

Chem 1B GENERAL COLLEGE CHEMISTRY II

Spring 2023

Lecture: **ONLINE**. You will not be required to attend lectures via video conference, e.g., Zoom, on specific days and times.

Lecture slides, videos, and practice problems will be posted on the Chem 1B website.

Laboratory: **IN PERSON - Required**. TTh 6:00-9:10 pm (Section 1065), S 205

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| Instructor: | Lawrence Yee |
| Office/phone: | S 226/755-6887 |
| Office hours: | TTh 5:30-6:00 in S226, T 9:10-9:25 in S205 |
| Prerequisites: | Chem 1A with a grade of C or better |
| Materials: | TEXT: Open Learning Initiative General Chemistry 2: https://oli.cmu.edu/courses/general-chemistry-2/ FREE – Set up an account at https://oli.cmu.edu/jcourse/webui/register/student.do Use this course key: yee-sp23. See https://olihelp.freshdesk.com/support/solutions/articles/32000020120 for help signing up.) Chem 1B website: http://ccchemteach.com Chem 1B Lab Experiments (FREE – go to Chem 1B website) Safety goggles or safety glasses Calculator |
| Optional Materials: | "Chemistry", Open Stax, FREE - https://openstax.org/details/books/chemistry Any chemistry textbook or website or reference that helps you with this class |

COURSE DESCRIPTION

- Chem 1B is a course designed for students in science and engineering programs. Chemistry is a quantitative/predictive science. It is not an isolated collection of facts but a body of knowledge that fits together in laws and theories to describe nature. We will discuss these laws and theories that will allow us to predict chemical phenomena. In Chem 1B, we will discuss solubility and the solution process, chemical equilibria, thermodynamics, chemical reaction rates, electrochemistry, nuclear chemistry, and coordination chemistry. This course is a more detailed look at substances and chemical reactions covered in Chem 1A and their applications.
- This course consists of lecture and lab. Hands-on work and group work will be used to help you learn and understand chemistry. Your learning depends on you; you are responsible for your learning. This course is fast-paced and covers a lot of material. Furthermore, each successive topic builds upon previous topics. To maximize your learning of this material, study the assigned chapters and try working questions/problems at the end of each chapter **prior** to each class. This practice allows you to focus on important points in class discussions and ask questions over material you don't understand. After each class, review your notes and the assigned chapter and try working more questions/problems. When questions arise, please ask! I am available during office hours or by appointment. In addition, ACCESS Program study sessions will be held at least once per week for related problem-solving practice.
- Chem 1B is a 5 unit course. You are expected to work/study/practice 15 hours per week (9 hours for lecture, 6 hours for lab) in this class.

COURSE OBJECTIVES/SKILLS

1. Identify organic functional groups, draw skeletal structures, and distinguish between the same compound, isomers, and resonance structures.
2. Understand organic hydrogenation reactions, oxidation reactions, and reactions that produce esters and amides.
3. Identify the chemical forces in ionic and molecular solutions.
4. Predict solution properties based on colligative properties.
5. Understand factors that determine reaction rate and describe reaction rate with rate law, order, rate constant, and activation energy.
6. Describe reaction mechanisms and relate mechanism to rate law and reaction energy diagram.
7. Understand equilibrium reactions (equilibrium constant, LeChatelier's principle, equilibrium calculation).
8. Apply equilibrium principles to acids and bases
9. Apply equilibrium principles to acid-base titrations and buffers.
10. Apply equilibrium principles to insoluble solids.
11. Predict heat and work in physical and chemical reactions.
12. Predict whether a reaction occurs using thermodynamics.
13. Apply oxidation-reduction reaction principles to batteries.
14. Apply oxidation-reduction reaction principles to electrolytic cells.
15. Identify radiation types and understand nuclear chemistry reactions.
16. Understand coordinate covalent bond and structure of coordination compounds (if time permits).
17. Apply chemistry lab skills, which include the proper use and operation of lab chemicals, equipment, instruments, lab techniques, and safety procedures, to experiments.

