Introduction to Chemistry 101
Active Learning

Learning chemistry is not a passive event in which you simply absorb facts given by the teacher like a sponge absorbs water. Learning chemistry requires you to take an active role. In fact, in a very real sense you must construct your own version of chemistry and store it away in a form that is meaningful to you.

We are here to help you in every way we can, but ultimately you bear the responsibility for learning chemistry and making it your own. To do this you must go beyond simple memorization of facts to a real understanding of the concepts of chemistry. We want you to learn to “think like a chemist”—to understand the concepts of chemistry in a way that enables you to solve problems because you understand and can apply the fundamental ideas, not because you have memorized a particular solution. This is a lofty goal—it is not easy to achieve this kind of understanding. So how do you do it? You do it by

1. listening to (not just hearing) the overview of the concepts discussed in lecture
2. reading the appropriate sections of the textbook and lecture notes (several times)
3. struggling with homework and online problems
4. having discussions with your peers and your teachers
5. studying to learn instead of studying just to get an “A”
6. recognizing what you do not understand and implementing a plan to achieve greater understanding

The purpose of lecture is not to give a detailed account of a particular topic. Rather the lecturer will give an overview of a topic, showing how a particular topic fits in with previously learned material and why the concept is important. Typically a lecturer will not go over detailed solutions to particular problems but will talk in general terms about how to think through the problems associated with that topic. The lecturer “paints with a broad brush.” Even though there are a lot of other students in lecture with you, you will still be required to take an active role.

The textbook is a source of detailed information about a particular concept and about the problems associated with that concept. Understanding the material in the textbook requires repeated readings and thorough study. The text is dense with ideas that require slow, careful consideration. You should read the text before coming to lecture and practice the example problems located in each section.
The homework in this course requires you to provide the overall strategy for solving the problems. This will show whether you understand the concepts well enough to think your way through an entire problem with no or minimal hints along the way. Your goal is to master solving each problem with no help by the time you take your exam. If you cannot do this, you are not ready and have not mastered the concepts.

The discussion section provides an opportunity for you to interact with other students and the teaching assistant. This is not a session in which the TA does the homework while you listen. In fact you should have your homework completed before you go to class. You will be expected to assume an active role in your discussion section and collaborate with other students.

The lab section provides an opportunity for you to apply some of the chemistry concepts you are learning in lecture and from the text. Through your lab write-ups you have a chance to demonstrate your understanding of chemistry by providing thorough, detailed explanations and answers to lab questions. Your lab TA is there to monitor safety in the lab and help you to fine tune points. It is not the lab TA’s job to provide you with explanations or answers to lab questions that are part of your write-up. Many of the lab days are actually discussion days, allowing you to interact with others in the class to come to a better understanding of the concepts covered in lecture and in your reading. The TA will be there to facilitate your group discussions, not giving you answers as much as helping you and those in your group ask the right questions as you proceed.

In summary, to learn chemistry effectively requires that you must take an active role. You must take responsibility for participating in the activities described above. We are anxious to help you but we cannot do it for you. We believe in you, now believe in yourself and go for it!
Chemistry 101 Course Policies

**CHEMISTRY 101A AND 101B**

**Instructor** Elise McCarren  
**Office** 2026 Chemistry Annex (CA)  
**E-mail** emccarr2@illinois.edu  
**Office hours** Tuesdays and Thursdays from 10–11 a.m. and by appointment  
**Website address** www.chem.illinois.edu

**CHEMISTRY 101C**

**Instructor** Jose Andino Martinez  
**Office** 2024 Chemistry Annex (CA)  
**E-mail** andinoma@illinois.edu  
**Office hours** Monday–Thursday from 9 a.m. to 12 p.m. and by appointment  
**Website address** www.chem.illinois.edu

**COURSE INFORMATION**

**Times:**

**CHEMISTRY 101A AND 101B**

**Lecture** Tuesday and Thursday:  
AL1: 2:00–2:50 p.m., 100 NL  
BL1: 8:00–8:50 a.m., 100 NL  
**Lab** Wednesday  
**Discussion** Friday

