Code (http://regents.umn.edu/sites/regents.umn.edu/files/policies/Student_Conduct_Code.pdf) for more information. If it is determined that a student has cheated, he or she may be given an “F” or an “N” for the course and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/education/instructorresp.

The Office for Community Standards has compiled a useful list of FAQs pertaining to scholastic dishonesty: https://communitystandards.umn.edu/avoid-violations/avoiding-scholastic-dishonesty.
# Class Schedule and Practice Problems

## Material for Exam 1: R-9, Chapters 1-3

| Chapter 2 | Atomic Structure and Periodicity  
*September 3-17*  
40, 42, 49, 54, 55, 58, 62, 65, 68, 74, 79, 82, 88,  
94, 100, 102, 111, 112, 116, 120, 144, 145  
Chapter 2 Mastery Due Sept. 16 |
| Chapter 3 | Bonding: General Concepts  
*September 17-24*  
32, 34, 38, 41, 43, 44, 48, 50, 51, 56, 57, 70, 77, 85, 95, 103, 107, 110, 112, 114, 118, 119, 123, 125, 132-134, 149  
Chapter 3 Mastery (Sec. 1-5) Due Sept. 23 |
| R-9 and Chapter 1 | Energy, Chemical Foundations  
*September 3*  
Quick Prep and Math Review #1 Due Sept. 9 |

**Exam 1:** Wednesday, September 25, 4:40 – 5:40 pm

## Material for Exam 2: Chapters 3, 4, and 7

| Chapter 4 | Molecular Structure and Orbitals  
*October 1-3*  
12, 22, 24, 31, 32, 34, 35, 46, 53, 56, 57, 59, 60, 83-85, 114  
Chapter 4 Mastery Due Oct. 7 |
| Chapter 7 | Chemical Energy  
*October 8-15*  
26, 28-30, 32, 33, 36, 43-45, 47, 68-70, 72, 74, 77, 78, 81, 83, 85, 86, 88, 91, 93, 96-99, 105, 106, 125  
Chapter 7 Mastery Due Oct. 14 |
| Chapter 3 | Bonding: General Concepts  
*September 24-26*  
32, 34, 38, 41, 43, 44, 48, 50, 51, 56, 57, 70, 77, 85, 95, 103, 107, 110, 112, 114, 118, 119, 123, 125, 132-134, 149  
Chapter 3 Mastery (Sec. 6-12) Due Sept. 30 |

**Exam 2:** Wednesday, October 16, 4:40 – 5:40 pm

## Material for Exam 3: Chapters 8-10

| Chapter 9 | Liquids and Solids  
*October 24-31*  
35, 37, 38, 40, 41, 46, 81, 82, 90, 92-94, 97, 98, 103, 104, 111, 115, 120, 131, 134, 144  
Chapter 9 Mastery Due Nov. 4 |
| Chapter 10 | Properties of Solutions  
*November 5-12*  
25, 30, 31, 33, 35-37, 39, 40, 44-46, 49-51, 53, 55, 57, 61, 63, 65, 67, 70, 72, 73, 75, 76, 79, 82, 84, 89, 96, 97, 101-103, 109, 121, 125, 126  
Chapter 10 Mastery Due Nov. 11 |
| Chapter 8 | Gases  
*October 17-24*  
23, 30, 37, 44-46, 48-50, 52, 54-56, 60-63, 65-70, 74, 76, 81, 84, 85, 87, 89, 90, 95, 99, 107, 112, 114, 127, 131, 136  
Math Review #2 Due Oct. 21  
Chapter 8 Mastery Due Oct. 28 |

**Exam 3:** Wednesday, November 13, 4:40 – 5:40 pm

## Material for Final Exam: Chapters 1-4, 7-10, 12, 15, and 16

| Chapter 12 | Spontaneity, Entropy, and Free Energy  
*November 21 – December 3*  
24, 26, 28, 30, 32, 35, 37, 39, 42, 44, 48, 49, 51, 54, 57, 59, 62, 64, 66, 70-72, 74-76, 79, 80, 82, 86, 88, 97, 101, 105, 109, 112, 114  
(from Ch. 16) 66, 67, 69, 71, 73, 75, 78, 87, 93, 110, 112  
Chapter 12 Mastery Due Dec. 2 |
| Chapter 15 | Solubility and Complex Ion Equilibria  
*December 5-10*  
20, 21, 23, 24, 26, 28-30, 33, 37, 39-41, 43, 47, 49, 53, 55, 57, 59, 77, 80, 82  
Chapter 15 Mastery Due Dec. 9 |
| Chapter 16 | Spontaneity, Entropy, and Free Energy  
*November 14-19, December 3*  
25, 31, 33, 35-40, 42, 43, 46, 50, 53, 54, 56, 57, 60, 82, 85, 105, 106  
Chapter 16 Mastery Due Nov. 25 |
| Chapter 10 | Properties of Solutions  
*November 5-12*  
25, 30, 31, 33, 35-37, 39, 40, 44-46, 49-51, 53, 55, 57, 61, 63, 65, 67, 70, 72, 73, 75, 76, 79, 82, 84, 89, 96, 97, 101-103, 109, 121, 125, 126  
Chapter 10 Mastery Due Nov. 11 |

**Final Exam:** Thursday, December 19, 8-10 am