STUDENT LEARNING OUTCOMES

By the end of the course, you should be able to apply the course objectives to:

- Given information about a substance, a student will be able to apply chemical concepts, laws, and theories to describe and predict chemical phenomena, such as properties and reactivity.
- Given a chemical problem, a student will be able to apply chemical concepts, laws, and theories to formulate a reasonable solution to this problem.
- Given experimental data, a student will be able to analyze the data, calculate results from data, and interpret results to draw rational conclusions.

ASSIGNMENTS AND GRADING

Your CHM 1B Course Grade (lecture and lab) will be based on your mastery of the 17 Course Objectives.

A = demonstrate knowledge, comprehension, application, analysis, synthesis, and evaluation of concepts and principles

B = demonstrate knowledge, comprehension, application, and analysis of concepts and principles

C = demonstrate knowledge and comprehension of concepts and principles

Your mastery of each Course Objective will be evaluated with these Graded Assignments you will do each week:

- Lecture Quiz (15-20 minutes) or Exam (30-45 minutes).
- Lab Activity.
- OLI Module Reading and Checkpoints for Homework. These Checkpoints are generally easier than Lecture Quizzes but are good preparation and practice.
- Consumer Product of the Week for Homework.
- You are expected to work/study/practice 15 hours per week in this class.

Your Chem 1B grade consists of 13 Lecture Quizzes, 2 Exams, Final Exam, 15 OLI Module Quizzes for homework, 15 Lab assignments, and 6 Consumer Product assignments. Every student will have an Incomplete Grade in this course until every assignment has been completed. Your Course Grade will be determined at the end of the semester when you have completed all course assignments based on the following criteria:

| Grade | Lecture Quizzes | Two Exams and Final Exam | OLI Quizzes | Consumer Product | Lab |
|--------|------------------------------|--|---------------|------------------|---------------|
| A | Pass (Master) 11 of 13 | B+ average ($\geq 85\%$) and A ($\geq 87.5\%$) on 1 of 3 Exams | $\geq 87.5\%$ | $\geq 87.5\%$ | $\geq 87.5\%$ |
| B | Pass (Master) 10 of 13 | B- average ($\geq 75\%$) and B ($\geq 80\%$) on 2 of 3 Exams | $\geq 75\%$ | $\geq 75\%$ | $\geq 75\%$ |
| C | Pass (Master) 7 of 13 | OR C average ($\geq 60\%$) | | | $\geq 60\%$ |
| D or F | Pass (Master) less than 7 | | | | |

A $\geq 87.5\%$, B range (75-87.5%), B- = 75-79.9%, B = 80-84.9%, B+ = 85-87.4%, C = 60-74.9%

Example: A student passes 11 Lecture Quizzes, earns 70% on the 2 Exams and Final Exam, earns 65% on OLI Quizzes, 70% on Science News, and 80% on Lab assignments earns an overall C grade.

13 Quizzes (weekly)

Each Quiz will evaluate one or two Course Objectives and will be given every Friday. *Make sure you are available to take the Quiz on Fridays between noon and 6 pm.* You will be allowed to use your book and notes. Each Quiz is designed to take 20-30 minutes to complete, will consist of 4 or 5 questions, and will be graded **Pass (Master)/Not Pass (Master)**. A Pass (Master) Grade (80% or higher) means you have mastered that Course Objective.

If you do not Pass (Master) a quiz, i.e., do not master a Course Objective, you can **retake** Quizzes 1-5 on 3/3/23, after Exam 1, Quizzes 6-8 on 3/31/23 after Exam 2, and Quizzes 9-12 on 5/12/23 after Quiz 13, and Quiz 13 after the Final Exam on 5/18/23.

Two (2) Exams

Each Exam will evaluate three or more Course Objectives and will be given on Friday, 3/3/23 and Friday, 3/31/23. *Make sure you are available to take each Exam on these days between noon and 6 pm.* You can use your book and notes. Exams are designed to take about 45 minutes to complete.

Final Exam

The Final Exam will cover all Course Objectives and will be on Thursday, 5/18/23. *Make sure you are available to take the Final Exam on this day between noon and 6 pm.* You can use your book and notes. The Final Exam is designed to take 45-60 minutes to complete and is graded A-F.