**CHEMISTRY 101C**

**Lecture** Tuesday and Thursday:  
CL1: 3:00–3:50 p.m., 100 NL  
**Lab** Wednesday  
**Discussion** Friday

**Required Materials:**

**Lab manual:** *Chemistry 101 Syllabus and Lab Book*, Fall 2017  
**Calculator:** A simple calculator that performs scientific notation. Using a graphing calculator (e.g. TI-84) is acceptable as well. NOTE: Ti Nspire is not allowed.  
**Safety goggles:** You must purchase the Honeywell Uvex Stealth OTG safety goggles. These can be purchased in the bookstore.  
**Regulation lab coat:** This can be purchased in the bookstore.  
**Lab notebook:** Any notebook designated for the lab, or college-ruled theme paper.  
**i-Clicker:** This can be purchased in the bookstore.

**Grading:**

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Percent of Grade</th>
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<tbody>
<tr>
<td>Hour exams (3)</td>
<td>450</td>
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<tr>
<td>Final exam</td>
<td>300</td>
</tr>
<tr>
<td>Lab write-ups</td>
<td>150</td>
</tr>
<tr>
<td>Electronic homework</td>
<td>60</td>
</tr>
<tr>
<td>Lab Cleanliness</td>
<td>10</td>
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<tr>
<td>Clicker questions</td>
<td>10</td>
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<tr>
<td>Stoichiometry Workshop</td>
<td>10</td>
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<tr>
<td>TA Evaluation</td>
<td>10</td>
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<tr>
<td><strong>1,000</strong></td>
<td><strong>100%</strong></td>
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</tbody>
</table>
Exam Dates:
There will be three regular exams during the semester. These will be given from 7:00 p.m. to 8:30 p.m. on:
- Tuesday, September 26 (Chapters 1, 2, 3.1–3.5, 4, 5, 8, 13.1–13.9)
- Tuesday, October 31 (Chapters 6, 7.1–7.4, 9.1–9.5, 13.10, 15.1–15.2, 15.4–15.7)
- Thursday, December 7 (Chapters 10.1–10.3, 11, 12, 14.1, 14.3–14.4)
Conflicts for exams must be arranged ahead of time. A signup sheet will be provided a week before each exam.
Note: Practice exams will be available electronically to help you prepare.

Final Exam:
The final exam will be cumulative. There is no scheduled conflict for the Final Exam. Do not make plans to leave campus before the Chemistry 101 final. Make sure you know which lecture you are in because this determines your final exam date above.

COURSE DETAILS
Lectures:
- **101A**: Lectures meet each Tuesday and Thursday from 2:00–2:50 p.m. in 100 Noyes Lab.
- **101B**: Lectures meet each Tuesday and Thursday from 8:00–8:50 a.m. in 100 Noyes Lab.
- **101C**: Lectures meet each Tuesday and Thursday from 3:00–3:50 p.m. in 100 Noyes Lab.

The purpose of the lecture is to present and discuss main concepts and ideas. The emphasis is on how to think about chemistry. Active participation (asking/answering questions and talking to your peers) is required, especially through the use of your i-Clicker.

Creating a Positive Learning Environment for All:
Due to the large number of students in lecture and the nature of the stadium-style seating in the lecture hall, it is very easy to get distracted in this environment. Therefore, it is very important to respect your classmates and create a positive learning atmosphere for all. One of the best ways to do this is to ban the use of all laptops, tablets, and cell phones during lecture. The personal time with the instructor and each other is very valuable since we only meet twice a week and material moves fast. Research shows that students in these lecture environments learn more effectively and perform better on exams when these devices are not used. Most importantly, they distract others around you.

Thus, when attending lecture, keep these points in mind:
- Before lecture begins, put your cell phones and/or tablets in “airplane” mode and close your laptop.
- As instructors, we understand that you have good reasons for wanting to use these devices. We know that this is hard for you but feel it is critical to the learning process. Remember, we are here to help you.
- Have your notebook, writing utensil, i-Clicker, and learning attitude ready to go!
Discussions:
Discussion sections meet each Friday. This is the time to ask questions of a teaching assistant and to be asked conceptually challenging problems. Active participation is required.

