

CHEMISTRY 51 (General Chemistry II)

Fall 2023

Professor: Kamran Golestaneh

CRN	LECTURE TIME, (LOCATION)	LAB TIME (LOCATION)
21654	T/Th 9:45-11:10 am (7-1201)	T/Th 11:30-2:40 pm (60-3628)

Please visit: www.chemvision.net and select "MtSAC" and then your course to access your course web page.

Email: kgolestaneh@mtsac.edu (Use this email for primary means of off-campus communication that is not time sensitive!) Instructor is not responsible to provide time sensitive information that you may miss through an absence or lack of attention to important announced or written deadlines during class.) Students are expected to check their school assigned email account regularly (through push notification) in order to not miss important announcements.

Office hours & Locations (Note: Any changes to this schedule will be announced in class and posted on Canvas).

[T, Th 9:00-9:40 am & M, W 1:00-1:50 pm \(on campus 61-1614\)](#)

[Fri 11:15 am-12:15 pm \(60-3617\)](#)

DETAILED COURSE RULES, POLICY & INFORMATION

Course Description (from Mt SAC Catalog)

CHEM 51 General Chemistry II

5 Units (Degree Applicable, CSU, UC, C-ID #: CHEM120S(50+51))

Lecture: 54 Lab: 108

Prerequisite: [CHEM 50](#) or [CHEM 50H](#)

Kinetics, equilibrium, thermodynamics, acid-base and oxidation-reduction reactions, transition metals, electrochemistry, and nuclear chemistry. Emphasis is on critical thinking and mathematical problem-solving. Laboratory experiments support lecture topics and use a variety of instrumentation and technology in data acquisition and analysis.

Required

- Access to a computer and high-speed internet service and Canvas is important for this course. Students are expected to have access to a personal printer or use one of the computer lab's printers to print lab assignments and handouts. You should also have access to Zoom to attend my Zoom office hour. If an emergency situation (ex. transportation issue) prevents my campus attendance, I will be notifying you through your Mt SAC email and hold my class session(s) through Zoom.
- Chemical Safety: You are required to wear an appropriate eye safety and a lab coat during the lab. Your lab coat should cover your arms and below your waist. Safety glasses should provide coverage of the sides and lower section of eyes. If you wear prescription glasses you must purchase goggles that fit comfortably over your glasses. "Shop style" Safety glasses are not approved for chemistry labs. These items should not be stored in your chem lab drawers because these drawers are shared between our course sections.
- Textbook: Chemistry, A Molecular Approach by Nivaldo J. Tro (author), Pearson Education Publishers. Please purchase the 5th (2019) edition: ISBN13: 978-0134874371. You can also purchase the 6th edition (2023) offered at our bookstore and refer to the provided homework posted and assigned out of the 5th edition. If you happen to have an earlier edition please talk to your instructor as you may be able to use it. Your instructor will be assigning homework out of the textbook's end-of-chapter exercises and will not be using an online homework system. Please shop around (Amazon. etc.) for best prices.
- Lab Manual: *Each experiment/activity's pdf file will be posted on your Canvas course.* Students are expected to print these pages and bring them to each scheduled lab session.
- Student Laboratory Research Notebook, 100 duplicate pages (graded).
- 1 Fine Ball Point pen (black) for lab data recording in your laboratory notebook
- Use a pencil for quizzes and exams, erase your mistakes and keep your work neat and organized.

- Your assigned homework should be hand written neatly on 8.5x11 sheets of paper. Use the format posted on *Chemvision.net* (2-page double-sided stapled and listing the problems included on space provided on top). Disorganized work does not receive any credit.
- Scientific Calculator
- USB flash memory for saving your computer files in lab.

Grading Policy

4 Exams (13% each)	52%	Written and multiple-choice format, No make-up exams!
Final exam	10%	Mandatory exam
Homework & Class Work	8%	Graded as 1 (Pass) or 0 (Improve). No Late Assignments accepted!!
Quizzes (4)	4%	Take-home and graded upon correct grading! No late Quizzes!
Attendance	1%	(Deducted upon instructor discretion for absences or being late!)
Total Lecture -----	75%	
Total Laboratory -----	25%	(Breakdown shown in your lab course information!)
Total -----	100.0%	

A letter grade will be assigned according to the following breakdown:

A:100.-88.0%	B:87.9-78.0%	C:77.9-65.0%	D:64.9-53.0%	F:52.9-0%
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If any form of extra credit is offered, it usually no more than 1.0-2.0 % of your overall grade at the discretion of your lecture instructor only! If your grade is borderline (say about 0.5% away from the next letter grade), You may receive the higher letter grade at the discretion of your instructor and upon your course performance.

Success Tips for this course!

1. Do your homework diligently in a way to learn from your homework experience!
2. Ask questions! Use instructor office hours for questions.
3. Pay attention! Don't miss class! Don't stare at or use your phone during lecture and lab! Pay attention to what is going on in class. Be on-time for lecture and lab sessions.
4. Be aware of what is going on in class! Pay full attention to your instructor's lecture. Write your questions and ask them either during class as time permits or during office hours.
5. DO NOT talk to other students during class! Take notes from lectures. Review class notes, PowerPoint presentations after class. You may need to read chapter contents from your textbook or other resources if a topic is not clear for you. Do your homework on a regular basis!