NOTE: Do **NOT** miss Exams, Quizzes, or the Final Exam. If you know you cannot take an exam on the scheduled date and time, inform me as soon as possible before the exam in **writing** and reschedule the exam. Missing an exam without valid reasons will result in a F grade.

Homework

You have to put in the study time (2 hours of deliberate, active work for every lecture hour) to learn and perform well in this course.

Homework includes:

1. **OLI Module Checkpoints (graded)** on the Open Learning Initiative General Chemistry 2 website. As you read/study a module, try the "Did I Get This" question to practice retrieval of the information you just learned. When you finish a module, take the OLI Quiz. **The OLI Checkpoint is graded.** You will have three attempts; your best attempt score will be your grade. OLI Quizzes for the modules covered that week will be due **Friday at noon.** **Self-testing is an extremely effective way to learn faster and retain more.**
2. **Consumer Product** assignment (**graded**) will increase our awareness of chemistry and science and its effect on and relevance to us and society. This assignment will be ongoing during the semester. See the Consumer Product page on the Chem 1B website.
3. **Retrieval and Deliberate Practice of course material.** While reviewing course material, practice retrieving the information and develop your problem solving skills by doing the Quiz Practice Problems (with solutions) spaced over time on the Chem 1B website. This will help your long term retention of these concepts.

Laboratory

In science, observations are made to discover, learn, and understand what's going on in nature. In a science course, hands-on activities are the best way to make observations and learn science. As such, the laboratory is a very important part of this course. Lectures and labs will be coordinated so you will be able to relate what you do in lab to what you do in lecture and vice versa. You will learn chemistry lab techniques and develop skills to collect data, analyze data to obtain results, and interpret results to draw conclusions. **All laboratory assignments must be completed to pass Chem 1B.** Guidelines for lab procedures and lab safety are described in the Chem 1B Lab web page.

Science is a collaborative endeavor. Employers value employees who know how to work as a team. In Chem 1B Lab, you will work in a group of 2 or 3. When you work in a larger group, assign a team leader, communicator, record keeper, and counselor for each lab and rotate roles for each lab. Each role is described in the Chem 1B Lab web page. Make sure each team member contributes equally to each lab activity. **Expect to spend the entire lab period in lab.**

Your **Lab Grade** consists of:

15 Lab Assignments (weekly)

Lab Activities are designed for you to apply and practice the objectives discussed in lecture to lab and to develop skills to collect data, analyze data to obtain results, and interpret results to draw conclusions. You will work with your lab partners on experiments but **you must submit Lab Assignments individually** due at the end of Thursday's lab.

Lab Safety Factor

The **Lab Safety Factor** will be determined by your lab instructor at the end of the semester. It will be based on your attendance (including **being on time**), your timely submission of lab assignments, your observation of lab safety rules and regulations, Lab Patrol, your lab technique, and your initiative and cooperation (ability to do your own work and an equal share of group work, ability and willingness to work, collaborate, and cooperate with other students). If you arrive late; hand assignments in late; do not observe lab safety, e.g., don't use eye protection, endanger the safety of your peers and instructor; have poor lab technique, or no one likes working with you, you will receive a low lab safety factor grade and a lower lab grade.

Lab Policies

1. Safety glasses or goggles and other appropriate personal protective equipment (PPE) are required in lab. For students who wear contact lenses, you will need to wear safety glasses/goggles over your contact lenses. Try to be aware of your safety as well as the safety of others in lab.
2. FAILURE TO CHECK-IN YOUR LOCKER, whether you drop the course or complete it, results in a \$25 LAB FEE plus a charge for any broken or missing equipment.
3. **ALL LABS MUST BE PERFORMED TO PASS THIS COURSE.**
4. Late lab assignments will be penalized 5% per calendar day.
5. The chemistry lab has 14 computers.
 - a. You **cannot** store your lab data and results on the hard drive of a computer you are using. Please bring a flash/thumb drive to store lab files.
 - b. Each computer is connected to a network printer. You will need to supply your own printer paper.
 - c. These computers are connected to the internet so you can look up scientific information. Please do not download images, files, or software onto these computers.

College Policies

Incomplete grades will only be given to students who are Pass (Master)ing the course, have completed at least 70% of the course requirements, and have special circumstances that prevent completion of the course.