Laboratory:
Labs meet each Wednesday. Always bring your textbook, lab manual and calculator to lab. You will perform the experiment or activity and complete as much of the lab write-up as you can before leaving the lab. If you decide to leave the lab early, you must turn in your lab write-up (anything not completed will be given a score of zero). Lab write-ups are due within the first five minutes of your Friday discussion section (or in one case next lab section) or else NO CREDIT is given. The exceptions are the Review Questions before each exam. These are due online by the specified due date. We also encourage you to turn lab write-ups in early! Furthermore, you will often perform your lab experiments with at least one other person. While this collaboration is important and helpful, you will submit your own lab write-up and write it in your own words. The only way to assess what you learned as an individual is to grade your own work! Turning in identical lab write-ups (even portions of it) is considered cheating. We will follow the university code regarding any Academic Integrity violation: http://studentcode.illinois.edu

You must be present in lab to receive credit for the lab write-up. Late lab write-ups will not be accepted due to the number of students in the course and to be fair and consistent with everyone.

Office Hours:

**101A/101B:** Office hours are on Tuesdays and Thursdays from 10:00–11:00 a.m. You can also make appointments to meet with me by sending me an e-mail.

**101C:** Office hours are on Tuesdays and Thursdays from 9:00–10:00 a.m. You can also make appointments to meet with me by sending me an e-mail.

TAs will have at least 2 hours of office hours each week in the Chemistry Learning Center. Your TA will discuss these with you in class in both lab and discussion.

Regrade Policy:
Regrades on any lab write-ups must be submitted within one week of receiving the graded lab. Regrades on exams must be submitted by the end of that class period in which the exam is returned.

Learning Center (2021 Chemistry Annex):
General chemistry TAs will usually be available for assistance in the Learning Center from 9 a.m. to 5 p.m. Monday–Friday during the weeks classes are in session. Additional texts, study aids, and computers are available.

The hours of operation for the Learning Center are:
- Monday–Thursday 8:30 a.m.–9:00 p.m.
- Friday 8:30 a.m.–5:00 p.m.
- Saturday CLOSED
- Sunday 3:00 p.m.–9:00 p.m.

(These hours are subject to change. Always check www.chem.illinois.edu for the most current hours.)
Students with Disabilities:

To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class are asked to see the instructor as soon as possible.

Academic Integrity:

Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabrication of information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Certain assignments may be submitted through software, which can check for plagiarism. By enrolling in this course, you are indicating implicitly to the instructor that you have read, understand and accept the university's policies and procedures regarding academic integrity and dishonesty (http://studentcode.illinois.edu).
CAMPUS SERVICES

The University of Illinois provides multiple services to new and continuing students for ensuring their success. The following services, though not an exhaustive list, might help.

- **Health Services:**
  - McKinley Health Center: http://www.mckinley.illinois.edu/mhc.html
  - Counseling Center: http://counselingcenter.illinois.edu/counseling/services
  - Wellness Center: http://www.campusrec.illinois.edu/wellnesscenter/
  - Disability Resources and Educational Services: http://www.disability.illinois.edu/

- **Academic Services:**
  - Access and Achievement Program: http://www.las.illinois.edu/students/accessandachievement/
  - Writers Workshop @ Center for Writing Studies: http://www.cws.illinois.edu/workshop/appointments/
  - Career Center: https://www.careercenter.illinois.edu/
  - OMSA Tutoring and Instructional Services: http://www.omsa.illinois.edu/academics/tutoring.html
  - LAS Honors: http://www.las.illinois.edu/students/honors/
  - Illinois Leadership Center: http://www.illinoisleadership.illinois.edu/

- **Diversity and Inclusion Services:**
  - Office of Inclusion and Intercultural Relations: http://oiir.illinois.edu/
  - Women’s Resource Center: http://oiir.illinois.edu/womens-center
  - Office of Minority Student Affairs: http://www.omsa.illinois.edu/
  - LGBT Resource Center: http://oiir.illinois.edu/lgbt-resource-center

- **Crisis Services:**
  - Emergency Dean: http://www.odos.illinois.edu/emergency/index.asp
  - Student Assistance Center/Dean on Duty: http://www.odos.illinois.edu/studentAssistance/index.asp
  - Office for Student Conflict Resolution: http://www.conflictresolution.illinois.edu/