NOTE: Your ability to follow instructions is very important in this course. You can lose 20% or more points deducted from any assigned work for being late or not following any formal instructions. Your course performance will be posted on a regular basis.

Note: It is your responsibility save all your graded work and check your posted grades regularly. Notify the instructor in case of a discrepancy within one week of posting through email.

Special Testing Accommodations, Medical Conditions and Disabilities

*Note: If you have a medical condition or a disability which may prevent you from compliance with the course rules, you must indicate that in writing to the instructor and see a designated college counselor as soon as possible. Special accommodations for these students are available if they are registered with the proper campus accommodation center and approved for these accommodations and services. **If you are set up to take your exams in our accommodation center, you must email the instructor 1 week prior to the test in order to allow for preparation and time needed to drop off your test at the center. Additionally, you are responsible for scheduling your exam on the day shown on the course schedule with the ending time no later or sooner than the class's ending time.***

Attendance and Course Withdrawal

*Being habitually late (after instructor starts the class) is considered disruptive behavior and you are likely to be dismissed from lecture or lab. You must email notify the instructor in case of your absence due to an emergency immediately and provide any supportive paperwork as soon as possible (ex. doctor's note) through email. **You are subject to being dropped from the course at any time, for the following unexcused number of absences at any time prior to the withdrawal deadline.***

- If you miss 3 consecutive lecture
- If you miss 4 lab sessions for any reason.
- If you are late or leave early from 3 consecutive class sessions (considered disruptive behavior).

NOTE: If you have any symptoms of COVID-19 stay home, fill out the *Health Check form* and follow all the steps listed on Mt SAC's web page (<https://www.mtsac.edu/covid19/student-health-check.html>). Email notify your instructor and state that you have completed the necessary steps. If you show up to lecture or lab session with symptoms (sneezing, coughing, fever, etc.) you will be dismissed from the class without having an opportunity to make up the lost work.

If you have any intentions of dropping the course, you must do so as soon as possible and prior to the "W" deadline. *If you stop attending class before the "W" deadline, you may end up with a failing grade for the course. It is generally student's responsibility to drop the course. However, the instructor can drop you for excessive unexcused absences and disruptive behavior.*

Homework Assignments

All homework must be turned in using the template sheets provided on Chemvision.net. All work must be your own work! No portion of your work should be copied from a different source (solution manual, internet resources, classmate, etc.) otherwise you will not learn from your homework experience and risk getting a zero for the assignment. **All grading in this category is based on pass(1) or fail(0).** If students complete about 80-90% of the assigned homework they get a passing grade. **No Late work in this category is accepted! No Exceptions!** Homework must be submitted through Canvas prior to the due date.

The homework problem set table on the course web page (chemvision.net) lists your homework problems for each chapter. Each line of assignment correlates approximately to one lecture period and should be attempted after the lecture. Problem sets with disorganized, messy work will not receive a grade.

Examinations

All cell phones and smart watches should be silenced, away from your reach and inside your backpack during exams and exam review sessions, otherwise your exam will not be considered valid for grading (a grade of zero) for the exam. Exams are administered according to the most revised version of the course schedule posted on Chemvision.net. **Exams are intended for your instructor's evaluation purposes, and are kept by the instructor during the semester/session and it will be destroyed after the semester/session.** Instructor will offer a scheduled follow up session for the entire class to review their graded exam and give everyone a chance to record specific issues they are having with each learning objective. If you miss an exam review session you should make an immediate appointment with your instructor to review your exam during an office visit no later than one(1) week after the official exam review session. Additionally, students who miss these exam review sessions are likely to lose the opportunity to earn extra points added to their exam, if offered. **Exam questions must not be recorded (digitally or by hand) during student review sessions. Students who copy exam questions (in any form) will be dismissed from the review session with a 20% deduction of their exam grade. Students are only allowed to note down the topics that they have lost points on so that they can learn these topics by doing extra homework problems related to their weakness area. If you are not sure about the topic or what to record, ask your instructor during the review session!**