The *Attendance Policy* states that “a college student is expected to attend all of his/her class sessions”. Students who do not attend the first class meeting will be dropped and will be replaced by other students unless the student notifies the instructor in advance. **Non-attendance does not automatically drop you from the course.** You must submit the appropriate forms to the Admissions Office to drop or withdraw from any course at this College. Failure to submit the proper forms will result in a failing grade (F) for the course.

The Department of Supportive Programs and Services (DSPS) coordinates academic accommodations for students with documented disabilities at Hartnell College. If you have, or suspect you may have, a disability that impacts your education, please contact the DSPS Office to determine your eligibility for accommodations. DSPS is located in the Student Services Building B, Room 107 (831) 755-6760. I encourage you to meet with a DSPS Counselor to discuss your specific accommodations and to have test proctoring forms signed 5 days in advance.

Spring 2023 Chem 1B TENTATIVE SCHEDULE

| Week | OLI Module | Course Objective | Tuesday Lab | Thursday Lab |
|----------------------------------|------------|---|--|----------------|
| Week 1 1/23 Quiz 1 | 12-16 | 0. 1A Review 1A skills. 1. ID Organic Functional Groups, bond types, isomers, resonance. | Check-in. Safety. Lab 1. Organic Chemistry: Smells and Odors from Esters | Continue Lab 1 |
| Week 2 1/30 Quiz 2 | 15-17 | 2. Organic hydrogenation, redox, esters, amides reactions. 2/3 Last day to drop with No Grade 2/4 Last day to add | Continue Lab 1 | Finish Lab 1 |
| Week 3 2/6 Quiz 3 | 2, 3 | 3. ID chem forces in ionic and molecular solutions. | Lab 2. Solution Properties | Continue Lab 2 |
| Week 4 2/13 Quiz 4 | 4 | 4. Predict properties based on colligative properties. 2/17 President's Day Holiday | Continue Lab 2 | Finish Lab 2 |
| Week 5 2/20 Quiz 5 | 6-8 | 2/20 President's Day Holiday 5. Understand, describe reaction rate, rate law, order, rate constant, E_a . | Lab 3. I_2 Clock Reaction | Continue Lab 3 |
| Week 6 2/27 Exam 1 | 9 | 6. Describe reaction mechanisms and relate to rate law. | Continue Lab 3 | Finish Lab 3 |
| Week 7 3/6 Quiz 6 | 11-14 | 7. Understand equilibrium reactions (K_{eq} , L-C principle, equilibrium calculations). | Lab 4. Shifting the Direction of an Equilibrium Reaction Using LeChatelier's Principle | Finish Lab 4 |
| Week 8 3/13 Quiz 7 | 14, 16-18 | 8. Apply equilibrium to acids and bases. | Lab 5. Food Preservatives | Finish Lab 5 |
| Week 9 3/20 Quiz 8 | 19, 20 | 9. Apply equilibrium to acid-base titrations and buffers. | Lab 6. Acid-Base Properties of Foods | Continue Lab 6 |
| Week 10 3/27 Exam 2 4/3 | 22, 23 | 10. Apply equilibrium to insoluble solids. 3/31 Cesar Chavez Day – no class Spring Break | Finish Lab 6 Start Lab 7 How to Remove Stains | Finish Lab 7 |
| Week 11 4/10 Quiz 9 | 24, 25 | 11. Predict heat and work in physical and chemical reactions. | Start Lab 8 Energy | Continue Lab 8 |
| Week 12 4/17 Quiz 10 | 25-27 | 12. Predict whether a reaction occurs using thermodynamics. 4/21 Last day to drop with W | Continue Lab 8 | Finish Lab 8 |
| Week 13 4/24 Quiz 11 | 28-30 | 13. Apply redox to batteries. | Lab 9. Batteries and Electroplating | Continue Lab 9 |
| Week 14 5/1 Quiz 12 | 31 | 14. Apply redox to electrolytic cells. | Continue Lab 9 | Finish Lab 9 |
| Week 15 5/8 Quiz 13 | 32-35 | 15. ID radiation types and understand nuclear chemistry reactions. | Lab 10. Nuclear Radiation: Half-Life and Protection | Finish Lab 10 |
| Week 16 5/15 | | 16. Understand coordination chemistry. Review. 5/20 Last Day of Term | Locker check-in. | Final Exam |
| | | Thursday, 5/18 Final Exam | | |

Chemistry Study Strategies

“It is not how smart a person is but how efficiently does a person work?”