- **Financial Services:**
  - Office of Student Financial Aid Scholarships: http://www.osfa.illinois.edu/aid/scholarships/index.html
  - Office of Student Financial Aid International: http://www.osfa.illinois.edu/aid/international/index.html
  - Illinois Promise: http://www.osfa.illinois.edu/aid/promise.html

- **Miscellaneous Services:**
  - University of Illinois Tenant Union: http://www.tenantunion.illinois.edu/
  - Student Legal Services: http://www.odos.illinois.edu/sls/geninfo/index.html
  - Veterans Student Support Services: http://veterans.illinois.edu/
  - Campus and Community Student Services: http://www.odos.illinois.edu/ccss/
  - Cultural Centers: Asian American Cultural Center, African American Cultural Center, La Casa Cultural Latina, Native American House
### CALENDAR—FALL 2017

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<td>Thanksgiving Break</td>
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**HE** = Hour Exams; **S/F** = Classes start/finish in Chemistry 101

101A Final Exam Date = Wednesday December 20 (7–10 p.m.)

101B Final Exam Date = Tuesday December 19 (7–10 p.m.)

101C Final Exam Date = Thursday December 21 (1:30–4:30 p.m.)

### LECTURE SYLLABUS—FALL 2017

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/29, 8/31, 9/5</td>
<td>Atoms, Molecules, and Ions</td>
<td>4 (plus 1, 2, 3, 5)</td>
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<tr>
<td>9/7, 9/12</td>
<td>Chemical Composition</td>
<td>8</td>
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<tr>
<td>9/14, 9/19, 9/21</td>
<td>Gases</td>
<td>13</td>
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<tr>
<td>9/26</td>
<td><strong>EXAM I: 7:00–8:30 p.m.</strong></td>
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<tr>
<td>9/29, 10/3, 10/5</td>
<td>Chemical Equations and Reactions in Aqueous Solutions</td>
<td>6, 7.1–7.4</td>
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<tr>
<td>10/10</td>
<td>Solutions</td>
<td>15 (Sections 1, 2, 4, 5)</td>
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<tr>
<td>10/12, 10/17, 10/19, 10/24</td>
<td>Stoichiometry</td>
<td>9.1–9.5, 13.10, 15.6–15.7</td>
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<tr>
<td>10/26</td>
<td>Stoichiometry Workshop</td>
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<tr>
<td>10/31</td>
<td><strong>EXAM II: 7:00–8:30 p.m.</strong></td>
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<td>11/2</td>
<td>Energy</td>
<td>10.1–10.3</td>
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<td>11/7, 11/9, 11/14, 11/16, 11/28</td>
<td>Modern Atomic Theory and Chemical Bonding</td>
<td>11, 12</td>
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<tr>
<td>11/30, 12/5</td>
<td>Liquids and Solids</td>
<td>14.1–14.4</td>
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<td>12/7</td>
<td><strong>EXAM III: 7:00–8:30 p.m.</strong></td>
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<tr>
<td>12/20 (Wednesday)</td>
<td>101A FINAL EXAM</td>
<td>(Cumulative)</td>
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<td>12/19 (Tuesday)</td>
<td>101B FINAL EXAM</td>
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<tr>
<td>12/21 (Thursday)</td>
<td>101C FINAL EXAM</td>
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## LABORATORY SCHEDULE