Your final exam is cumulative. **All exams will be closed book and similar in concept to lecture examples and your homework.** You will be provided with appropriate reference materials including a periodic table and a list of conversion factors and constants. You will also need a scientific calculator with log and exponential (scientific) notation but other electronic devices including cell phones will not be allowed during exams. **You may not share calculators during an exam. No make-up exams will be offered.** It is ultimately to your advantage to prepare for and participate in every exam session. **Students who miss one exam due to a valid and substantiated reason (ex. medical emergencies and car accidents) have the option to use the average of their other midterm exams (not the final exam) to substitute for the missed midterm exam. Missing more than 1 exam for any reason will cause a score of zero for subsequent exams.** Smart phones, smart watches, recording devices and electronic dictionaries are not allowed during a test and should be kept away from the student in their backpack. All backpacks must be placed on the floor or backpack cabinets in the laboratory entrance. **Students are not allowed to use the calculator feature of their cell phones. Use restrooms prior to taking the exam. Students are not to leave the classroom during an examination for any reason until the exam is turned in. Students who are more than 30 minutes late into an exam session are not allowed to take the exam resulting in a grade of zero for the exam.** If a student leaves an exam session without turning in their exam papers, they will get a zero(0) grade for the exam. Each student's face should be fully visible during an examination period. (ex. no baseball caps). **All exam grade disputes should be brought to the instructor's attention immediately after the exam review session. All grade disputes should be requested in writing (request through email) and state the issue(s) you are having with your graded exam.**

Problem Solving and Grading

All logical steps must be shown for all calculation type of problems to receive credit for correct steps. Draw a rectangular box around the reported answer(s). All answers should include proper units and significant figures for complete credit. Use pencil for problem solving and show your work in a neat and logical manner to receive credit. If your instructor has a difficult time following your problem-solving logic and/or your work appears messy and disorganized, you may not receive any partial credit. During quizzes and exams, If you are partially correct in setting up a problem, you can get some partial credit (50% or less). Typically for a multi-point problem, mistakes in significant figures, incorrect or missing units as well as round off errors will cost you a one-time deduction of -0.5 points for each numerical problem. Please note that you will not receive any credit if you place a correct answer without showing steps (in a clear and logical manner) leading to the answer. Also, note that if there is reason to believe that the work presented by you (exams, lab reports, etc.) is not yours, instructor reserves the right to conduct an oral interview with you and determine if the work presented is yours and you should earn any credit for it. A voice record of this type of interview will be recorded and saved. If you do not consent to the meeting/recording, you will likely get a zero for the work presented.

Academic Integrity & Courtesy & other important Policies

- **Cheating by copying someone else's work is a serious offense that can ruin your academic record and career. You are not to show or loan your work (homework, exams, lab reports, etc.) to anyone other than your instructor. If another student asks to see your work, do not share the work. If someone copies your work word by word both parties involved will get a zero for the work.**
- **Refer to the college catalog for important policies such as student misconduct, plagiarism and cheating. Any form of cheating and plagiarism will lead to a report of the incident with the college administration.**

The following student misconduct incidents can cause the instructor to expel you from 1 or more class session as well getting no credit (zero) for the work. Examples of student misconduct include (but not limited to):

- a) Cell phones on your desk, clothes pockets or your lap. Cell phones are expected to be away from you in your backpack in silence mode.
- b) Glancing at or looking over someone else's exam papers (with or without copying their work).
- c) Using any text, voice or picture recording devices to record exam contents.
- d) Copying another student's lab report.
- e) Copying another student's lab data unless authorized by the instructor in writing or email.
- f) Receiving any information regarding exam contents in any form (email, etc.) and not informing your instructor about the incident.
- g) Communicating test and quiz contents with another student of your class or any other class.
- h) Any form of copying (if authorized to do so) and without listing the source is an act of plagiarism and punishable.
- i) Having someone else take the course or any form of assessments (on-line or in-class) for you.

What are some of the common types of disruptive behavior that will cause you to be dismissed from the lecture or lab:

- Violating safety rules in the laboratory
- Insulting a classmate or your instructor
- Talking to another classmate during lectures
- Socializing with other students in lecture and lab discussing matters unrelated to the course
- Not wearing your safety goggles in the laboratory
- Making fun of or disrespecting another student
- Socializing in the lab over topics which are not directly related to your lab work or communicating with a noise level that can distract other people and/or instructor's focus
- Using a phone to send, receive or read any text messages during class sessions
- Fooling around, clowning or horseplay during lab or lectures
- Being frequently late for a lecture session. If you happen to be late once enter quietly from the far-side door and sit in the back of the class
- Disrespecting your instructor or using a foul language to communicate
- Habitually coming to class unprepared without having your textbook, calculator and Chemistry and lab notebook
- Sleeping during lectures
- Refusing to follow course-related instructions given by your instructor

Please refer to the current schedule of classes to check important semester dates including deadlines for dropping a course with and without a "W" on your record.

Important!

This detailed course rules, policy and information serves as “binding contract” between you, the student, and course instructor. If you disagree with any part of this contract you should email your instructor and express the matter(s) in writing as early as the first week of the semester and get the instructor’s approval to remain in the course in writing. Ultimately, if you stay with this course past the first week of instructions, you are expected to abide by these rules.

The following is a highly summarized list of learning objectives.