-- Dr. Lawrence Doyle, Executive Director, UCLA Medical School Prime Program and Expert on improving study skills, 3/11/11 presentation. Parts of these strategies are adapted from his talk.

You have other classes, a job, a family, and a life. You have academic and professional goals that you want to achieve. You want to learn what you need to learn from every class to prepare you for your next classes and to learn and develop a set of well rounded skills that employers value.

Review, review, review: You will forget 25-30% of what you learned within 1-2 hours (to 12 hours) if you don't review. You'll forget another 25-30% after 24-48 hours if no review.

“**Spacing Effect**” – practice, e.g., learning and reviewing, that is spread out over time enhances long term retention. Cramming does not help you remember.

“**Retrieval effect**” – repeated practice of active retrieval of information, not studying, promotes and enhances long term retention. Repeated retrieval practice through testing was shown to enhance long term retention, whereas repeated studying produced essentially no benefit.

Practice retrieval by **Quizzing yourself** – self-testing is an extremely effective way to learn faster and retain more.

Need to sleep 6 to 8 hours per night. A rested brain and body learns, retains, recalls, and processes information better than a tired one. Put in the time so you don't feel compelled to pull an all-nighter. Cramming does not help you remember.

Study Skills:

1. **Time management. It does not matter how smart you are if you don't or can't put in the time to study.**

Study two hours for every class hour.

It is better to take fewer units and get better grades than to take too many units and get poor grades. *Protect your GPA.*

2. **Memory. See “Spacing Effect” and “Retrieval Effect”.**

Chunking information. Learn better in groups of 4 or less. E.g., phone number: xxx-xxx-xxxx

Use mnemonics, e.g., place mnemonics – relate what you are trying to remember to a place.

Lists – usually items at the beginning and end are learned first and remembered, middle not so well. If items on a list are on flash cards, need to shuffle the cards.

3. **Reading. Relate what you already know to what you are reading.**

Reading a science textbook is **NOT** the same as reading a newspaper or novel.

Scan a chapter before reading it helps you identify main ideas and main points and determine what you are reading.

For example, look over the headings first. Next, read the end of chapter summary. Then, read the chapter. You'll have an idea of what you are reading and know what to look for and focus on.

4. **Note taking. Process information as you get it - class lecture and textbook reading.**

Predict an answer or what the teacher is about to say improves learning. You'll get immediate feedback.

Process information as you get it. Write one idea per line in your notes. Is it a main idea, lesser point, or digression?

Write a summary of the lecture ASAP (ideally at end of lecture). Then, share it with or teach someone else. **(Those who TEACH learn faster and retain more.)**

Compare your notes with other students if you feel you have missed something in a lecture.

Quiz yourself when you are done.

5. **Test taking. Improve your exam performance by taking a PRETEST or PRACTICE TEST (with immediate feedback) to prepare.**

Common mistakes include: **not setting plans** for every test, **premature closure** (get an answer and move on to next question), **change answer** (most people should not change answer. Intuition is usually right. Test taker often tricks self into believing teacher is trying to trick them), and **not reviewing every test** to identify mistakes. **Have a Growth Mindset.** Use visualization to visualize self doing well on test or other goal like athletes do.

Several books have been written on how people get good at something (see “Talent Is Overrated: What Really Separates World-Class Performers from Everybody Else”, Geoffrey Colvin and “The Talent Code: Greatness Isn't Born. It's Grown. Here's How.”, Daniel Coyle). Here are three important factors:

1. **Deliberate practice** is deep, focused practice that makes you get better each time. More than just reading and reviewing, work on practice questions/problems that push you to a deeper learning and understanding. Try to teach someone what you are studying. This is a good reason to study with other students.

2. **Insightful coaching** for help, feedback, and guidance. See your instructor or SI Leader for help.

3. **Motivation** so you feel you are investing your time to accomplish something worthwhile. A positive attitude helps.