<table>
<thead>
<tr>
<th>Activity/Review</th>
<th>Meets On</th>
<th>Lab Write-up Due</th>
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</thead>
<tbody>
<tr>
<td>Introduction and Check-in</td>
<td>August 30</td>
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<tr>
<td><strong>Activity 1:</strong> Measurements</td>
<td>September 6</td>
<td>September 8</td>
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<tr>
<td><strong>Lab 1:</strong> Explorations with Gases</td>
<td>September 13</td>
<td>September 20</td>
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<tr>
<td><strong>Review Questions for Exam I</strong></td>
<td>September 20</td>
<td>September 22</td>
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<tr>
<td><strong>NO LAB</strong></td>
<td>September 27</td>
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<tr>
<td><strong>Lab 2:</strong> Precipitation Reactions</td>
<td>October 4</td>
<td>October 6</td>
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<tr>
<td><strong>Activity 2:</strong> Nuts &amp; Bolts and Stoichiometry</td>
<td>October 11</td>
<td>October 13</td>
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<tr>
<td><strong>Lab 3:</strong> Limiting Reactants</td>
<td>October 18</td>
<td>October 20</td>
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<tr>
<td><strong>Review Questions for Exam II</strong></td>
<td>October 25</td>
<td>October 27</td>
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<td><strong>NO LAB</strong></td>
<td>November 1</td>
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<td><strong>Lab 4:</strong> Weak Acid Unknown</td>
<td>November 8</td>
<td>November 10</td>
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<td><strong>Lab 5:</strong> Modern Atomic Theory</td>
<td>November 15</td>
<td>November 17</td>
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<td><strong>Activity 3:</strong> Making Models of Molecules</td>
<td>November 29</td>
<td>December 1</td>
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<tr>
<td><strong>Review Questions for Exam III</strong></td>
<td>December 6</td>
<td>December 6</td>
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<tr>
<td>Final Lab Day and Check-out</td>
<td>December 13</td>
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</table>

## ELECTRONIC HOMEWORK SCHEDULE (LON-CAPA)

Generally speaking, you will have three types of electronic homework due throughout the semester.

**Type 1** homework will usually be due on Mondays, and you will have an unlimited number of attempts to complete these problems.

**Type 2** homework will usually be due on Wednesdays, and you will receive a limited number of attempts to complete these problems. (Exact due dates for Types 1 and 2 homework will be posted online as the semester progresses.)

**Prelecture exercises** will encourage you to do your textbook reading and become familiar with the problems associated in each section before each lecture. This will provide a more valuable learning experience for you during the actual lecture time. (Due dates will correspond with the lecture days.)
SUGGESTED TEXTBOOK HOMEWORK FOR CHEMISTRY 101

This homework is in addition to the electronic homework and lab write-ups. Your TA will tell you the specific due dates for the particular problems they assign, and collect them at the beginning of Friday discussion sections. You are expected to understand all of the concepts in these problems. Each problem is found under the *Questions and Problems* section at the end of the chapter.

Note: Chapter 2 and Chapter 3 homework is due Friday, September 1.

**Text Homework for Exam I**

**Chapter 2**: 7, 8, 31, 32, 37, 59, 89, 92

**Chapter 3**: 18, 29, 31, 56, 57

**Chapter 4**: 16, 19, 39, 42, 51, 60, 74, 83, 98, 106

**Chapter 5**: 9, 13, 17, 19, 33, 35, 39, 41, 43, 45, 57, 93

**Chapter 8**: 6, 8, 11, 18, 19, 22, 27, 29, 31, 37, 46, 50, 55, 58, 59, 66, 70, 77, 81, 92, 118, 124

**Chapter 13**: 17, 31, 44, 49, 69, 75, 77, 78, 79, 82, 116, 117, 122, 123, 131, 135

**Text Homework for Exam II**

**Chapter 6**: 2, 6, 13, 16, 18, 24, 40, 73, 76

**Chapter 7**: 11, 15, 18, 22, 26, 40, 75

**Chapter 15**: 34, 35, 37, 49, 55, 59, 61

**Chapter 9**: 5, 14, 16, 24, 29, 35, 45, 48, 90

**Chapter 13**: 85, 87, 89

**Chapter 15**: 64, 65, 67, 70, 91

**Text Homework for Exam III**

**Chapter 10**: 6, 8, 13, 65

**Chapter 11**: 9, 16, 19, 24, 26, 29, 31, 47, 50, 51, 56, 61, 63, 73, 74, 95, 98

**Chapter 12**: 1, 7, 8, 11, 13, 19, 25, 33, 38, 43, 44, 48, 60, 65, 70, 78, 81, 86, 110, 116, 119

**Chapter 14**: 3, 7, 8, 10, 21, 25, 27, 74, 75, 76, 77
# Master Due Date Schedule for Assignments: Fall 2017

(Note: This is a tentative schedule and is subject to change.)