Course Measurable Objectives: (Source: <http://webcms.mtsac.edu/>)

1. Determine the kinetics of a reaction including reaction order, half-life, rate constant, activation energy, and rate law given experimental data.
2. Evaluate whether proposed reaction mechanisms are consistent with given experimental data and rate laws.
3. Write equilibrium expressions for reversible chemical systems.
4. Calculate the equilibrium position, value of the equilibrium constant, and concentrations of all components of the system.
5. Apply Le Chatelier's Principle to systems at equilibrium to predict responses to stresses on the systems.
6. Calculate the pH, pOH, and concentration of all species in aqueous solutions of strong acids, strong bases, weak acids, weak bases, including use of acid and base ionization constants.
7. Write hydrolysis equations and calculate the pH of salt solutions.
8. Predict the relative acidity of binary acids, oxo-acids, and organic acids based on molecular structure.
9. Calculate the pH of solutions at various points along a titration curve.
10. Prepare buffer solutions of a given pH and molarity, and predict the response of the buffers to additions of acids and bases.
11. Calculate ion concentrations using solubility product constants and predict the effect of pH, complex ions, and common ions on solubility.
12. Calculate enthalpy, entropy and free energy for chemical reactions, and relate the equilibrium constant and the spontaneity of reactions to these thermodynamic variables.
13. Assign oxidation numbers and balance oxidation-reduction equations in acidic, basic, or neutral solutions.
14. Apply oxidation-reduction principles to design galvanic cells.
15. Calculate the cell potential and the equilibrium constant of an electrochemical cell under standard and non-standard concentrations.
16. Name coordination compounds and describe their properties including structure and bonding.
17. Balance nuclear decay equations and predict modes of nuclear decay for radioactive isotopes.
18. Calculate the half-life, rate constants, and amounts of radioactive substances using first-order kinetics.
19. Follow safe and proper laboratory procedures in designing and conducting experiments.
20. Observe, collect record data in a laboratory notebook and analyze data and communicate results in written laboratory reports.

The following college website lists example student learning outcomes for our courses. Chem 51 SLO topics are listed here.

<https://www.mtsac.edu/slo/>

Our department has historically gathered student learning outcomes (SLO) upon testing the following topics for this course. You may or may not be tested this semester. If you are, your participation is important in determining our students' weakness and strength areas in Chem 51.

- Chem 51 students will be able to; a. Examine and predict the common ion effect on an equilibrium b. Recognize buffer a solution c. Determine pH of a buffer solutions d. Determine pH of a buffer solution upon addition of a strong acid or base. e. Determine chemical quantities needed in order to prepare a buffer solution.
- Chem 51 students will be able to determine the order, rate law, and rate constant of a chemical equation based on a. Initial rates vs concentration data and b. Graphical analysis of concentration vs time data
- Students completing relevant assignments in Area B courses will evaluate the impact of science on their daily lives
- Chem 51 students will be able to a. determine the equilibrium constant expression (Law of Mass Action) when given a balanced chemical equation b. relate the magnitude of the equilibrium constant to the general position of the equilibrium c. determine the value of the equilibrium constant when given concentrations of reactants and/or products and the equilibrium expression d. apply stoichiometric principles to determine concentrations of reactants and/or products (simple algebraic or quadratic equation method) when given initial conditions, the value of the equilibrium constant, and the equilibrium expression e. apply Le Chatelier's Principle to an equilibrium system to predict the shift in equilibrium position when reaction conditions of concentration, temperature, or volume are changed
- Chem 51 students will be able to a. examine and predict the effect of common ions on an aqueous equilibrium system b. recognize a buffer solution c. determine pH of a buffer solution d. determine pH of a buffer solution upon addition of a strong acid or base e. determine Kb from a corresponding Ka or vice versa f. determine chemical quantities needed in order to prepare a buffer solution of given pH and acid or base concentration
- Students completing relevant assignments in Area B courses will evaluate the impact of science on their daily lives. The Chem 51 GEO assessment question for Fall 2012 dealt with solubility equilibria and Le Chatelier's Principle
- SLO on Common Ion Effect and Solubility Product Constant (Ksp) focused on the following measurable objectives: 2. Write equilibrium expression for reversible chemical systems. Calculate the equilibrium position, value of the equilibrium constant, and concentrations of all components of the system. 3. Apply Le Chatelier's Principle to systems at equilibrium to predict responses to stresses on the systems. The questions focused on determination of solubility, understanding the concept of Ksp, and the effects of the common ion effect on solubility. Some of the questions related directly to experiences that they had in several lab experiments.
- By using the concept of Le Chatelier's Principle, students will be able to a. predict the effect that causes the reaction to shift toward products in a gas phase reaction initially at equilibrium. b. predict the correct effect of different stresses on a gas phase reaction at equilibrium c. predict the correct effect of adding a substance that reacts with a component in the equilibrium system of a slightly soluble salt that was used in the "Review of Equilibrium Systems" experiment d. predict the correct effect (by color of solution) from adding common ion in the aqueous phase equilibrium system used in the "Review of Equilibrium Systems" experiment e. predict the correct effect (by color of solution) from adding a substance that reacts with a component in the equilibrium system used in the "Review of Equilibrium Systems" experiment. The questions focused on determining the direction of shift of a reaction upon adding a variety of stresses to a system at equilibrium. Some of the questions related directly to experiences that they had in several lab experiments
- By using the concept of Le Chatelier's Principle, students will be able to a. predict the effect that causes the reaction to shift toward products in a gas phase reaction initially at equilibrium. b. predict the correct effect of different stresses on a gas phase reaction at equilibrium c. predict the correct effect of adding a substance that reacts with a component in the equilibrium system of a slightly soluble salt that was used in the "Review of Equilibrium Systems" experiment d. predict the correct effect (by color of solution) from adding common ion in the aqueous phase equilibrium system used in the