EMERGENCY NOTIFICATION

In the event of a life-threatening emergency call 911.

To report a non-life threatening incident, safety hazard, or a suspicious activity please contact campus security at 755-6888

To obtain campus status information, call the campus safety and facilities emergency status bulletin telephone number: 831-796-6222.

From a campus line, simply dial 6222

Please visit Hartnell's emergency reporting link here: <http://www.hartnell.edu/reporting-emergencies>

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| Non-emergency police business.831-758-7321 | Non-life threatening incidents, injuries or illness <ul style="list-style-type: none"> during school hours call Campus Safety 831-755-6888 after school hours call 831-755-6888 | Utility Failure <ul style="list-style-type: none"> during school hours call the Facilities Office at x6950 or 831-755-6950 after school hours call 831-755-6888 | Any incident with potential for adverse publicity to the college <ul style="list-style-type: none"> call President's Office, x6900 or 831-755-6900 after school hours call 831-755-6888 |
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Emergency Text Notifications

In the event of an emergency, Hartnell College can contact you by email, text, and voice. [Hartnell College has partnered with the Everbridge Mass Notification](#) system to provide emergency notifications. The system is used to send emergency notifications to Hartnell faculty, staff, and students in the event of a campus emergency such as a campus closure or hazardous situation. The system will send notifications through email, voice calls, and text messaging.

Students: If you receive an emergency notification, please tell your instructor immediately.

During a campus emergency, you will generally be told to do one of two options, SHELTER IN PLACE or EVACUATE.

When either of these are given, vehicle traffic coming onto campus will likely be turned away. Students are required to obey the directions of staff in a timely fashion.

EVACUATION:

Please note the exit(s) in the room. In the event of an alarm or safety threat, uniformed Hartnell personnel equipped with two-way radios--including security, and maintenance staff--have up-to-date information; they also have the authority to order either shelter-in-place or immediate building evacuation. For evacuation, immediately heed their directions by proceeding calmly and quickly to an exterior assembly area as indicated by trained staff. Please stay back at least 200 feet from any building until the "all clear" command is issued.

SHELTER IN PLACE:

In the event of a safety threat, instructors and staff will lock classroom doors and direct occupants to stay clear of windows. Occupants are requested to remain quiet. During this time, DO NOT access any exits unless directed by first responders or staff. A shelter in place order is also used for severe environmental threats like a thunderstorm.

In the event of an Active Shooter Event, there are three things you need to know in order to survive: [Run, Hide, Fight](#)

[Ready.gov Active Shooter Website](#)

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| RUN Have an escape route and plan in mind Leave your belongings behind Keep your hands visible | HIDE Hide in an area out of the shooter's view Block entry to your hiding place and lock the doors Silence your cell phone and/or pager | FIGHT As a last resort and only when your life is in imminent danger Attempt to incapacitate the shooter Act with physical aggression and throw items at the active shooter |
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EMERGENCY PREPAREDNESS: The first 72 hours of a disaster are often the most difficult, but this period can be less stressful if everyone has extra supplies on hand. The college has a limited amount of emergency supplies, so students and staff should have on campus their own portable emergency kit including snacks, water, and prescription medication; this is especially important for those who may need to shelter on campus. For more information go to <http://72hours.org/>

Students: If you have knowledge of an emergency on campus, share it immediately. If you see something suspicious or potentially hazardous, let someone know.

Reporting suspicious Behavior

If you see suspicious behavior on campus, please contact [Campus Safety](#)

Anonymous reporting of incidents or concerns

Hartnell's Behavioral Intervention Team (BIT) accepts and processes anonymous reports from anyone about incidents or concerns on our campus. Please visit the [Behavioral Intervention Team website](#) for more information.

Reporting Forms

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| Public Incident Report Form Use the Public Incident Report form for: Student Conduct Violations Academic Integrity Issues Student Complaints or Grievances | CARE Form Use the CARE form for: Concerns about Well-being Mental Health Concerns Unusual or Disruptive Behavior | Useful Links Campus Maps and directions Emergency online resources Campus Safety Policies Hartnell's Emergency Alert System Hartnell College Behavioral Intervention Team |
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