<table>
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<tr>
<th>Week</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
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<tbody>
<tr>
<td>Aug/Sept 1</td>
<td>28</td>
<td>29 First Day of Chem 101</td>
<td>30</td>
<td>31 Have i-clicker purchased</td>
<td>1 Textbook Problems Assignment 1 Chapters 2-3 (Due in Discussion Section)</td>
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<tr>
<td>2</td>
<td>4 LonCapa HW 1 Type 1 7:00 pm</td>
<td>5 Pre-lecture Assignment 1 8:00 am</td>
<td>6 LonCapa HW 1 Type 2 7:00 pm</td>
<td>7 Pre-lecture Assignment 2 8:00 am</td>
<td>8 Text Problems Assignment 2 Activity 1: Measurements Lab Write-Up</td>
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<td>Lab 3: Limiting Reactants Lab Write-Up</td>
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**November: 11th**
- 6th: Pre-lecture Assignment 17
- 7th: Pre-lecture Assignment 18
- 9th: Pre-lecture Assignment 19
- 10th: Pre-lecture Assignment 20
- 12th: Pre-lecture Assignment 19
- 13th: Pre-lecture Assignment 20
- 15th: Pre-lecture Assignment 21
- 16th: Pre-lecture Assignment 22
- 18th: Pre-lecture Assignment 23
- 20th: Pre-lecture Assignment 24
- 22nd: Pre-lecture Assignment 25

**November: 12th**
- 12th: Pre-lecture Assignment 19
- 13th: Thanksgiving Break
- 14th: Thanksgiving Break
- 15th: Thanksgiving Break
- 16th: Thanksgiving Break
- 18th: Thanksgiving Break
- 20th: Thanksgiving Break
- 21st: Thanksgiving Break
- 22nd: Thanksgiving Break
- 23rd: Thanksgiving Break
- 24th: Thanksgiving Break

**November: 13th**
- 27th: LonCapa HW 6 Type 1
- 28th: Pre-lecture Assignment 21
- 29th: LonCapa HW 6 Type 2
- 30th: Pre-lecture Assignment 22

**November: 14th**
- 1st: Textbook Problems Assignment 11
- Lab 4: Weak Acid Unknown Lab Write-Up
- 3rd: Textbook Problems Assignment 12
- Lab 5: Modern Atomic Theory Lab Write-Up
- 5th: Thanksgiving Break
- 7th: LonCapa HW 6 Type 1
- 8th: Pre-lecture Assignment 21
- 9th: LonCapa HW 6 Type 2
- 10th: Pre-lecture Assignment 22
- 12th: Textbook Problems Assignment 13
- Activity 3: Making Models of Molecules Lab Write-Up

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<td>December 17</td>
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<td>Final Exam Chem 101B 7:00-10:00 pm</td>
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<td>December 18</td>
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Legend:
- Textbook Problems Assignment—Introductory Chemistry textbook homework
- LonCapa—LON CAPA electronic homework
- Lab Write-Ups and Activities—Due to your TA in your Friday discussion section
Laboratory Conduct and Policies

PREFACE

This Lab Book contains laboratory experiments, activities, and review questions. All of these have the same goal—to get you to actively think about the chemical principles involved. The emphasis is not on memorization of the “what’s” but on understanding of the “how’s” and the “why’s” of chemistry.

Something you should take note of immediately is that the procedure sections of the labs in this book are quite short and do not list steps for you to follow. This requires you to read and think about the experiments before coming to lab.

In general, before coming to lab, you should:

1. Read about the experiment.
2. Think about the procedure you will follow and write this in your notebook.
3. Read the background material (in the text and your lecture notes).
4. Write any tables you will need for your data/observations in your notebook. Give some thought to the organization of the tables.
5. Read and think about the questions.

The questions asked of you for the lab write-ups often ask for the significance of your results. This requires that you not only understand what you did, and how you did it, but why you did it. It is best to think about all of this before coming to lab.