“Review of Equilibrium Systems” experiment e. predict the correct effect (by color of solution) from adding a substance that reacts with a component in the equilibrium system used in the “Review of Equilibrium Systems” experiment. The questions focused on determining the direction of shift of a reaction upon adding a variety of stresses to a system at equilibrium. Some of the questions related directly to experiences that they had in several lab experiments.

- Chem 51 students will be able to a. examine and predict the effect of common ions on an aqueous equilibrium system b. examine and predict the effect of common ions on an aqueous equilibrium system as applied to the Solubility Product Constant (K_{sp}) Experiment c. predicting degree of solubility based on solubility product constants d. calculating the value of the solubility of a solution containing a common ion The questions focused on determination of solubility, understanding the concept of K_{sp} , and the effects of the common ion effect on solubility. Some of the questions related directly to experiences that they had in several lab experiments.
- Chem 51 students will be able to a. Define and identify a buffer solution b. Determine the pH of a buffer solution c. Predict the change in pH of a buffer solution upon addition of a strong acid or base d. Determine the chemical quantities needed in order to prepare a buffer solution of given pH and acid or base concentration
- Student will be able to understand kinetics

LABORATORY RULES, POLICY AND INFORMATION

Bring this handout to the First Lab Session!

Lab Instructor: Prof. Golestaneh

Laboratory Grading:

Total Laboratory -----	25%	(Breakdown as shown)
(Lab reports)	16%	(Collected a week after the experiment's completion)
(Lab Notebooks)	2%	(Checked upon turning in the duplicate pages)
(Prelaboratory Assignments)	2%	(Turned in through Canvas)
(Mandatory Lab Final Exam)	5%	(Based on each experiment's concepts and calculations)

Note: Instructor is likely to use a portion of lab time to cover lecture concepts or solve problems related to lecture coverage.

Note: If you fail the lab portion of the course, your lecture grade will decline to your lab grade, even if you are passing the lecture portion of the course.

Required Lab Materials

Note: If you come to lab without the following safety-related mandatory items you will not be able to do the experiment and you will get a zero for the laboratory activity.

1. Safety Goggles are mandatory (Purchase from the college bookstore or if you already have a pair get your instructor's approval. Eye protection must have protective shields on the side and at the bottom to protect student's eyes from chemical splashes. Each student is responsible to purchase their own goggle and bring their goggles to each lab session. To ensure the safety of all students, students without proper goggles will not be allowed to perform the experiment.
2. Lab coats are mandatory. Lab coats must be long sleeve and must cover your body. To ensure the safety of all students, students without proper lab coats will not be allowed to perform the experiment.
3. Long pants are mandatory. Cropped pants, shorts or pants which expose your skin (ex. torn jeans) are not acceptable dress code for lab. To ensure the safety of all students, students without proper long pants will not be allowed to perform the experiment.
4. Closed toed, non-absorbent shoes are mandatory. Shoes should be sturdy with rubber soles, and cover the entire foot. Sandals are not allowed! Sport shoes which meet these criteria are acceptable.
5. Gloves are not mandatory but highly recommended specially if you have sensitive skin. Bring the type and size of gloves that fits you. Avoid latex if you are allergic to it. Nitrile type gloves are usually the best. Wearing gloves does not mean that you should be careless with handling chemicals. Students who wear gloves are expected to wash their gloves if their glove is exposed to chemicals. Gloves provide an extra safety barrier against chemical exposure.
6. Laboratory Manual: Lab experiments handouts will posted on Canvas.
7. Ball Point pen (permanent ink, black or blue) for lab data recording

Attendance and Course Withdrawal

Being habitually late (after instructor starts the class) is considered disruptive behavior and you are likely to be dismissed from lecture or lab. You must email notify the instructor in case of your absence due to an emergency immediately and provide any supportive paperwork as soon as possible (ex. doctor's note) through email. **You are subject to being dropped from the course at any time, for the following unexcused number of absences at any time before the withdrawal deadline.**

- If you are late to lab more than 10-15 minutes you will be prevented from completing the laboratory procedures causing a grade of zero for the lab work.
- If you miss 4 lab sessions for any reason.
- If you are late or leave early from 3 consecutive class sessions (considered disruptive behavior).

NOTE: If you have any symptoms of COVID-19 stay home, fill out the *Health Check form* and follow all the steps listed on Mt SAC's web page (<https://www.mtsac.edu/covid19/student-health-check.html>). Email notify your instructor and state that you have completed the necessary steps.

If you miss more than 10 consecutive days of lecture and lab meetings due to COVID-19 for the duration of the course, you will not receive any credit for any missed exams and lab assignments and you will be subject to being dropped from the course.

If you have any intentions of dropping the course, you must do so as soon as possible and prior to the "W" deadline. *If you stop attending class before the "W" deadline, you may end up with a failing grade for the course. It is generally student's responsibility to drop the course. However, the instructor can drop you for excessive unexcused absences and disruptive behavior.*

Note: If you show up to lab or lecture with flu-like and/or COVID-19 symptoms (ex. coughing, fever), or any other unusual symptoms, you will be immediately excused from class and you will not be admitted back in until you bring a note from your healthcare provider (or Mt SAC's Health Center) that you are allowed to attend class. If you are dismissed for attending class while sick, you will not be excused from the lost work due to being dismissed from class, and you will receive a zero for the lost work. Please note that during a medically-related absence, you are only excused for a maximum of 10 consecutive days of losing your coursework. Any absences beyond the 10-consecutive-day limit, will not be excused throughout the semester and will lead to grade(s) of zero for the missed work and any assignments and reports related to the missed experiment. Additionally, if you choose to stay enrolled in the course, and your lab performance, whether related to your absence(s) or not, has declined to the point that your instructor feels that your presence in lab has created an unsafe and/or unproductive (or uncooperative) situation for other students, you will not be permitted to continue with the lab portion of the course. In order to support students in their success both in our classes as well as in their future endeavors, the Chemistry department requires that students in this course miss no more than five lab days during a single term. Before the course drop date, students will be dropped after missing six lab days, for any reason. After the course drop date, students will receive an "F" grade in the class after missing six total lab days, for any reason, unless the student is approved for an "EW" or Incomplete grade.

Overall Objective & Topical Outline:

The purpose of the laboratory is to offer you a practical hands-on opportunity to learning chemistry. In the laboratory, we will revisit selected lecture concepts that apply to a selected number of experiments in order to gain a more effective understanding of abstract concepts. In the laboratory, you will have the opportunity to see applications of lecture topics, engage in problem solving, as well as executing a number of laboratory techniques that will help you carry out a number of experiments. You will practice the scientific method by forming hypothesis and learning to analyze and interpret the laboratory data in order to test your hypothesis. Additionally, you may be performing quantitative and/or qualitative chemical analysis. All data should be reported with correct units and precision (significant figures) in appropriate data tables and/or lab reports. You will also learn to record your laboratory data and maintain a lab notebook. All lab reports should be turned in on doubled-sided white paper using a reasonable font size (11 or 12) in order to minimize paper waste.

Topical Lab Outline (examples)

- Kinetics: rate laws, order of reaction, mechanisms, activation energy
- Radioactivity: decay processes, half-lives, balanced nuclear equations
- Equilibrium: reaction reversibility, calculations with equilibrium constants, response of a system to stress
- Acids and bases: Arrhenius, Bronsted and Lewis acids and bases, ionization constants, hydrolysis reactions, strength of acids and bases, pH calculations of acids, bases, salt solutions, effect of molecular structure on the acidity of organic and inorganic acids, titration and titration curves
- Buffers: definition, preparation, concentration and pH calculations
- Solubility: equilibrium, calculations using the solubility product constant, effect of pH on common ions and complex ions
- Organic compounds: structure and properties
- Thermochemistry: entropy, second law, Gibb's free energy, spontaneity of chemical reactions, relationship between

free energy and equilibrium constants

- Balancing redox equations under acidic, basic and neutral conditions
- Electrochemistry: galvanic and electrolytic cells, relationship between cell potential, free energy and equilibrium constant, effect of concentration changes on cell potential
- Coordination compounds and transition metals: nomenclature, properties, structure, and bonding
- Final exam

Instructor's Specific Role During Lab:

Your instructor's role is to:

- To ensure a safe laboratory experience for all. Students who do not follow instructions and/or ignore instructor's feedback will be reminded first and then subject to a reduction in their lab report/skills grade. Students who dismiss safety rules will be dismissed from the laboratory with a lab report grade of zero for the missed experiment or the portion missed.
- Deliver a lecture on applied laboratory concepts with examples involving chemical reactions, data analysis and calculations.
- Demonstrate important lab procedures and techniques.
- Be present at all times in the laboratory and create a safe environment for all.
- Observe students and provide feedback when necessary. Note that students are not allowed to perform any laboratory experiments without instructor's presence and guidance in the laboratory.
- Help students understand safety aspects of handling a number of laboratory chemicals.
- Issue chemical unknowns for quantitative and/or qualitative chemical analysis.
- Grade your laboratory report and administer lab tests.

Desirable Behavior in Lab

1. Practicing safe lab techniques
2. Being aware of your surroundings in safety and proper waste management practices.
3. Taking active part in doing the lab
4. Performing correct laboratory techniques
5. Focusing on the experiment
6. Keeping your work area clean
7. Working with optimum speed
8. Taking care of your lab equipment
9. Conservative use of chemicals

Undesirable! (Lab skills grade deduction)

- Unsafe practices (may also be dismissed from lab)
- Not knowing what is going on around you or how others handle waste and chemicals
- Watching others do the experiment
- Showing poor lab techniques
- Being confused or socialize with others
- Leaving waste papers and chemicals on your bench
- Working too fast or too slow (Poor time management)
- Losing or breaking any lab equipment
- Taking too much of a chemical and wasting.