Also, the discussion questions (or “Additional Questions”) cannot be answered adequately by merely copying words or phrases from the text. These questions require that you apply the knowledge you are getting from the text, lectures, and discussion sections. You will find that you will not be able to answer all of the questions immediately, but that is the point; you should think about these questions for an extended period of time. Take advantage of your time in the lab to discuss these questions with others in the class. You will have sufficient time to think about these questions, and to complete your lab write-ups.

In general, the lab write-ups should include a discussion of your procedure (when appropriate) along with your observations. Finally, you should discuss the significance of your findings by answering the questions. When you are asked to include observations and data, make sure they are presented neatly, and in a format that makes sense. Also, be sure to show all of your work for your calculations.

The concepts in the lab will coincide with what you are learning about in lectures and discussion sections, but will also add to these. It is to your advantage to understand the labs, activities, and discussion questions as these ideas will appear on the exams.
LABORATORY POLICIES

Safety is a high priority when working in the laboratory; therefore, the following policies should be followed AT ALL TIMES. These policies apply to any person who works, or spends time, in the laboratory (students, instructors, TAs, student employees, lab personnel, etc.) and were established to fulfill national guidelines and Illinois state law for working in a laboratory.

Students are required to purchase, and wear, regulation safety goggles for their personal use in the laboratory. These goggles form a complete seal around all sides of the eyes and may be obtained at any campus bookstore. (Note: the current approved safety goggles stocked in the bookstore is the Honeywell Uvex Stealth OTG safety goggles.) Safety goggles are to be worn AT ALL TIMES in the laboratory, not just when an experiment is in progress. To this end, students are expected to put their safety goggles on BEFORE entering the lab. If a student must remove their safety goggles for any reason, they must first leave the lab. The student may then return, once they have properly replaced their safety goggles to cover their eyes. Failure of a student to bring, and wear, safety goggles for eye protection, will result in removal from the laboratory and a grade of a zero for the experiment on that particular day.

Students are required to purchase, and wear, a regulation lab coat for their personal use in the laboratory. These may be obtained at any campus bookstore. Lab coats are to be worn AT ALL TIMES in the laboratory, not just when an experiment is in progress. To this end, students are expected to put their lab coat on BEFORE entering the lab.

• Specific policies for lab coats include: (1) Lab coats must fit properly such that it will cover the arms to the wrist without excess length or bagginess and will cover the legs to just above the knee at minimum, (2) Lab coats must be fully buttoned closed. Open lab coats will not be permitted at any time.

In addition to safety goggles and a lab coat, the following lab attire policies will be enforced for all persons in the lab:

• Students wearing lab coats may wear shirts that do not provide maximum coverage so long as they put their lab coat on BEFORE entering the lab and wear it the ENTIRE time they are in the laboratory, i.e. from the time they enter the laboratory, until the time they leave the laboratory.
• Pants must be worn that cover the entire leg, ending at the top of the shoes. The following items of clothing are NOT permitted: shorts, cropped or capri pants, skirts/dresses that are not full length (i.e. must reach the tops of the shoes), tights, leggings, exercise pants, and other tight-fitting synthetic materials. Students will NOT be permitted to pull their pants down so that they are proper length, to tuck their pants in their shoes, or to pull their socks up over their pants to cover their ankles.
• Shoes must completely cover the foot. Sandals, flip flops, clogs, open-toe shoes, open-back shoes, boat shoes, ballet shoes, and boots that go over the pants are NOT permitted under any circumstances.
• Socks must be worn with ALL shoes as an extra layer of protection.
• Long hair must be tied back (or confined) for both male and female students. Note: Long hair is defined as hair that is at a length that can be tied back.
• Loose clothing is not recommended; however, if it is worn it must be confined. This includes scarves. If a scarf is worn in the laboratory, it must be securely tucked into the lab coat.
It is important to note the following about lab attire:

- If a student is not properly dressed when arriving at the laboratory s/he will have two options:
  - Option 1: the student may leave the lab and receive a grade of a zero for that particular experiment.
  - Option 2: the student may choose to return home to obtain the proper lab attire or call a friend to bring them the proper lab attire. *(Note: if the student is waiting for proper attire to be delivered, s/he must wait in the hallway.)* If the student chooses this option, the following stipulation applies:
    - If the student returns to the lab more than 20 minutes after the start time of the lab, s/he will not be permitted to complete the lab and will receive a grade of a zero for that particular experiment.