Additional Rules which will impact your laboratory grade. Your lab report grade is likely to be impacted by these incidents.

1. If a student is late and misses most of the lecture or the safety-related portion of the lab lecture, he or she will not be permitted to do the lab due to safety reasons. This will result in a zero lab grade for the report or a significant reduction in the report's grade if the experiment extends over multiple lab sessions.
2. Lab reports are due a week from the experiment's completion date. Reports are promptly due at the beginning of the laboratory/class period BEFORE instructor takes role. Late Reports (even if late for a few minutes) lose 20% credit, if turned in late on the same day the report is due and marked down 20% for each additional day passed the due date.
3. Raw data (data recorded from a measuring instrument or your laboratory observation) must be recorded in permanent ink. Do not obliterate your incorrect (presumed) laboratory data. Draw a single line over the "wrong" data and write the correction above or below the old data.
4. If a student misses a lab it may be possible to do a make-up lab (or other arrangement(s) set by the instructor) provided that the absence is clearly beyond the student's control (accident, sickness, etc.) and verified (ex. A doctor's note). Students must provide the instructor with official paperwork as soon as they return to school. Make up is allowed only if the experiment is currently performed in other lab

sections and upon the lab instructor's permission. Only one (1) make up lab is allowed for a legitimate and substantiated reason.

5. Each student should read the entire experiment, and be prepared before the start of the experiment. When applicable, students who do not complete their lab notebook prior to the lab may not start their experiment before completing their notebook. If they run out of time to do the lab, a grade of zero(0) will be issued for that lab.
6. Students must clean up their work area with a wet towel before leaving the lab. Sinks should be kept free of matches, paper towel or broken glass. All groups working near a dirty sink will lose lab grade.
7. Students must return their cleaned glassware back into their drawers before leaving the lab. Those who leave behind their lab equipment and glassware on the lab benches will lose lab points.
8. Students should conserve their use of chemicals and any unknown chemical issued by the instructor.
9. Get your instructor's initial on your lab data before leaving the lab.
10. If a student does not record data during the experiment and relies on a partner to copy their lab data, such data will not be valid.
11. It is each student's responsibility to finish the assigned experiments in a timely manner. Students who do not finish their experiment, will not be given additional lab time beyond the scheduled lab activity.
12. Students are not allowed to leave the laboratory without notifying the instructor for any reason other than checking out equipment from the stockroom. Notify the instructor upon your arrival to the lab.
13. Treat the stockroom personnel with respect when you deal with them. If you experience any problems, notify the instructor immediately and let your instructor resolve any issues.

It is very essential that you have a safe Chemistry Laboratory experience. To do so, all students must adhere to the following rules:

- Safety goggles, that provide a complete, snug seal around the eyes, must be worn in the laboratory at all times.
- Students should come to the lab properly attired. This means wearing closed-toe shoes that cover the entire foot, tying long hair back, and removing dangling jewelry. Avoid loose fitting clothing, bulky sweaters, synthetic fabrics (due to flammability concerns), and clothing that expose bare skin such as mid-drifts, short skirts or short shorts.
- Eating or drinking in the laboratory is not allowed in the lab areas. Avoid skin contact with chemicals. While in lab, avoid touching your face (eyes, mouth and nose). At no time should students taste chemicals and, absolutely no pipetting by mouth. Remember to always wash your hands when you leave the lab.
- Avoid trip hazards. That means keeping your book bags, sweaters or other personal off the floor and out of the walkways and storing them in the cubbies where provided. Make sure that locker drawers are kept closed when not in use.
- When conducting laboratory activities, be sure to carefully read labels on all reagent bottles, notify your instructor of all accidents no matter how small, and report and clean-up all chemical spills. Do not pour excess chemicals back into the reagent bottles. Never perform unauthorized experiments.
- Good housekeeping is part of safety and good laboratory practices. This includes keeping your immediate area clean and clutter free, avoiding drips, drizzles and spills when transferring liquid chemicals, and maintaining a professional attitude. Dispose of chemical wastes, broken glass, and paper towels in appropriate containers.
- Take extra precaution when using glassware and heat. When heating test tubes, be careful not to point the test tube at yourself or another student. Protect your hands with paper towels and use lubrication when inserting thermometers and tubing into stoppers.
- Lastly, as part of good safety practice, all students must know the location of safety items such as the safety shower, eye wash stations, first aid kit, fire extinguishers, material data safety sheet (MSDS), chemical-spill kits, and exits. In addition, students should know proper procedures for using the safety shower and eye wash station, and know what to do in case of an accident.

Students must also follow these laboratory safety procedures and rules! Students who refuse to follow these rules are prevented from doing any lab work with a grade of zero for the lab activity. Keep this page for your records

1. **Approved and proper safety goggles as well as lab coats must be worn at all times while being present in the laboratory. Students who refuse to wear safety goggles are dismissed from the laboratory (after 2 warnings) and considered absent from the activity. Do not wear cosmetic or prescription contact lenses in the lab.**
 2. **Students must wear a lab coat and come to lab with pants and sturdy shoes (no shorts or sandals!)**
 3. **If you have a special medical condition** that prevents you from following any of these instructions or requires special care during a medical emergency, **notify your instructor** as soon as possible and provide a doctor's note to your instructor.
 4. **Report any personal injury** immediately to your lab instructor. You are required to fill out an accident report.
 5. **KEEP yourself safe** in the lab. Students with **long hair** should tie back their hair in order to avoid chemical and fire exposure hazards. **DO NOT** wear sandals to the lab. Wear closed-toe shoes.
 6. Each student is responsible to know the location of **emergency equipment** such as the emergency shower/eye wash station, fire blanket and fire extinguisher. Ask your instructor or lab technicians if you are not sure. In case of eye contact, rinse your eyes for a minimum of 15 minutes with water.
 7. **DO NOT** remove any chemicals from the **laboratory fume hood**. These chemicals must be dispensed and processed under the laboratory fume hood.
 8. **In case of an earthquake** do NOT panic and run. Keep calm and stay in a safe location. Evacuate the laboratory only if it is safer to be outside the laboratory than inside.
 9. **In case of a laboratory fire, activate the fire alarm** and use emergency exits to evacuate the laboratory/building. All students should remain on-campus and immediately report to the nearest and safest area outside the classroom and wait for proper instructions from the fire department personnel or the campus-assigned building marshal(s).
 10. **No Food or drinks** are allowed near the laboratory benches. Keep all food and water sealed in your backpack.
 11. **Unauthorized persons** such as children and non-enrolled students should not be present in the laboratory. If you have to leave the lab for any reason, **notify the instructor** upon leaving and arrival.
 12. **Dispose** of all chemical waste in properly labeled waste containers. Careless waste disposal practices (overfilling a waste container, filling a waste container with a wrong waste, etc.) are not permitted and the student will be immediately dismissed from the laboratory. Check with your instructor if you are not sure to find the proper waste container.
 13. **If you are pregnant** or planning a pregnancy during the semester, ask for a list of chemicals you may be exposed in the laboratory.
 14. **DO NOT** perform an experiment that is not scheduled as the lab activity. If you do not have your own written procedures for a lab experiment you can not do the lab.
 15. **DO NOT** joke or play around in any form with others in the lab.
 16. **DO NOT** touch, taste or smell any chemicals. If you accidentally get some chemicals on your skin, wash your hands immediately with tap water. Wash your hands regularly in the lab.
 17. **Know** the location of tap and pure water, also known as distilled or deionized (DI) water.
 18. **KEEP** lab balances clean and let the instructor know if you find them dirty with chemicals.
 19. **DO NOT** take more than what you can use of a chemical. Never return unused chemicals to the original bottle to avoid the risk of contamination.
 20. **If you spill** any chemicals immediately notify your instructor and your lab technician.
 21. **If you break a mercury thermometer**, everyone must evacuate the lab. Notify the instructor immediately. You may get a zero grade for that lab.
 22. **If you break glassware**, notify the instructor. Do not place any broken glass in trash cans. Place all broken glass in special broken glass containers.
 23. **After you finish working with a gas burner**, be sure the main gas valve is properly turned off.
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Note: Keep the above copy for your reference and sign and turn in the duplicate copy included in this packet.

Read and Sign this Copy and Turn it in through Canvas!

Every student must follow these laboratory safety procedures and rules!

- 1) **Approved and proper safety goggles** as well as lab coats must be worn at all times while being present in the laboratory. Students who refuse to wear safety goggles are dismissed from the laboratory (after 2 warnings) and considered absent from the activity. Do not wear cosmetic or prescription contact lenses in the lab.
- 2) **Students must wear a lab coat and come to lab with pants and sturdy shoes (no shorts or sandals!)**
- 3) **If you have a special medical condition** that prevents you from following any of these instructions or requires special care during a medical emergency, **notify your instructor** as soon as possible and provide a doctor's note to your instructor.
- 4) **Report any personal injury** immediately to your lab instructor. You are required to fill out an accident report.
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- 6) Each student is responsible to know the location of **emergency equipment** such as the emergency shower/eye wash station, fire blanket and fire extinguisher. Ask your instructor or lab technicians if you are not sure. In case chemical eye contact, rinse your eyes for a minimum of 15 minutes with water.
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- 10) **No Food or drinks** (and water) are allowed near the laboratory benches. Keep all food and water sealed in your backpack.
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- 23) **After you finish working with a gas burner**, be sure the main gas valve is properly turned off.

I have read and understand course rules, policy and information and agree to follow these rules.

Signature: _____	Print name: _____	Date: _____
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