It is strongly recommended that students do **NOT** wear contacts lenses in the laboratory. Chemical vapors may penetrate the contact lens material and cause the lens to adhere to one’s eye, which could be detrimental to the eye. Goggles are not vapor tight and do not completely eliminate this absorption. If a student understands this risk and chooses to wear contacts lenses to lab s/he must notify their TA and wear a “CONTACTS” sticker on their lab safety goggles for easy identification in case of an emergency.

Students should avoid direct contact to their skin with all chemicals. Non-latex, regulation approved gloves will be provided for student use during all laboratory experiments.

Students should know the location of the essential safety features in the laboratory:

- Exits, fire extinguisher, safety shower, eye wash station, fume hood (if applicable), chemical spill kit, broken glass box, first aid kit

There is **NO** food (opened or unopened) or drink permitted in the laboratory **AT ANY TIME**.

Chewing gum is not permitted in the laboratory as it can easily be contaminated with chemical vapors.

Students should **NEVER** put anything found in the laboratory (equipment, chemicals) in their mouth. When pipetting a solution in the laboratory, students should **ALWAYS** use a pipet bulb; pipetting by mouth is **NEVER** allowed.

There is **NO** smoking or chewing tobacco permitted in the laboratory **AT ANY TIME**.

**ALL** chemicals should be discarded in the proper waste container, using the approved method, as instructed by the TA. Always check the label of the waste container **BEFORE** discarding waste in any container. **NEVER** pour solutions down the sink or dispose of solid waste in the trash cans.

Waste paper should **ONLY** be discarded in the designated containers, as instructed by the TA. Waste chemicals and glass should **NEVER** be discarded in these containers. Waste paper should **NOT** be disposed of in the trash cans.

Students should always be careful with glassware in the laboratory. Never use cracked or broken glassware. The TA should be notified immediately when any piece of glassware is broken. Any glass
or ceramic equipment/material that breaks should be handled with care and disposed of properly, as instructed by the TA, in the blue and white designated “glass only” container located in the laboratory.

Students are **NOT** permitted to sit or lean on the laboratory benches. Chemicals may be present, though not seen with the naked eye, from previous experiments that could be harmful to skin or clothing.

Laboratory experiments involving chemicals that produce harmful vapors will be dispensed under the ventilated hoods (or other ventilated stations) located in the labs, when available.

Students are **NOT** allowed to work in the laboratory unless the TA is present. Students should wait in the hallway until the TA arrives. Students should wait to begin the experiment until **AFTER** the TA has given instructions.

Reagents should **ONLY** be used in the designated areas. Students should only take the amount of chemical needed from the reagent bottles, as instructed in the procedure, using the appropriate size beaker and funnel. **NEVER** pour chemicals from stock reagent bottles directly into graduated cylinders, test tubes, etc. **NEVER** place pipets in the reagent bottles. In the situation where too much of a chemical has been obtained, the surplus reagent **MUST** be placed in the appropriate waste container, as instructed by the TA; **NEVER** pour unused or excess reagent back into their original stock containers as it can contaminate the entire supply.

Accidents should be reported to the TA and the lab personnel immediately, regardless of how minor the injury may seem.

Students should **ALWAYS** leave the balances clean. Balances are sensitive instruments and should be used with care. To this end, (a) the students should **NEVER** move the balances and (b) if a student spills a chemical on a balance, or the surrounding area, the student should seek assistance from the TA for help in cleaning the spill. Problems with the balances should be reported to the TA.

Music is **NOT** allowed in the laboratory, under any circumstance, as it can be distracting and prevent the TA or others from hearing if a student is hurt and requires help.

Students should do the following before leaving the laboratory:

- Students should wipe down their work area with soap and water.
- Lab benches should be free of equipment.
- All glassware should be washed, dried and returned to its designated location.
- Wash hands with soap and water, even if gloves were used during the experiment.
- Ensure the sinks are free of glass, paper, debris, and standing water.
- All gas outlets and water taps should be turned off.